

Internship Experience at NARI

[NARI](#) has been having interns from all over the world since early 1970's. Almost all of these volunteers/interns come to NARI with their own funds and for the rural experience. NARI provides them a place to stay and an excellent opportunity to work on rural development. Staying and living in Phaltan also allows these interns to experience life in rural India.

Interns are presently housed in [NARI's Bajaj Center](#). It has excellent residential facilities with limited internet connectivity. Interns eat out in a nearby restaurant. Eating expenses in Phaltan are very reasonable. Thus a good Indian meal (lunch and dinner) cost Rs. 80-100 per day (US \$ 1.25 – 1.75).

[NARI](#) hosts interns in the areas of agriculture, renewable energy, engineering and sustainable development. Since NARI is an R&D institute, we expect the interns to have a minimum of bachelor's degree in agriculture, engineering or sciences. Interns with master's degree are preferred. NARI benefits from the enthusiasm of these interns and in turn these interns get a rich experience of doing projects relevant to rural India. There is a tremendous opportunity at NARI to get hands on experience of developing technologies.

If you want to apply for internship at NARI please fill up the form at www.nariphaltan.org/internform.pdf

In the past NARI had signed a Memorandum of Understanding (MOU) with University of Florida (UF), Gainesville, U.S.A. so that engineering graduate students from UF could come to NARI for a 3-month internship.

Here we list some of the experiences of the interns **in their own words**.

A very nice brochure for interns has been made by the French intern Rachel Nannette. [Please read it here](#).

ORDINARI | EXTRAORDINARI

Internship Experience at Nimbkar Agricultural Research Institute (NARI)

Rivaan Jadav

Internship Duration: 14th November 2021-22nd May 2022

Ordinari living with **extraordinari** efforts towards something meaningful is something I observed and understood here at NARI primarily from Padma Shri Dr Anil Rajvanshi Sir. In addition to all the practical knowledge, I gained at this beautiful institute, the most valuable skill that I take home is the ability to empathise with a problem and identify economical ways to address them, often by doing, realizing and improving. NARI provided me with an opportunity to challenge my thinking process and expand my horizons by allowing me to work on relevant problems that have a direct impact. One of the highlights was working directly under Dr Rajvanshi Sir, who guided us with his vast expertise in engineering as well as spiritual understanding. He gave me enough food for thought to stretch my perspective and push me to be a better engineer and more importantly a better human being.

Work and responsibilities at NARI

I was primarily involved in mechanizing the sweet sorghum plant where we worked on technologies to improve the productivity of the plant and effectively reduce human intervention and manual labour. Throughout the project, we tried to develop frugal yet effective mechanisms to allow easier implementation and transition of those technologies to the end-user; farmers. I must admit this was a challenge in itself but was something that pushed me to ponder upon eccentric possibilities and favourably bring out innovative solutions for the same. I and the team were directly involved in the development and integration of highly economical systems including but limited to a Conveyor system, Cooling mechanism, Mucilage press, and Small-scale furnace from limited resources. I also got the opportunity to dismantle and repair various machines like the Shredder, Crusher, ELECSHA, and Electric Trike amongst others, impelling me to understand the mechanism first-hand and rectify its issues. I confess that I was initially oblivious to the potential of learning from working hands-on but Dr Rajvanshi Sir was the one who insisted me to “just do it” (as he often says) and go out on-field to get things done and I must admit it never felt this content up until now, given the value it added to my knowledge base and the impact it might have.

In addition, I was also responsible for making a detailed 3D model of the entire sweet sorghum plant, the model of which included minute details ranging from a gear in a mechanism to the entire plant assembly. Subsequent engineering drawings were also drafted, all of which greatly refined my 3D modelling skills and prepared me to work on industry-relevant 3D designs.

Again, the essence of all things I learnt and the work I did at NARI boils down to working on **ordinari**, often ignored but relevant problems and creating economical ways/technologies to bring out **extraordnari** results that benefit the farmers and the society as a whole

People and Life at NARI

At NARI, I was able to meet and learn from a variety of **extraordinari** people with different sets of skills, and if it weren't for them my experience here would not be as enriching as it has been. I had the privilege of interacting with everyone, from the top management and engineers at NARI to the daily wage labourer at NARI, and I must admit that each of those interactions had been fruitful and wholesome. Particularly, My conversations with Dr Rajvanshi Sir were largely about the project and self-improvement and it would not be a stretch to say that they have shaped how I think about technology and responsibility towards society. I spent most of my time working with the best of engineers that I know; Sanklp Sir and Patange Sir who helped and guided me in almost every hiccup I faced. Adsul Sir helped me bring all the crazy ideas to reality and Rezeena a fellow intern was someone I was glad to have interacted with. I owe all of these people in particular a great deal of my pleasant experience and learning at NARI.

The weather at NARI was pleasant throughout the duration of my stay pertaining to strong winds in the evening and generally cloudy conditions. It was always a good idea to attach my hammock and gaze at the stars after a hard day's work. In addition to the weather, the cats and dogs here made my days ten times better with their daily meows and love. I found and experienced how an **ordinari** simple living away from the hustle-bustle of the city can be so enticing, enriching, impactful and **extraordinari**.

And that I owe it to NARI on making my time here a wholesome learning experience.



With Dr Anil Rajvanshi Sir

Experience at NARI

T. Harishankar (2018-19)

After completing my B. Tech, I did not have much idea about what to do in life. I only knew that I wanted to do something worthwhile and I also knew that I don't have enough knowledge nor good training. One option I had was, to do some courses and learn some skills. But again I knew, if I did that I would still be in my comfort zone and most probably it would end up like my B. Tech (" just passing exam" as Dr. Anil K Rajvanshi would say). It was during this time I saw about NARI and applied for an internship through Internshala and I was called for an interview. After the interview, I was satisfied that NARI would be a good place for me to learn many things and live an independent life for the first time.

My main objective while coming to NARI was to learn some engineering and to get a direction in life. Even though I could not achieve much regarding the first objective, I can say that I have some direction in life and feel like my life has a purpose, thanks to NARI for that.

My first task here was to study different oil presses for a project related to designing a solar-powered oil press after that I was involved in many different projects involving sweet sorghum, Lanstove, Weather data analysis, and hydroponics. Dr. Anil K Rajvanshi is a tough taskmaster and working under him can be difficult but at the same time you are pushing your boundaries and it is completely worth it. In all the projects even though I was not able to achieve much, I can say that I have learned a lot of things, understood how many things worked and learned lots of lessons, that I would apply in my future. Some of the main things I achieved with these projects were to understand data-driven research, Proper planning to do things and some engineering.

Some of the activities I did here are mentioned below:

Hydroponics

- An experimental indoor unit was set up at NARI. The unit has two sections: - One is for growing fodder and the other for growing vegetables using NFT.
- Currently, fodder is grown regularly and a yield of 5-6Kg is obtained from 1 Kg of seeds.
- In NFT system, was not able to get any yield

Studies on sweet sorghum and syrup making

- **Analysis of Variation in Brix from top to bottom of sweet sorghum plant-**

A study was conducted to find out how the Brix of juice varied from top to bottom of a plant from a batch and to find out how brix varied every day in a batch, to find the optimum time for harvesting. About 5 plants were taken daily of sweet sorghum plantation each for a given planting date was cut at every node and the brix of the juice of all the pieces was measured. Graphs were plotted to find out how brix varied from top to bottom of a plant.

- **Analysis of Damaged plant percentage in sweet sorghum**

A study was conducted to find the amount of plant loss due to stem borer damage Also, the syrup was prepared from the juice of plants exhibiting different amounts of damaged proportions and organoleptic tests were conducted with these syrup samples.

- **Analysis of Scum removal rate while preparing the syrup**

A study was conducted to optimize the scum removal process while making syrup. Different scum removing agents like mucilage from Opuntia, okhra in different proportions (with water) were tested to improve the flocculating process.

Also, I was given many tasks like solving problems with computers at the institute, which helped me learn a lot regarding computers.

Taking weather data and sorting weather data from the Automatic weather recorder at the institute, I was never interested in the weather before and never taken matters regarding weather seriously. But all this has helped me in learning a lot regarding the weather and is more interested in learning matters regarding the same.

Dr. Rajvanshi came to know about my interest in photography and as soon as he knew that he gave me the task to take nice photographs of the institute and asked me to start making videos related to institute, after I told him I had some interest in video making and this led to my main task at NARI, Video making. I would like to thank Dr. Anil Rajvanshi, Dr. Nandini Nimbkar and Madhura tai for going through innumerable drafts of the different videos and correcting the innumerable mistakes while making those videos. The video editing was extended to podcasts and a podcast channel was started with the writings of Dr. Anil Rajvanshi. This is one best quality of NARI, as you are given the opportunity to work in various tasks, which you are weak at. But you are given an opportunity to work on many tasks like that and learn regarding those too.

Other than these I was able to learn many invaluable lessons in life including planning, sparked an interest in spirituality while working on videos and podcast related to Dr Rajvanshi's writings.

Life at NARI was also a new thing for me, as this was the first time I was living independently. I was given free accommodation at the Bajaj center for two years and great home-made food was available nearby itself, which made life at NARI more comfortable as I did not have to worry about food. I also got an opportunity to spend a lot of time alone and this has helped me think about various things and get perspectives of many things.

I would like to again thank Dr. Anil K Rajvanshi and Dr. Nandini Nimbkar for giving me such a great opportunity to work at NARI. I would also like to thank Rahul Pisharody, Shivam Patange, Choudhari sir, Anil Nale, Pawar mama, Navanth Shinde, Shubam Sharma, Gautham Yadav, Anita tai and all the other staffs at NARI for helping me out during work and my time at Phaltan during the past two years, most of the time during which I barely knew Hindi and nothing in Marathi.

Some photos from my time at NARI:



With DR AKR



With Shubam at a temporary stall put in front of NARI

With Rahul and Nale at NARI farm.



Internship experience

Abhinav Bhanawat,

3rd year B. Tech. Mechanical Engineering, IIT Kanpur

Duration: 18th May 2017 to 12th July 2017

(A nice [blog by Abhinav in Internshala is here](#))

I used to fascinate working in rural India, helping transform the lives of the poor with the use of my technological knowledge. I was inclined towards doing this kind of a work in the future. But how to start? Also, I wanted to test myself whether I was really capable of it or was it just romanticism. NARI provided me an excellent opportunity for the same. Working under Dr. Anil Rajvanshi, who has been involved in research work related to rural India for the past 35 years, has been a great learning experience.

The first day I reached NARI, I found out that I was the only intern here. I was accommodated in one of the rooms of the 'Center for Sustainable Development' here in the campus. I found that I would be living alone here, at night, along with two watchmen in the whole campus. I would be eating alone in a nearby house (although not very near as it was a good 500 steps away from my workplace). All these prospects scared me as to how I will spend the rest of my two months here! The next day I communicated these fears to Anil sir.

His encouraging words removed all my fears and that day I decided: "Now that I have come here and will be spending the rest 2 months of my life here, how can I make the best use of them?". It took me some days but at last, I formulated a routine for myself, which comprised, in addition to the internship work, some of the things which I always wanted to do at IITK but never seemed to find the time for them or was too conscious about them e.g. writing daily on some topic, physical exercise, singing aloud and above all: think!! Being alone proved to be a blessing in disguise as it helped me to introspect and realise what my priorities really were.

Now, coming to the projects. I was assigned mainly two projects:

1. Research project: "What should be the true price of farm produce"?

The farmers are doing the most important job in the country. It is because of them that we have access to food, which is essential for survival. We cannot eat nuts and bolts or software to fill our stomach. Yet, it is highly ironic that the farmers who provide the food for us to survive are themselves finding it difficult to survive in the profession because of farming being highly non-remunerative. So, sir wanted to find a solution to this problem from the energy point of view: as to how much energy that goes into the production of food, how much money the farmers receive for it and comparing it with the other things that define our quality of life and their respective energies. It was quite an interesting project as we were looking at agriculture from a totally different point of view. We also compared it with the prices that we pay in restaurants etc. and how little of that does the farmer get. My main job was to collect data (a lot) while analysing whether it is suitable for our purpose or not. I was exposed to the creative thinking process that goes into doing research of such a kind. I am happy to have finished the project (as sir had asked that before you go back, the article must be published!).

2. Modelling the Solar Water Purifier for mass manufacturing

My task was to make a CAD model of the solar water purifier and finally make a document, containing all the part drawings, so that any small rural workshop can see the document and manufacture it easily. Also, sir had asked that the model should be such that it can be packed and sent to the user and the user should be able to easily assemble it (using nuts and bolts and a single spanner). I was asked to select a food grade material for the manifold, and to make the frame lightweight. This project helped me understand the working of solar water purifier and the simplicity of it impressed me. Also, I got better on Autodesk Inventor.



It was sir's inspiring words that motivated me and helped me realise my true potential throughout the internship. He used to say: "You have to work 26 hours a day!". He believed in me the whole time and used to provide many learning opportunities to me e.g. attending the meeting of Sir with a CEO of a start-up (who was also from IITK) for the purchase of an automatic weather station, interacting with the interviewees for engineer post (from IITs, NITs and other colleges) and assessing them, giving the technical and personality tests meant for the incoming engineers, operating Lanstove etc. I was really awed by the enthusiasm of Sir to make all his inventions better even after so many years of their creation.

One of the biggest qualities of Sir is that he encourages discussion and gives a lot of time to you. You are free to discuss any of your doubts with Sir anytime. His style of work involves daily reporting of all the staff members (including you) and a weekly presentation in order to discuss the work done in the past week and the further course of action. He makes a checklist of everything that he wants to do in the day and keeps ticking off the work done. I found this technique really helpful as it makes you very efficient. I learned this from him and is something that I will continue in my life. Also, Sir is full of ideas about how to make farming modern, how to develop rural India etc. all of which seemed to fascinate me.

The internship was also about my personal development. I, being an introvert, didn't really used to talk to strangers. Being in NARI among complete strangers (who mostly talked in Marathi which I didn't know), with no other intern like me to share my thoughts, it was a challenge for me to rise above my inhibitions and talk to people so that I can build a bond with them in these two months. So, I used to bring my lunch in a tiffin and used to eat along with the two technicians: Mr. Ashok Pawar (Pawar mama) and Mr. Anil Nale. They used to share the stories of the culture here, their lives and also the life of people in this region. They were really helpful and explained me anything that I asked them whenever they were making/repairing something.

In addition, this whole experience helped me learn a lot about life. I would like to share some of these:

1. When you accept the current situation and not complain about it, you can be happy in any situation and can find the zeal to work towards a better future.
2. I realised the importance of a routine and how you look forward to things when you are in a routine.

One another highlight of my internship was my visit to Ralegan Siddhi during the extended weekend of Eid. Being a model village, I really wanted to see the development there and also to meet Shri Anna Hazare. It was really inspiring to meet him and know his thoughts for the youth of India. Apart from this, travelling all alone and pulling this off filled me with a sense of achievement.

About the facilities at NARI:

1. The institute has excellent Reliance Jio 4G services, with internet speed of 3-4 MB/s!!
2. The workplace has an AC but is recommended to use only if the weather is unbearable (which at most times is not)
3. The living rooms are excellent with proper ventilation

Weather:

1. The weather is really pleasant here, with strong winds in the morning and evening, clouds at most times and temp only around 25 deg. C at night.
2. The beautiful sunset, with a new scene each day, really makes you forget all your worries and urges you to just admire it.

Some inspirational words by Sir which will stay with me forever:

1. Take things as a challenge and work towards them wholeheartedly. Even you will be amazed how much you can achieve.
2. When someone expects things from you, you are motivated to do them.
3. Every challenge is time bound.

4. Be curious. Keep your mind engaged in thinking so that it has no time to be upset about things.

Acknowledgements:

First of all, I would like to thank my elder brother, Abhijeet Bhanawat, who believed in me and supported my decision of doing this internship and also convinced my parents for it. Next, I would like to thank Dr. Rajvanshi sir for constantly motivating me and guiding me (with some future plans also!). I would also like to thank Dr. Nandini Ma'am. Big thanks to the technicians: Pawar mama and Nale bhaiya for helping me understand the practical things and also for making my stay here cheerful. I would also like to thank Dr. Singh, Mr. Chowdhury, Mr. S.S. Aherrao, Dr. Jadhav and the other staff members of NARI who were very helpful.

To conclude my internship in one line, it was about: "Accepting challenges and working towards them religiously"

So, for anybody who likes challenges, wants to get a feel for real engineering and do some hands-on work, this is the best place for him/her.

Aniruddha Kane

M.Tech-Thermal Engineering (SPCE, Mumbai)
Internship Duration-September 2016 to January 2017



NARI decision

This all started with the liking to work for rural development. When I was in the 2nd year of my M.Tech I decided to take thesis project related to rural development and I took it on biomass gasification. At the start of project I referred a research paper of Anil Sir. But when my project was at the completion stage I went through all the papers I referred again. At that time just for the sake of information I searched about Sir on internet and I was surprised to see that such a good research had done in the rural town of Maharashtra. I also found his book 'Romance of Innovation' and purchased it immediately on kindle. I read it and was very much inspired. I mailed him and extended my wish to meet him. And I was very happy to see his positive reply. Within a week I visited NARI. In that meeting I got to know he is a 'hard task master'. I thought this would be the perfect place to experience and fulfil my interests.

About work

On 19th September I joined NARI. First few days I read about the previous works then sir gave me the project on thermoelectric mobile charging unit. It was a very interesting project of utilization of waste heat from lanstove to charge mobile phone. I started the work and did many experiments but something was going wrong. I used to get frustrated but Sir motivated me whenever I got such feelings. These discussions with sir were inspiring and I think will benefit me more in future.

Besides I also supported Sanket Mane (another intern with me) in the development of sweet sorghum leaf stripping machine. This project gave me insight of development of any product from ideation to fabrication. Other than these projects I used to read and discuss with sir about his writings on spiritual, technical subjects.

About life

Life at NARI is complete peace of mind. One gets to live close to nature, pollution free environment. The accommodation at sustainable centre is free of cost and of best quality. One can get quality food from 'Belgaokar Mavshi' (lives nearby) at very cheaper prices (nearly Rs. 100 a day).

Now I would like to thank Dr. Anil K. Rajvanshi, Dr. Nandini Nimbkar for giving me an opportunity to give my small share in the rural development work of NARI. Also I would like thank Sanket Mane, Anil Nale, Ashok Pawar ('Pawar mama') and all the staff of NARI for their direct and indirect support.

Finally I would say there are some experiences in life which last for long time in mind and teach lot of things. The experience at NARI is one of them.

Sanket Mane (Oct 2016- Jan 2017)



My name is Sanket Mane and I have completed my bachelors in mechanical engineering from Sardar Vallabhbhai National Institute of Technology. During my bachelors I developed interest in product design and wished to explore various aspects of it even after graduation. I participated in various product design competitions but most of them aimed at creating a great 3d model or were based on generating creative ideas. None of them aimed at making a workable prototype. After reading the internship experiences of other interns I felt internship at NARI may play a critical role to impart fabrication and prototyping skill to me Hands on experience was missing and I really wanted to have one. Hence I applied for design engineering internship at NARI.

I was lucky as new project of sweet sorghum leaf removal machine was just started in NARI and hence I had opportunity to experience complete product design cycle during my internship. I generated ideas for leaf removal and for auto rotation of stem, calculated the force required in removing the leaves and the sheath, I made my own prototypes, did testing of these prototypes, learned report writing, and did cost analysis of the machine. Apart from this project I worked on development of thermo electric mobile charging unit for Lanstove. Overall it was really a great experience.

Working under Anil Rajvanshi is demanding but eventually satisfying. On November 26, after a quick SWOT analysis I decided to leave NARI. I had worked so hard on sweet_sorghum leaf removal machine but he didn't appreciate my efforts much. I knew NARI was best place for me as the work here really met my expectation. But I had made my mind and had already packed my bag. The next day I met, informed and explained him my decision. He called me after some time, appreciated my work and motivated me to stay till the project gets complete. Anil Rajvanshi compares his interns with a samurai's sword unless and until the sword is heated and beaten thousands of time it is not of great quality. I did stay. This decision to continue my internship was right (after all hindsight is always 20/20.).



From day one you get to learn something new and the list below sums up my learning experience-

1. Proper planning before any task
2. Scientific approach while testing of machine
3. Ideation with practical approach.
4. Hands on experience using different machines and tools
5. Importance of data driven research.

In the end I would like to thank Anil Rajvanshi for providing me this great opportunity. Sweet sorghum leaf removal machine is yet to be completed but I am sure my contribution will be useful. I did learn fabrication and prototyping skill but more than that I understood his design philosophy. The journey wouldn't be complete without thanking Anil Nale, Ashok Pawar, Aniruddha Kane and Anita tai without their support it would have been difficult to reach till here.



Shristi Kumbar

Master thesis/internship: Prototype development of flow control valve for Lanstove (Designing, fabrication and Testing)

Duration of internship: Mar-Aug, 2016

I'm a master's student majoring in design. Dr A.K. Rajvanshi gave me an opportunity to carry out my thesis work at NARI for 6 months. I was involved in three ongoing projects: solar water evaporation still, solar water purifier (water analysis) and Lanstove (master thesis project) at Energy Dept. I wanted to work with an NGO for my project and I'm indebted to Dr. Nandini ma'am and Dr. Rajvanshi sir for giving me the chance and for their guidance. The people working at the institution are very gentle and kind and they help you out with everything. The internship was a great learning experience for me.

Life at NARI

The on-campus accommodation is given to the interns and the rooms have all the provision and I was very gratified with it. The food (breakfast, lunch and dinner) is available from a nearby house and it tasted like home made cuisine (just it was little bit spicy). Phaltan is 5km away from the NARI campus and the city has got everything you need. The place is very calm as it is situated outside the city and during monsoon it looks more beautiful as it's surrounded by farms. The evenings are very pleasant and breezy. The only problem is the internet connection, as most of the network signals are weak.

Work culture

Dr. Rajvanshi sir is a tough task master. But that has helped me immensely and I could see the changes in myself. There are weekly meetings and daily reporting, which is very beneficial as one can track his/her work progress. Also one learns to multitask as you can work on different projects simultaneously. The DNA of this institution is research and innovation and the approach towards any problem is practical. The work here is exciting and challenging.

Internship responsibilities

The project given to me was to design and test flow control valve for Lanstove. The flow control valve is used to regulate the heat and light output in Lanstove. Thanks to Dr. Rajvanshi sir, Anil Nale (Technician) and Jnana Bhaskar Rao (Engineer) for their feedback and help to complete the project. I'm content that I was able to work on Lanstove which will

reshape people's lives. Lanstove is an excellent cooking and lighting device can be used in the remotest of the places, which lack energy based services. I'm sure it will soon transform millions of lives.

The second project I got to work on was the solar water evaporation still. The frame having a glass cover is placed on the pit and it extracts moisture from the soil using solar energy. The water droplets are collected over the glass cover and this water was used



to plant and water the seedlings. Also I was working on water analysis of solar water purifier. Different experiments of water samples from the purifier were carried out.

Notes

- Carry your own internet modem or a dongle and make sure it has got good signal in this area. Also bring your own laptop to work here
- The accommodation provides everything so you don't have to carry your blanket, pillow, etc. The food is available from the nearby houses.
- The students who want to gain hands-on experience, this is the best place.

26 August 2016

Internship Experience

Raghav Mittal (3rd Year IIT Kanpur student)

Internship duration: 7th May '16 to 5th July '16

On a pale rather dusky evening in the month of September '15, I was caught intrigued by a dark- blue poster outside our lecture halls in IIT Kanpur. It announced that one of our distinguished alumni Dr. Anil K Rajvanshi, was going to deliver a talk titled "*Romance of Innovation: R&D for Forgotten India*". Quite naturally, the gravity of the title was more than sufficient to cast a strong pull. And what transpired during the lecture brought me all the way to Phaltan, driven to contribute to Anil Sir's endeavours.

Through our correspondence over the web, I was assigned a project on solar energy based water purification and refrigeration. On joining the institute, I was further briefed on the problem statement. The task was to devise the plan for a self-sustainable 'Water storage cum purification and refrigeration' plant to cater to the needs of the rural folk living around the taluka of Phaltan. For all our power requirements we'd be relying completely on the solar radiations witnessed by the region, ensuring the sustainability aspect. The target population we were

aiming at had a strength of 3000. And assuming each individual would require 10 litres of potable water per day(including the quantity of ice cubes)we had to design the following:

- a. The Catchment Area for Rain Water Harvesting
- b. The Storage Reservoir & Overhead Cistern to store the collect of the harvest
- c. Solar Treatment arrangement for Purification
- d. Solar Energy based vapour absorption refrigerator for obtaining ice cubes/chilled water

To be honest, initially, I felt that I could do with some more of 'hands-on' work and perhaps contribute to the other products being worked on in the institute. However, as a few days passed there was a strong realisation that the work allocated was rather demanding in itself. Interestingly, there was a lot weather data analysis involved. It required me to observe trends in different weather parameters and based on the results, design the components of the plants.

Moving on to solar energy based water purification- although NARI has worked tremendously in this domain, my contribution was to suggest ways to automate the working of the sterilisers. Furthermore, I also suggested alternative materials to build the purifiers' frame with. Now that the above mentioned aspects were looked into, a rough cost analysis was essential to review the economic feasibility of the project. For this, I contacted several firms in and around Pune to get an idea about the best bargains for bulk orders of different components (For Eg: Solar Evacuated Tubes). It was my first insight into how businesses for bulk orders work. Getting competitive quotations and negotiating with the dealers was thoroughly engrossing. For some reason, I felt quite professional whenever I'd talk to them on behalf of the institute; a feeling I'd experienced for the first time.

Coming to Solar Refrigeration- I must admit, this was the most exciting of them all. The very idea of procuring ice with the assistance of solar radiation was simply overwhelming for me. As I discovered the finer nuances of its working principle, it was just amazing to appreciate the profoundness in their simplicity. Finally, helping in brainstorming its design in order to improve its efficacy was a challenging task and similarly it was attended.



Raghav with the Elecsha (a NARI invention)

Besides that, I'm really fortunate I met some great folks here. Jnana (though we used to call him just 'Rao') and Srishti were exceptional friends and mentors I got introduced with. This intern-ship wouldn't have been as enriching if it weren't for their company. We'd discuss physics, economics, political ideologies and evolution-based theories at lengths when initiated. Rao also introduced me to some really cool authors who go about popularising concepts of science so that everyone can appreciate them. In particular, on his recommendation, I picked up Bill Bryson's 'A short History of Nearly Everything' here. And what a thrill it was to go through its pages. Srishti's knack to view things pictorially and design complex structures was inspiring in its own ways. Her vivid creations would always leave you stunned. Both of them, were of immense help as they also advised me on a couple of matters where you find yourself completely lost at this age.

The stay at Phaltan was particularly special owing to the pleasant weather here. At least far better than what its like in either Delhi or Kanpur in these months. The evenings would be the most sought after; thanks to the strong winds they brought with them. And the clear night skies would urge you to gaze at the stars ad infinitum. Sometimes, I wished I'd brought a telescope with me. Morning runs were no less either, as the cool air hitting the chest would prepare you for the day that lied ahead.

My interaction with Anil Sir is something I'm going to cherish always. Our discussions on advances in modern technologies, fundamental concepts of science, 'biomimicry' and even classic western literature were rather engaging. In fact, often they would provide you enough food for thought to trouble your sleep.

What stirred me the most were his thoughts on alleviating poverty by coming up with technologically-advanced, renewable energy-powered, frugal innovations for the folks at the bottom of the pyramid. His constant suggestions on the upcoming areas of research which harbour immense potential would ignite us to study deeply about their principles and scrutinize them. And this doesn't end here. With all the discussions that have transpired, I've realised that I owe a certain sense of responsibility to the society. One where I utilise my abilities for collective welfare and progress for our country.

Most importantly, these two months have come to fruition because they've made me excited about sciences and engineering to a previously unknown level altogether. It seems like my curiosity has been kind of fuelled up here. I earnestly hope that I am able to do justice to the knowledge gained, the ideas discussed and the lessons learnt here.

Cheerio.

Amol Shailesh (December 2014 to October 2015)

Amol Shailesh: *“I was always hunted by a question, why do we live? Why do we toil so hard? Why do we want to earn so much, though everyone knows that they will end up with just 7 ft X 3 ft grave? I made answer to this in my way that, if there is no purpose in my life, my life is totally waste! There must be something which is more beautiful and worthwhile, and it can be accomplished by giving purpose to life. Mahatma Gandhi did it, Mother Teressa did it, Baba Amte did it, and so, I want my life to be as beautiful like them (though intensity and brightness might be low!).”*

I, a young youthful mind, always wanted to work with a purpose, purpose to find happiness. My search for a socially relevant workplace finally ended up with NARI under valuable guidance of Dr.

Field testing in huts



Dr. Anil K. Rajvanshi on 1st of December, 2014. Since then, it has been an amazing learning experience till date. The most wonderful thing happened with me in NARI was, I was not allotted any specific project. So, everything became my project.

Cooking test



Most of you will laugh, but if you will read the list of tasks, I did, I'm sure you will be astonished. There were no constraints to my learning and working in.

Everything, I worked in, I enjoyed! 'Lanstove' is the one on which I worked the most. Today when I remember, how much we sweated doing Lanstove, a smile has appeared on my face. It was pretty exhausting, from pressure regulator to preheater, where we faced lot of failures cum learning and few joyful moments to make the Lanstove more better design (though it is not the best yet). Improvements were followed by testing, and here comes the 'night field testing' in the huts. The poverty of India, mindsets of these people, their dreams, I saw, while discussing with them, I was shaken.

totally

worked
Purifier'.
attack the
of rural



One more project I the most is 'Solar Water Purifier'. It has a tremendous potential to problem of safe drinking water India. From daily temperature recording, calculations to **Solar Water Purifier**



Pathology lab

improving mechanization, from designing aesthetically good manifold to making the user manual, from costing to drawing and every single thing we did, was an amazing learning experience!

Now hold a chair; I think you will now get shock to know that I have also tried my hands on 'bacteriological water analysis' successfully. Those hands, once blackened with the soot of Lanstove, have also done

delicate work in pathology lab with gloves on. No need to mention that it was really astonishing experience!

We organized a workshop to sensitize the young engineers to work in rural inventions, named 'Roadmap for Rural India'. Organizing such a wonderful event, interacting with so many students, taking care of catering, mic arrangements and all those things really built confidence in me.

AutoCAD, Inventor drawings (I learned Inventor in NARI); cooking tests on Lanstove; study assignments on Solar Absorption Refrigeration systems, World's best insulator- Aerogel, Rain Water Harvesting, LCA, Lighter; SWOT analysis (I was unaware of this term before NARI); Costing of Lanstove (that was a great learning task!); making User manuals, protocols; experiments with layout of workshop; inventory of workshop and chemistry lab (get to know long named chemicals which I never heard); Windmill maintenance (First time I have worked on such a giant machine!); Railing for windmill (working on 60 feet height- a thrilling experience!); Diesel Generator issues; studying ELECSHA and other electric cycles; plumbing work of the tank; maintenance work of agricultural machineries like thresher, juice crusher, kuti



Roadmap for Rural India



machines; Designing a vacuum refrigeration system; facilitating the workshop electrical panel work; Systematic analysis of past 11 years weather data and so many things I tried during my training period will give idea of vast learning exercises.

This journey of fabulous learning would have been incomplete without Dr. Anil K. Rajvanshi who engineered me and always guided me to do

new things. He, being a Gandhi follower, always told me ‘to abolish untouchability of work’. And I followed his advice by never discriminating between tasks offered to me. This is the key learning funda of Dr. Rajvanshi. He always pushes you to do new things; you just have to show courage to fly towards new horizons.

I also like to thank Mrs. Nandini Nimbkar, President, NARI for her guidance during crucial conditions. One special mention, Mr. Sikandar Madane (technician), without his companionship, this would not have been possible. Staff and other personnel of NARI were very supportive and helpful, and always be remembered. Every other person I got in contact with (let it be contractors or students or labors or watchman or any third person), I feel, is also part of my journey and all will be remembered for their kind cameo.



MAPRA, Sikandar and me

Summing up all these memories and experiences of this wonderful journey, towards end of this, I can only feel – ‘nostalgia’!

Internship Experience at N.A.R.I.

by Pablo Ignacio Eulogio de Sancha
(12th February to the 15th July 2014)

Introduction



My name is Pablo Ignacio Eulogio de Sancha, and I am about to narrate my experience as intern in N.A.R.I. Since I got my degree in Chemical Engineering in my country (Spain), I tried to gain work experience by doing internships, and at the same time gain life experience by trying to do that in different countries with different lifestyles and cultures.

My thesis degree was about water treatment, so I looked for internships related to that area. I discovered N.A.R.I. in a website of renewable energies, and I decided to contact them. When I was offered to develop a project about water treatment which also involved solar energy, I didn't have to think about it twice. One month later, I was in a plane with destination Mumbai.

Work in N.A.R.I.

Working here has been a very productive experience to me. It has shown me the great difference between theory and practice, by putting into practice lots of theoretical concepts learned at the university. And sometimes I experienced disappointment when actual results didn't match with theoretical results. But that is part of the learning process, so when that happened I could only try harder next time.

I was lucky with my project, because it involved so many different disciplines as thermodynamics, microbiology, climatology or transport phenomena.

The installations were completely equipped; maybe they didn't have the most modern technologies available, but it's important not to forget that this is an NGO, this is a developing country, and that sometimes in science is good to go back to the basis.

But the most important factor of my work here in is the help I have received from the people who worked with me, making my work here easier: beginning with the Director, Mr Rajvanshi, who always tried to guide me in the right direction; Dr Singh, a real problem solver, especially in Internet matters (that it's essential nowadays to do research); the technicians, Pawar and Bongle, making real my crazy designs; Bharat, my lab buddy; Mrs Patil, always up to help; Aka, because my job of getting test tubes dirty would have been impossible without her doing the opposite; and many others that were willing to help me if they had the chance.

Live in N.A.R.I.

N.A.R.I. is located 2 km away from Phaltan, on the side of a busy road, so, although there are buses periodically and rides available from a co-worker, sometimes it's possible to experience so kind of sense of isolation. My experience would have been more enjoyable if I would have an intern companion to share the free time. But if that's not the case, if Internet works you can spend the time reading or watching movies.

About the food, there are hotels nearby in which you can get good quality of food. I had the chance to eat homemade food thanks to Nandeshwar, a co-worker who introduced me a local family who made three meals per day at an insanely low price. Nandeshwar was the perfect example of Indian hospitality, and I really loved that food; I can salivate just thinking about it.

About the water, one of the advantages of my project is that I produced my own water and drank it daily, proving at the same time the effectiveness of the treatment.

About India

If you want to travel around this region a little, and you are short of money or time (Tal Majal or Darjeeling are far, far away from Phaltan) you have at a relatively short distance beautiful beaches (I recommend Goa for that) landscapes (Mahambaleshwar or Ratnagiri), temples, even monkeys...and meeting people at the same time. There is an aspect that has been a pity and sometimes frustrating; the fact of not being able to communicate sometimes with the people. Not everybody speaks English in India, normally just the people who went to the institute or university, and before coming here I didn't know even the existence of the local language (Marathi), so because of that I feel my experience here a little incomplete.

Final thoughts

I strongly recommend to do an internship here to any graduates or undergraduates who want to challenge themselves and also discover themselves and other culture; the Indian culture. It can be an unforgettable and very valuable experience. But once you are here, before thinking about complaining about electricity problems, uncomfortable buses, animals on the road...don't forget: for bad and for good...THIS IS INDIA.

Internship Experience at Nimbkar Agricultural Research Institute

Rittika Sen and Sunay Shah

Sardar Patel College of Engineering, Mumbai

December 2013- January 2014 (one month)

Being third year civil engineering undergraduates, we were always keen on getting involved in a civil project that would also contribute to sustainable rural development since the country's largest population comprises of the rural poor. NARI provided us an excellent opportunity to be a part of their institute, to learn and to contribute to the development of the rural poor in a sustainable way.

We came to learn about this institute through various articles on the net explaining the many technological wonders [NARI](#) has produced for the benefits of the rural poor. Our work was focussed in the area of renewable energy (water management). The project that was assigned to us involved the filtering of raw water through layers of cotton Sari, solar sterilizing it and thus developing a design for the same.

The institute stands amidst layers and layers of green fields and we could only visualize vast stretches of scenic farmlands for as far as our eyes could travel. The centre for agricultural research lies at a distance of 5 kms from the main town of Phaltan. We were greeted warmly by Dr. Rajvanshi on arrival and he explained the nature of work we were supposed to accomplish within a month.

The project

The project assigned was developing a design for filtration of water through layers of cotton sari and then solar sterilizing it at 60 degree Celsius. The idea was to generate 30,000-40,000 litres of clean potable water for the rural poor each day since the unavailability of clean drinking water is one problem that vastly encompasses the lives of the rural poor.

The design procedure had three major component parts in its body. The first step was to design a storage pond that is capable of storing the required amount of water throughout the year and accordingly devising a necessary catchment area for the steady and collective inflow of rainwater, the only source of water in the pond being rainwater. For the planning of the same, we scanned through various reports on the weather data of Phaltan and after meticulously calculating the various parameters of pond design, came upon a conclusive figure for the water storage.

The following steps included working on the pumps to be installed in the pond and the necessary piping, thus deriving a feasible cost for the same. Then followed the design of the water tank in which the filters were to be installed from which the water would continue its course to the solar boiler.

The design of the solar boiler constituted the major part with the various calculations taking into account the data on solar radiation, efficiency, etc. finally we came upon a decisive figure for the solar boiler with an optimized capacity and cost.



Workplace

Our experience

The month long stay in NARI, Phaltan was a very pleasant and memorable experience of our lives. As we had never been subjected to a rural environment and had always been eager to experience the way of life in a rural neighbourhood, the opportunity to stay in NARI month long was the best means to fulfil this eagerness. It's enthralling to see the vast and superior spread of technological wonders NARI has produced.

One among the many genius inventions include the lanstove. It has been developed to benefit the rural households residing in huts that have no electricity. It thus effectively solves the problems of cooking and hut illumination both at the same time. We had never witnessed technology at its supreme best, being put to such generous use by enlightening the lives of the poor, and thus, we were amazed. Soon after, we would use the lanstove for boiling water for our drinking purposes.

The electric rickshaw, another creation by NARI got us extremely excited since it was a first time we rode in an electric rickshaw that emitted no polluting gases and was very smoothly running.

A visit to a few rural huts opened our eyes to rural poverty. We had little knowledge regarding the acute poverty that holds firm ground on the most part of India. NARI also provided us the opportunity to visit the rural households, interact with them and learn the many problems that surround them and their inability to grow. It's appalling to learn the sheer tormenting way of life they lead and NARI is working to its full potential to benefit them in the best possible means with the varied technological innovations. Hence, we resolve to work towards the same goal of removing their inconveniences in our own small way.



The accommodation provided to us was excellent as the rooms were spick and span with adequate provision of hot water. The hot water came from solar boilers installed on the terrace of the accommodation. The daily food came from a local dhaba that stood beside the institute, at minimal costs. The food was simple home cooked but it teased our taste buds in a pleasing way, since we were never accustomed to local Maharashtrian food. The people residing in the area were very hospitable and welcoming so were the staffs. Not one month into the internship and we were already invited to three special occasions, two weddings and a naming ceremony. They would help us with everything that we could ask for.

The weather remains pleasant even in the cold days of December and it is indeed a delight to breathe in fresh, crisp air or to go for a stroll in the mornings and the evenings.



We are very thankful to Dr. Rajvanshi for having provided us this wonderful opportunity to be a part of his institute and assist him in the noble deeds the institute has undertaken. His motivating talks drove us to work soulfully and hard towards the accomplishment of our goal. Not only did we learn application of engineering in a practical scenario but also the doubts that were encountered whilst learning in theory, were affirmatively solved. Also visualizing poverty and the interaction with the inmates of the huts helped us learn a lot of invaluable things which necessitates the steps to be taken for the development of the rural poor.

The internship experience was truly a very invaluable one and we will always cherish and look back at it with fondness as it helped us experience a whole new set of things that we would never have been able to otherwise.

Valentine Triquet at Nimbkar Agricultural Research Institute From the 20th June to the 3th September 2013

I am Valentin Triquet, a French student in an electrical engineering school named ESIGELEC in Rouen (France). I came to NARI at Phaltan (Maharashtra, India) in June 2013 have been recently completed my second year of the graduate course. I am grateful to Dr. Anil K. Rajvanshi who gave me the opportunity to come in his institute in order to improve my engineering skills.

My work at NARI:

I worked on the Lanstove project. The aim of this project is to provide light and heat in order to cook the essential Indian dishes. But I didn't work on the Lanstove itself. My main missions have been to think about products which could improve the Lanstove. For example Dr. Rajvanshi asked me to search some information about the additive manufacturing in order to design and print items with a high degree of accuracy. These items will be useful for all products manufactured by NARI. Furthermore I worked on a refrigeration project. Dr Rajvanshi and I have chosen two types of refrigeration that is to say the absorption and adsorption refrigeration. Finally I worked on a bending machine allowing the NARI's technicians to bend tube with the wanted angle.

I was looking to get away from the routine and experience something different and the opportunities I got at NARI are the ones I will never experience elsewhere. So it was a success.



Working on a Lanstove



A road in Pune (a big town near Phaltan)

Life in India:

As a French person, being in India was a real shock! Everything is different (the culture, the people, the food, the clothes, religions and habits) and sometimes surprising... Indians are so excited when they see a foreigner so you are invited and welcomed everywhere! During my internship period, there were a lot of festivals like "Palaki"; pilgrims walk during one month to reach Panpradur,

or the "Raksha Bandhan; a brother and sister's festival. So because of these festivals and the kindness of Indian people I succeeded in running through the Indian culture. But a lot of things stay to be learnt.

In India you don't have accommodations like in a developed country but you have all the necessary equipment that you need. At NARI, rooms with bed, desk and bathroom are available for interns. For food, you don't have to cook yourself because there are some restaurants near the institute. They provide you traditional Indian food and the tea for the tea time after the work!

I would like to thank Dr. Anil K. Rajvanshi for welcoming me in his institute and all the employees to make me happy to being there. It was a real pleasure to have this experience in my life. This experience will remain in my memory. So you, who is reading my internship report, I tell you "Don't hesitate to come in India, you'll be proud of the work done at NARI. This is your challenge to come here!" It was a great experience on human as well as professional levels.

Etienne Gayet's internship at Nimbkar Agricultural Research Institute (12 June to 30th June 2013)

Introduction:

My name is Etienne GAYET, I am from France and came in India in 2013 I was finishing my graduate year in nuclear physics at the Claude Bernard University in Lyon. Nimbkar Agricultural Research Institute and its director the Dr. Anil K. Rajvanshi offer me the opportunity to improve all the skills that I developed during those years in my university...

India:

For sure it has been hard for me French people to leave the comfort of my country and immerse myself in an unknown culture. It's a hard decision to take; it was also possible for me to complete this internship in a fancy lab of my university. Now I know and I can say that this experience has been and will remain one of the greatest personal and professional adventures of my life.

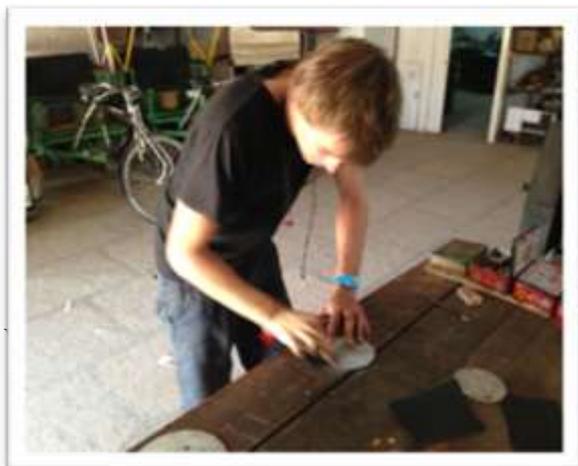
India appears as a really poor country, public and private services are not so good, there is no such facilities for transport, culture, sports as in northern countries but richness of India can be found everywhere in its people, their cultures and also in Indian's cuisine which is full of diversities (French speaker).

Indian's way of living:

To enjoy as much as possible your stay you have to be open-minded; in India, differences are everywhere, languages, culture, religion, traditions. A small smile can unlock many doors behind which you'll find happiness, joy and serenity.

The internship:

During this internship I discovered (again) the engineer's objectives. In N.A.R.I. your first tool will be your brain, the second ones are your hands and Dr. Rajvanshi will keep an eye on you if you meet some problems (and it will happen more than once). You will not use fancy technologies it is not the aim of an internship here, you will build and improve your brain as a real engineer.

Hard work in the institute**Small trip near Phaltan (Mahabaleshwar)**

I never worked so much in my whole life, projects are interesting, I have been in “free lance” and I built my project myself with the help of Dr. Rajvanshi. The last project I undertook was coming from one of his idea. Develop an application for smart phone which could measure soot concentration in the air (useful for Indian people who cook with kerosene stoves, LPG gas stoves, by burning biomass). I only worked on the first steps of this ambitious project and my work will also appear as a paper on the scientific review “Current Science”. I’m proud of the work accomplished in this institute.

Last words:

One sentence learnt from Dr. Rajvanshi that I will keep in mind and remember for ever is: “An engineer can think at a thousand things”. I would not believe it, now I understand. I built myself and my future engineer career during those three months, I extend my heartfelt thanks to Nandini and Anil Rajvanshi to offered me this opportunity, to all the N.A.R.I.’s employees for their good mood and also to me to made the right choice...

RACHEL NANNETTE

(French intern. 1st March 2013 – 5th July 2013)



Myself NANNETTE Rachel; I’m a student in a French engineering school, ESIGELEC, in Rouen. I came in India for 4 months to realize my last internship before my graduation of business Engineer in the distribution of energy and signals. So, on 1st March 2013, I arrived in India and after some hour of driving I reached at NARI where I was welcome by Mr. Rajvanshi. Since the beginning, he told me I’m free to do what I want because the Institute was going to be my Institute during four months.

On 4th, I integrated the NARI’s team for the Lanstoves project. Because of my little formation of electric I worked on producing electricity with the Lanstove, I made different research and tests. Finally I proposed a report to present my idea.

I worked essentially on the Lanstove; I made the poster and brochure of the device but also of the Institute in addition to a brochure for Internship’s opportunity. Then, I worked on the solar panel of the Institute. This internship wasn’t really in my major but when I explain it to Mr. Rajvanshi, he asked me what I wanted to do and give me the freedom of work. That’s why when the time permitted it I went to visit the lanstoves users to know about the life conditions of them and their feelings about the Lanstove.

My Internship experience

Proficiency acquired

Four months after, when I'm thinking, I understand all the good proficiency I had acquired. To begin, I learned how to insert in a team which has this functioning; I understood how to adapt fast and well, to work properly as soon as possible.

Then, I saw what this is the real engineer's work, I work on how to make presentation of work (with a monthly meeting which were using for everyone presented this month's work). Give the good information and also already have results to show never stop to work.

In another part, I really learned how to use my hand like an engineer used tools, to open, analyze, find the solution and close the lanstove for example. Now, I don't afraid to use my hand, because sometimes the engineer stays in this office and ask everyone to do the job, today I can be the engineer behind his desk but also in the workshop.

In a part about the customers, I saw how to manage them, ask the good questions and never stop to arrange them without forgetting our goal. Every time think about a better solution for them but also for us.

So, I know what the work in an institute is, how researchers are thinking to analyze, propose and find a good solution for what they want.

Also, when I decided to go to India, one of my first objective was to improve my English, because of this immersion I can see how my English improved, sure I have to learn again but I acquired a good practice here.

Then, I improved my knowledge about how to make properly an official document like a brochure or a poster for a company.

In sum, I developed autonomous ability.

Difficulties met and solutions used



My first difficulty was the language, I never been in an immersion like that, also the accent change and I had a lot problems and difficulties to understand but also to be understand. For this difficulty there is no miracle product, I should do one's utmost to everyone understand me.

Another big problem I met, was in relation with my work, sometime I didn't know how to do what my tutor ask me. I was really lost, because he used to tell me to do something which I should know for him, but it wasn't all the time the case. And it's also difficult to ask more explications because he was waiting for my personal results. Finally, I used to look for the information on internet, to have a minimal of autonomy and work by myself, but sometime I used to ask more

details.

Then, be in a country like India with different culture, type of life, was a little more difficult. When I worked on how to sell the lanstove, of course I ask but I had no real idea of which life they have to be really close of something which be interested for users but also for us. Life in rural area it's completely different of what I know, but it was a good experience to know about that also.

Life in the Institute

It's true that these nineteen weeks permitted me to see how a good engineer its working but also I live a good life's experience.

I was living in the NCSD, I had a propel room with all the comfort I should except and European toilet. I was really feeling in safety in this accommodation because of



the watchman and Mr. Rajvanshi and his wife who already try to know about my feeling.

Beyond the Institute's functioning, the feeling in the team was really good and nice. Life in the Institute was really nice every people all the time try to help me. I never really feel stupid or not in my place, I learned a lot of about the Indian's culture and this mentality.

I also had opportunity to visit a little part of India because Mr. Rajvanshi accepted I left some days to visit some places. I really

had a good experience here.





Pierrick Fosse's Internship report

(30th June 2012 – 28 August 2012)

I'm a student of ICAM, a French engineering school, in Toulouse. On the third year of our study, my school ask us to leave France for three months and to see the world. So this year, 2012, it was my turn to live this experience !

We were completely free to build our own journey, so I built mine with those two main ideas :

- I wanted to use my skills to help and to do something really useful for people.
- I wanted to see the world with some other perspectives. So going in a developing country was obvious for me.

I also wanted to know more about myself, the questions that I was asking to me was :

- Am I able to leave 3 months in a place where almost everything is new for me ?
- What will miss me the most while the journey ? and why ?
- Will I be able to bring something useful to the people who need it ?

So, with all those questions, and more, I search on net where I can live this experience. And I found out NARI which matches with all my expectations, and even more ! Even more, because NARI is working in the field of renewable energies which is a field which really matter for me.

Therefore I sent an email to NARI, to know if I can come during the summer 2012 and they answered me in the day. Almost three months after my first mail, I was in my aircraft from Toulouse to Mumbai !

I can say that I got lucky, because I'm the first intern that NARI took directly from the airport to their institute. It is a big relief to know that someone will be at the airport waiting for you in a country that you don't know at all. But I was far to know all what NARI will provide to me.

When I reached NARI, I was introduce with Dr. Anil Ravanshi, the Director of NARI and Ashwin Pawade , an engineer of NARI. They welcome me very nicely, and they gave me

some very good news about my internship. Dr. Anil explain me that NARI has built a new centre last year, in which I will be able to stay during my internship. What you have to know, is that five minutes before I didn't had any idea of where I will spend my first night in India, and they were offering me a whole room with all the comfort (even with the Wi-Fi !) freely for all my three months !

Therefore I was the first internet to enjoy this centre, and I can say to the next interns that we can't dream a better place to live in India as an intern ! As I said the centre has all the comfort we need : all most continues electricity and internet, European bathroom (shower and toilets), a kitchen. And the building was design by Dr. Anil himself to be comfortable to live, the rooms are naturally cooled by the wind, the water is heated by the sun and there are some electrics solar plants.

Pictures of the centre :



[Web site of the centre](#)

But the good news didn't stop there, they also told me that Ashwin was living in the same centre too ! He was just in the room next to mine, and he is only four years older than me. Hence it was obvious that we became close friend very quickly.

My work at NARI

Thanks to NARI I worked on a lot of different subject very interesting, such as 3D modelling, heat transfer, thermo-electric generator, web site creation, Photoshop design, electronics... It was very great for me, because thanks to it I improved my skill in a lot of fields. And what is even better is that Dr. Anil is always there to teach you some precious knowledge about what you want.

About the 3D modelling, I used SolidWorks™ to create the models of the different product of NARI such as the Lanstove, Alcohol Burner, Electric tricycle. Thanks to the models I have created I had been able to improve some of their products, like the valve of the Lanstove. Hence for this I had to study how the valves work. I also made the part list and the manufacturing manual of the Alcohol Burner, so I had to learn how to make some good part drawing.

Still with the 3D modelling, I had to create an improved Lanstove which contain a thermo-

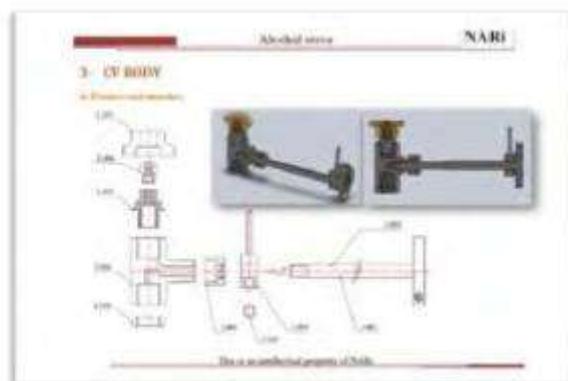
electric generator with a USB plug to load cell phones. Therefore for this I had to study what the thermo-electric generator are, and Dr. Anil gave me a very good course about them. I also had to search on net for some thermo-electric generator (TEG) which matched with our needs.

Moreover, with the TEG I also had to create a USB loader. So for this I used my skills in electronic. Once I have done the electronics sketches of the loader, we bought the different electronic parts and I manufactured the loader. This time it was a purely practical work. After manufacturing, I tested them on different devices.

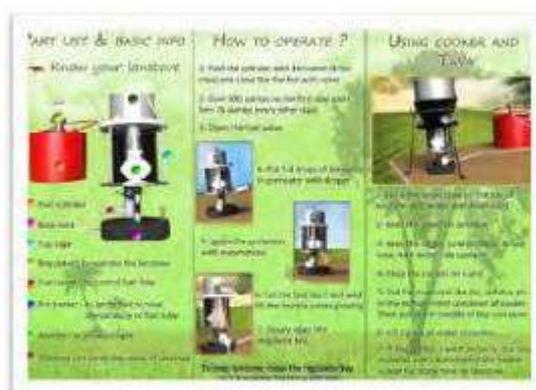
I also worked on heat transfer, to improve the cooker of the Lanstove; on Photoshop, to make the Lanstove manual and on web site design, to improve one of the web site of the NARI.

Like I said, I worked on a very wide range of subject and for this I can thanks NARI because they allow a lot of freedom to the interns to do they work. If you think that you can do something useful for them, you just have to explain your idea and they will let you do it, like it happen for me for the 3D modelling.

Here you can find some of my work :



Alcohol burner Alcohol burner manufacturing manual



Lanstove Lanstove manual



Tricycle USB loader

[Here](#) you can find the web site that I improved.

My life in India.

Now let's talk about my life in India ! Like I said, I had the chance to live in the centre with Ashwin. We become quickly close friend, therefore he make me visit India and introduce me to his friends.

NARI is near Phaltan a small town, where the previous interns use to live before they built the new centre. We use to go to Phaltan only one or two time a week to buy some food, fruit, newspapers... Hence I don't really know this city, but there you can easily find almost all what you need. To reach Phaltan we use to took the bus in front of NARI, it took use around 10-15 minutes (waiting time included).

About the food, there is like a small restaurant next to NARI (actually, it is a restaurant only for the interns of NARI and some 2-3 other people) which is very good and cheap. The food there is all home-made, you will eat the same thing that they are eating at home, so the quality is quite good. It cost me only 40Rs (0.6 €) for one meal , you have everything in it and you ask for some more every time you want.

The staple food in India is : rice, a sauce for the rice, vegetables and chapatti (the Indian's bread). And in all and every dishes you will surely find spices ! Before I came to India, I thought that in Europe I was eating spicy, but I was far to know what eating spicy means ! They put chilly (red and green), turmeric, coriander, mustard seed, cumin and a lot of spices unknown for me in every dishes ! At the beginning it can be hard, but don't worry they know it and the cook for you some "none-spicy" dishes (but for them a none-spicy dish is a still a little bite spicy for a European), but you will quickly get used to it, and you will love the spices ! You will also find tea everywhere at any time.

About the places I visited, I went in Pune which is the nearest big city (10 million of

inhabitants) it takes you 2h30 – 3h00 of bus the reach there. In Pune we were living in the flat of Ashwin's friends, hence I was introduce to a lot of them. From Pune we went to Lavasa (1h of bike) which is a city built in a European style.

The landscape in the area of Pune are very beautiful (I went there during the raining season), the city is surrounding by mountains covered by a flashy green grass with red earth. There is nothing like a bike trip, with a light rain, in those mountains to make you feel happy !

My feeling now This experience is still very new for me, therefore it is quite hard to give a good feedback. But what I can say is that I lived the experience I wanted. Have-I done something useful for someone ? I think that I had been able to bring some news things to NARI. Did I see the world with some news perspectives ? Yes, of course this journey taught me a lot about how people are living there and how they see the world. Thanks to NARI I learned a lot of things, not only in engineering. I also tied some close relations with some people, and I'm glad for it ! Therefore if you want to live something great in your life, NARI is made for you.

Christopher J. Reeve, Ph.D. (Physics) from Sussex University, UK.

January, 2010

1 Introduction

I discovered [Nimbkar Agricultural Research Institute \(NARI\)](#) while trawling through websites advertising free volunteer placements abroad. NARI had posted a note requesting a volunteer to help set up a computer network. I wasn't interested in paying thousands to a charity to hold my hand and show me the best time of my life. I was just looking for a cheap place where I could take a break from my normal work and make myself useful, and if possible learn something along the way. NARI appeared to tick all the boxes I had hoped to tick and after reading extensively on their website I decided to offer my service. This brief report summarizes my experience and what I have achieved during my stay at NARI between 1 November 2009 to 14 January 2010.

2 NCSD Website

My first task was to develop a website (www.nariphaltan.org/ncsd) for the new NARI facility, *NARI Center for Sustainable Development* or NCSD. When I arrived, most of the structural work to the building was complete but no suitable photos could yet be taken to advertise what it will look like. Consequently, I had to rely on my own sketches and photos of a model that was created by two American architectural students. Dr Rajvanshi asked for a clear simple design. After creating a basic template with some example graphics and content the result was shown to Dr Rajvanshi and a process of continuous editing took place. Dr Rajvanshi is only happy with the best he thinks he can get and will keep pushing you, no matter how long it takes, until you achieve it. Thus, working with Dr Rajvanshi can be both a little frustrating and at the same time rewarding when you finally accomplish something you are both pleased with.

3 Completion of NCSD brochure

The brochure was based on a couple of previous volunteer's work. The last volunteer created a brochure in *Adobe Photoshop*. However, because Photoshop rasterises the text this resulted in large files that could not be emailed or easily downloaded from the website. The colour scheme was also not to the taste of Dr Rajvanshi and I agreed to attempt a design similar to the website. The only Linux software I was aware of, when taking on

the project, that could easily produce a PDF with non-rasterised text, was Inkscape, Open Office and L^AT_EX. I since then know about Scribus, which I believe uses L^AT_EX with a GUI front end to produce pages particularly for printing. I chose to use Inkscape because of its flexibility and advanced features, however, I later realised it does not yet support CMYK colour coding required by the printing company so the PDFs now require converting from their current RGB coding.

Again, many iterations were made in the editing process to attempt to bring the design and content up to a professional standard. The brochure can be downloaded from here: [link to the brochure](#)

4 Review of the oorja biofuel stove

The *oorja* biofuel stove was tested and reviewed, in part, to compare its performance with the ethanol stove developed at NARI. No *oorja* fuel pellets were available. However, its performance was tested with locally available wood since it was recognised that rural families will attempt to cut running costs by burning wood collected from road side hedges, where possible.

The main draw backs of the stove design are that fuel cannot be added mid cycle, the fire cannot safely be put out mid cycle and the heat output cannot be controlled well, compared to a liquid or gas fuel stove. The stove, however, was run successfully on wood, which produced very little or no smoke if the wood was broken into small pieces. It also enabled a very small quantity of wood to be burned compared to an open fire. The maximum cooking time of the stove with wood was 42 minutes and the power output varied from about 4 kW to 1 kW. This was calculated by heating water on the stove and compensating by the calculated 30% efficiency of the stove, based on the mass of wood and collected heat, which assumes all efficiency losses are in collecting the heat and that combustion of the fuel was complete.

Note. Cristopher almost died since he met with an accident while driving a two wheeler in Himachal Pradesh. Despite being told not to drive a bike in India he still insisted on doing so.



Internship Experience (December 2009)

Vikram Kadam and Amit Bhojane
(IIT Kharagpur students)

A clock on the wall with every tick reminds us that it is going to repeat itself after every 24 hours, without minding we accept this and pass each coming day. We used to do the same, until we met an innovator; the very invention of whose has challenged the universal forces,

which keep the time running on time! He invented days with 26 hours. And fortunate were we that he showed us the way to reinvent it ourselves.

Our interest in sustainable and renewable energy carried us, two third year students, from the Department of Mechanical Engineering at IIT Kharagpur, over to a small town called Phaltan, which had an identity in history and nothing more than that. We came here to Nimbkar Agricultural Research Institute (NARI). The first sight of the place gave us no better impression than a mere brick stone structure standing amidst countryside. Also some offices and a workshop. A talk with the director of the institute Dr. Anil Rajvanshi was enough to show us all this with different perspective. The very first talk with this maverick of words found us accepting a challenge that we ourselves were not convinced of living up to. But we went on to test ourselves and together with us were Dr Anil and his knowledgeable, experienced and equally helpful technical staff. Within the period of a month, we, then, had to go through various experimentations.

Some taught us that you really could make as large a number as you want with seemingly nothing figures 'zeros'. What you want is just the '1' behind them in the form of 'will'. And then this became a daily experience. Sometimes through just knowing that this well curved fuel tank isn't the product out of a forging mill but Mr Patil's hammer has made it that way. Whereas sometimes through appreciating a fact that the Globe Award winning lanstove has been designed and developed in this very same small workshop.

Some taught, being humble is the only thing that you need to acquire knowledge. We would just go with little query to Mr. Anil or any staff member and hoards of information is what we got in return.

The life lesson we got was that one may have a sound knowledge and many skills, but a systematic approach is what it takes to get to the milestone. And we learned this fact continuously through regular constructive interactions with Mr. Anil.



The work in the small sturdy looking workshop was always fun. With a look at it, we always wondered how we are going to finish a particular work. But there was always a tool, a way to do almost anything. It astonish us greatly that, Mr. Patil and his team has prepared anything and everything here in this mediocre looking lab? Be it a huge gasifier, the pressured lanstove tank or intricate parts in the LanStove! Working here taught us a great lesson of working with the minimum resources and giving what they call the maximum output.

The daily sessions with Dr. Rajvanshi were so inspiring that, just a couple of days into the internship, and before we knew we were working in the lab for hours even after the official closing time of the institute. We would lock it in the night and come back before everyone else early in the morning so that people do not find it locked. We never thought we could work so much, but as we near the end of our stay here in Phaltan, we can definitely say it was Mr. Anil's constant support, inspiration and the way he showed us the way that made all this possible.

And besides these enriching experiments inside the walls of NARI, there is lot to enjoy for a keen eye in Phaltan. We really loved the place in spite its dusty roads with continuous flow of heavy vehicles, burping dizzying smell from sugar factories onto us. Food with special west Maharashtrian flavor, people showing love and enquiring with fervor (typical of Indian custom of hosting their guests) are some of the things, which made our stay very enjoyable.

And how can we forget our English co-intern, Dr. Chris Reeve. This tall chap from London always showed us light. Whatever you ask him, spirituality, life sciences, sustainability, physics or even Indian girls, he would always show us the greener pasture.

The place has so much to offer on all fronts that a period of one month is really insufficient to appreciate this all. We had a real rewarding, challenging and life changing time here and are really looking forward to the next opportunity when we could come here again and start from where we left. We are really happy that we came here and we would like to encourage any person who wants to "learn life" to come here.



Internship Experience – MJ Smit (June-August 2009)

As a third year student of Mechanical Engineering (ME) from Twente University in the Netherlands, I followed the theme Minor (a part of all bachelor studies at Twente University) *Sustainable Development in a North-South perspective: 'As the World Turns'*. After having followed several courses in relation to development work the students are obliged to go abroad for about 10 weeks to do development work. My interest immediately went out to India for some reason. So, determined to go to India I accessed a database of Twente University with trusted NGOs located all over the world and found about five organizations active in the field of technology, located in India. After having read about the different organization I decided to apply for an internship at a few of them, of which Nimbkar Agricultural Research Institute (NARI) was one. After some communication, I decided to go to NARI and that is how I eventually started my internship over here in the beginning of June 2009. In total it lasted for a little more than 10 weeks (until the 14th of August), but for my experience it felt like only two!



Although I had prepared a research proposal on forehand, based upon one of the projects I found on their website, I had to adapt it once I got here for the project and the nature of work I was going to carry out turned out to be slightly different (much more fun actually) than what I had expected and counted on, but that did not matter at all. Changing your original research proposal is actually very common when working for development organizations. However, good communication on the topic of you work on forehand will, at least partly, prevent this from happening.

Before I start elaborating on my experience about the research that I did, I'd like to say that this whole internship was very different from what I had expected and that actually in a very positive way. Before applying for an internship I of course focused on several technical NGOs and I eventually thought I quite knew what to expect when doing an internship in India or at NARI in my case (and of course those expectation did come true for a certain part), but the experiences I got here are quite different from what I expected and are in fact one of the best experiences I have ever had. I have not only learned a lot on the area of development work but also on the area of ME and really there is so much more to learn that what is taught to you at the University..!

My research experience

My work over here has been dedicated to one of NARI's current projects: the Lanstove. Some information about this project can also be found on their website. Although I initially aimed on working at a NGO which is active in the area of technology (familiar to my field of education) and NARI is for the biggest part devoted to agriculture, I would have never thought that I would use my ME skills so much over here and even enrich them with many more experiences and practical knowledge! For me the internship has been a great learning process both personally as well as on the area of ME.

During my stay I have worked on several technical aspects of the Lanstove in order to improve its performance and during this research I have had many discussions with the director, Dr. A.K. Rajvanshi, who has studied ME himself. Doing research at NARI meant in my case, actually in most cases, doing a lot of testing and experimenting in order to gather valuable information which could help me (further) to finding the solution(s) for the problem I was trying to solve, or provided me with valuable and useful information.

Another great thing is that every part of the Lanstove and every part that you need for your research is made by hand in the institutes' workplace. This workplace is equipped with enough tools and some quite hot machines (at least for Mechanical Engineers) to make practically every part you need. Doing this much with your hands gives you a lot more insight in the basic manufacturing processes and its possibilities. Also I realized that there is much more possible with relatively simple devices than I thought, for almost all the equipment back at my university is very sophisticated and computer controlled. Of course this meant in my case that some parts I designed were too complex to manufacture and therefore you are limited to the goods and services here, but that

does not matter for practically every complex part can be simplified (with some clever thinking) in such a way that it can be manufactured over here.

Although the problems I have been working on sometimes seemed to me as being unsolvable by human effort (leading up to a lot of frustrations), eventually through all the experiments and tests valuable information, and connections in between different experiments, started to become clear and progress towards the solution(s) was realized little by little; making the solution seem somewhat more reachable by human effort. Whenever I got stuck doing my research I discussed my problems and findings with Dr. Rajvanshi and that practically always helped me and gave me new energy and motivation to try new things and work into another direction or change the direction I was currently working in. Personally I was not very familiar to this kind of research and it was therefore a great learning experience; not only now but I'm quite sure also in the future whenever doing research or working on a project. I can unfortunately not go into detail about the exact work I have been carrying out for the project is still in its development phase and therefore most information is to stay within the institute.

Nimbkar Agricultural Research Institute

The institute is a very hospitable place to work and the interns are given a lot of freedom in doing their research, which I experienced as a very positive feature. Of course you are tied to your research but there are many ways leading to the eventual achievement of the solution(s) to the problem(s) and you are not bothered which path you decide to follow as long as you are confident that you will eventually tackle the problem. This kind of freedom is rare, at least for my experiences, in doing research, for the researches I have done at my university were tied to a lot of obligations and such which (drastically) restrains your freedom in doing research. So I think that this is a very enjoyable and educational feature of doing research at NARI.

I had to report daily on my activities and findings at Dr. Rajvanshi and we discussed them so that he could hold track on my research and its progress and could help me or give me advice whenever he thought that was necessary. In my case these discussions were not only helpful for the progress of my research but also for my own experiences and knowledge on the area of ME. Often I considered these discussions as teachings which were very helpful!

Other tasks

During my stay it happened a few times that I (or another intern) was asked to do some small side tasks as well. This could be any tasks such as designing a brochure for the institute or new sustainability center, working on a part or feature of another project or other small tasks. In my case it was reviewing the book 'Nature of Human Thought' written by Dr. A.K. Rajvanshi himself. The second edition of this book is being published not too long after my internship here and since I am an engineer I was able to understand it although most of the topics discussed were as good as completely new to me (it is pretty hard stuff to read actually). Against my own expectation, I actually got really interested in the topics discussed in the book so not only the reviewing but also the reading was a great learning experience for me. This seemingly small task actually awakened an interest in me for human thought and I am sure that I am going to do much more reading on this topic.

Overall learning experiences

While doing my research at NARI I have learned and experienced a lot of different things. Of course by living in rural India (Phaltan) you get to learn the Indian culture and all their, sometimes pretty weird, habits, which is an amazing experience; especially if you have never been in such a country before. While working here I stayed in the guest quarters of the institute which are located in between the village Phaltan and the institute. Staying here I got to know the neighbors, some people in the neighborhood and above all: myself. I think that this is one of the most valuable experiences: new things about myself I came to know about here.

About the experiences and things I learned by doing my internship quite some things have already been said in previous parts. Although I have done many projects in the Netherlands, I think that the one project I did here has been the most useful of all for I have really learned how to do research on a whole different level and how to use engineering in this. This has not only been good for my own development but also for my study and I am sure that my experiences here will prove themselves very useful when I return to the Netherlands, both in my study as in my normal life.

I think that with this most of the things about my experiences have been said. The decision I made to come to India and do this internship is the best decision I have ever made.

Cheers,

Maarten Smit

Internship Experience of Mariette Mc Campbell (Feb-June 2009)

Mariëtte Mc Campbell – The Netherlands
 Study Bachelor Human Technology
 Hanze University Groningen, Netherlands

To finish my bachelor studies in Human Technology I had to do a five month internship at some company or organization. During the third year of my studies I had done a five month internship in Cape Town, South Africa, which had a great impact on me and changed my idea about what I wanted to do with my studies. So from someone who had always focused on the commercial Western World I became someone who wanted to play a role in the improvement of those living in developing countries.



When I started to search for a placement I was having two important requirements:

- I wanted to work on a product with a real value for people.
- I wanted to do something which could improve the lives of people in developing countries.

I found the Nimbkar Agricultural Research Institute via www.ideologist.org, and after I looked at the institutes' website it felt as if I had found what I was looking for. What I liked about NARI is that even though the projects are conducted on a small scale, the results can have a big (international) impact. Besides that I became curious how I would find it to work for a scientific research institute. I applied for an internship position and a month later I arrived in Phaltan.

The project I worked on involved the ethanol stove/lantern, which was a very innovative product. My main task was to collect input from users about their current cooking and lighting sources and habits, their desires for the future and their opinion about NARI's stove/lantern. To collect this information I did two different researches:

- Field test research with the ethanol lantern/stove. For this part of the project I visited labour families around Phaltan to test the product.
- Research on fuel-use in and around Phaltan, which I did via a questionnaire.

While I was finishing my project the institute won an international award (the [Globe Sustainability Award in Sweden](#)) with the ethanol lantern/stove concept.

What I learned during my internship is to have a passion for the work you do, and to make the best out of everything. During your research you might find that the available sources and situations are often far from ideal. You need to be flexible and willing to improvise to obtain the results that you and the institute are looking for. An important mentality at the institute is to do things. The idea is that you can only learn and find new ideas or solutions by trial and error. So I received all opportunities to try and learn new things. This gave me the chance to learn some engineering skills, something which I was lacking a lot even though I am doing an engineering study. I experienced that basically everything is possible at the institute, and the staff will help you as much as they can, as long as you can motivate why you want to do something and as long as you are willing to put a lot of effort in it.

Life in India is different from anywhere in Europe or America. Basically everything is different and you will need a couple of days to get adjusted to the situation. But once you have accepted the new situation in which you are living you will easily feel at home in Phaltan. Some facilities might be limited in rural areas such as Phaltan (limited electricity, water shortage, etc.) but somehow this has its charm too. Moreover, it is for sure that you will have a better understanding about the situation in

which the majority of people in India and the whole developing world live. This will certainly show you how spoiled we more or less are and how much things we simply take for granted in the Western world, things that are not as obvious as we often think.

Besides the charm of this simplified life you might be able to learn something from the friendly and helpful people in Phaltan: How to be happy and satisfied with what is available to you. Somehow we have the tendency to think that one can only be happy in life when he or she is having the richness we have ourselves. But while I was doing field tests with the lantern/stove for NARI I discovered once again that this is in most occasions not true. Many of those people might actually be more satisfied with their life than we are. But what is lacking so often are some basic facilities: safe drinking water, electricity, a safe and attainable cooking source, a reliable lighting source and health facilities. By providing these facilities to those people one can really improve their quality of life. The great thing about doing an internship at NARI is that you can work on projects which aim to do this! You will gather a lot field-experience, get insight in the life of (poor) rural people and learn lessons you can only learn at a place like this.

My internship at NARI will most probably remain to be an important period in my life. It was inspirational and I will take the things I learned with me. I found out that research can be something very exciting and my stay in Phaltan strengthened my feeling that I want to do something valuable, something which can make a difference. Hopefully my experiences will help me to choose a suitable master studies and, later, to make a (small) change in the quality of life of people in developing countries.

Internship experience of Meenal Pore (Jan – Feb 2009)

I came to NARI in January 2009 having recently graduated from the University of Cambridge with a Masters degree in Chemical Engineering. My interest in appropriate technology began at university and after graduating I was keen to use my engineering skills to get some first hand experience in the field. Whilst searching for placements I came across the NARI website and several weeks later I arrived in Phaltan.

On arriving at the institute I was shown to the place where I would be living for the next couple of months. Interns are accommodated in the guest quarters, which are basic but sufficient – there is a gas stove, a fridge and hot water (if there's electricity and water!). The quarters are located outside of the town itself and it's a five-minute drive or a fifteen-minute bike ride to the institute.

I had done a couple of summer internships in large multinational organisations but working at NARI was completely different: being located in rural Maharashtra there are constraints on the availability of expertise and facilities, which challenged me to be more creative and proactive in getting the information I needed. The engineering department at NARI is small (one engineer and four technicians) so it was easy to get to know everyone and I found the ingenuity and resourcefulness of the technical team here very impressive.

Project Work



My work focussed on the development of the ethanol lantern-stove. The aim of the lantern is to provide a clean-burning lighting and cooking alternative for rural areas with no access to electricity.

- **Ethanol Concentration Measurement**

The NARI lantern had been developed to run on 50 % (w /w) ethanol-water mixtures. One of the key problems in the development of the lantern was determining the ethanol concentration of the fuel. Working with the technicians, I developed a new, more accurate method to measure the ethanol concentration. Designing the new method given the operating constraints turned out to be a challenge: it had to work in both winter and summer when temperatures vary from 15 to 45°C and it had to be very simple since equipment is limited.

- **Lantern Testing**

Before testing the stove-lantern with consumers, I did several lab tests to determine its performance parameters. During these tests, the lantern would block and stop working within a couple of hours so my next task was to investigate why it was blocking and what could be done to prevent it. This part of the project involved a plant visit to the local alcohol plant and seeing the whole process from farm to fuel made me realise what a large impact introducing ethanol as a fuel would have on the local community.

- **Field Testing**

As the final part of my project I worked with another intern to field test the lantern. The experience gave us the opportunity to see how lighting (or the absence of) affects the quality of life of people living without electricity access. The current kerosene lamps were insufficient to do everyday tasks, such as sewing or reading and it was amazing to see what a difference a bright, steady light could make.

General Information for Interns

- **Shopping**

Everyday groceries are easily available in Phaltan. There is a fruit and vegetable market for cheap and fresh produce and a large supermarket (Shreeram Bazaar) that sells most things you might need. Otherwise there are many smaller shops in town where you can buy groceries, homeware, clothes etc. There are a few small shops within walking distance of the guest quarters for basics (milk, bread, soap etc.) and there is also a small medical store. Access to English books and films in Phaltan is limited, but they are widely available in Pune.

- **Eating**

Restaurants: Rs 100-150 per person

Hotel Aryaman in town and Hotel Sahara near the guest quarters are both good

Mess: Rs 30-45 per meal

You can either eat at the mess or arrange to have a 'dubba' (a lunchbox) delivered to the guest house.

Cooking: There is a gas stove in the guest quarters so it is possible to prepare your own meals.

- **Transport**

Bike: A new bike costs Rs 2700 and you can sell it back to the shop afterwards

Auto Rickshaw: Rickshaws are easily available near the guest quarters and in town. The prices are now:

Guest quarters to NARI	Rs 30
Guest quarters into town	Rs 20-25
NARI to bus station	Rs 50

Bus: Phaltan is well connected to Pune, with buses leaving at least every half hour. Journey times vary from one hour forty-five minutes for the express bus to three and a half hours.

- **Phone**

A local prepaid phonecard is available for Rs 100 and the more credit you buy, the cheaper the calls are with international calls costing Rs 9-12/ min.

- **Internet**

USB prepaid internet access is now available in Phaltan which gives you internet access from the guest house. The two main providers are Tata Indicom and Reliance. The USB modem costs around Rs 2500, but the shop will buy it back at the end of your internship. The connection speed is slow (about 20Kbps) but it is enough to check email, look up bus timetables etc. Alternatively, there are internet cafes with broadband in town.

You need ID and two or three passport photos in order to purchase a phone card or USB internet modem. It can be a bit of a nightmare trying to get them to accept foreign ID and they will require you to have a local contact number.

Vaidehi Jadeja

Internship Experience: September 15 – November 26, 2008

As a third year environmental engineering student at the University of Waterloo (Ontario, Canada) and having completed four co-operative placements already, I was looking to get away from the routine and experience something different. I have always had a keen interest in rural development and in the past couple of years have had a growing drive to make a change. While surfing the net for internship opportunities, I stumbled upon the NARI website. NARI had to offer an experience that I had been waiting for a very long time. In January 2008, after reading about the experiences posted by previous interns, I applied to NARI, and here I am 10 months later, writing about my own internship experience.

Arriving in Phaltan in the midst of open fields and fresh air was itself a pleasant change from the crowded city life. I knew the moment I stepped out of the car that this experience would always be one to remember and cherish. There was very little I expected before arriving to Phaltan as the only information I had was that it is a very small rural town. My biggest concern after reading the previous interns' posts was to have to arrange for my own stay and food. I was slightly apprehensive about travelling to an undeveloped rural town without a place to stay and no arrangement for food, however, to my surprise, before arriving to Phaltan, the arrangements for my stay had already been made. Dr. Rajvanshi put me up in newly finished guest quarters which included all the necessary facilities including refrigerator, cooking facilities and a modern bathroom with hot water (whenever there is electricity).

Despite being situated on the outskirts of such a small town, it was startling to see NARI's development and the technology produced here. The opportunities I got at NARI are the ones I will never experience elsewhere. Living in a rural town and being part of a team that finds lasting solutions to real problems was very satisfying. The unique experience of living amongst the locals and experiencing the difficulty of obtaining basic needs such as light, which I take for granted everyday, was very inspiring. It led me to utilize my time wisely in order to make what little difference I could to make life easier for the rural population.

Living in quarters in the midst of fields and cattle, riding a bicycle to work everyday and eating and enjoying tea at a roadside dhaba was truly an enjoyable and unforgettable experience. While at NARI, I met some of the most interesting co-workers who made me feel very welcomed and my stay even more pleasurable.



Local Dhaba where I had lunch



My day was incomplete without the morning and evening tea

The projects I worked on while at NARI are as follows:

Rainwater harvesting system for new Centre for Sustainable Development:



The design for the new sustainable development centre is completely environmentally friendly and self contained. A complete rainwater harvesting system has been designed for the centre. The rainwater from the roof tops and courtyard will be collected in an underground tank and used for watering the grape field throughout the year and fulfilling water requirements during the monthly 5-day seminars held in the centre. An estimated 520 m³ of rainfall can be estimated and water requirements have been calculated to a total of 283 m³.

Biogas Digester for Sustainable Development Centre

A biogas digester has also been designed to produce gas for cooking needs during the monthly 5-day seminars. The gas will be produced using toilet and kitchen wastes, and field and cop residues. The calculations for the amount of waste material required and the digester size have been completed.

AutoCAD Drawings:

The set of AutoCAD drawings for each ethanol lantern component has been completed for easier understanding of the design and dimension. This will make it easier to fabricate more lanterns.

Ethanol Lantern Field Testing:

I had the wonderful opportunity to initiate and lead the entire field testing component for the analysis of the ethanol lantern. During this exercise, the two lanterns fabricated and modified in the lab were given out to several participants to take home for use. These participants were then interviewed by me to obtain their feedback on the newly designed lanterns. Through these sessions, I realized the hardships of living in a rural community where basic needs such as lighting are unavailable. Talking to the laborers and locals inspired me greatly and made me realize how many facilities I take for granted. During my entire time spent at NARI, this part was one I learnt from and enjoyed the most.

Ethanol Lantern Report and Paper:

The final ethanol lantern report was comprehensively revised and edited and thorough economic analyses, lab and field tests were conducted to evaluate the efficiency of the ethanol lantern as compared to Hurricane and Petromax lanterns and electricity. This report was to test the efficiency of ethanol as a lighting fuel and thus far it proves to be very useful.

An ethanol lantern paper will also be extracted from the report to provide a short overview of the lantern, its development and characteristics and efficiency. The paper will be published in an international journal.

Sustainable Development Centre Brochure:

A brochure has been prepared for the Sustainable Development Centre outlining the details of NARI's accomplishments and its philosophy, why the centre needs to be built, the uniqueness of its structure, what services will be offered in the centre and to whom etc.

My entire internship experience at NARI has been one to remember. I have had the opportunity to view life differently and live sustainably, which living in Canada had not been possible. I will be taking a lot back from these few months and hope to apply some the things I have learnt back home.

Caroline Dalby and Laura Hinckel from ISTOM, France. *(Unedited version of their write-up)*

We are students of ISTOM, an engineering school of agronomics, in third year, in Cergy (near Paris). As a part of our study we did an internship during 3 months at NARI from **June to September 2007**.

We worked on biogas experiment. We began to study the yield, we tested different inputs and we do some calculations about the efficiency of the system. Then we studied possibilities of implantation of biogas reactors in rural areas. For that we sound out some household in Phaltan.



During the training we lived in an unfurnished flat lend by NARI. We had a lot of very nice neighbours who are always available to help us. They help us to buy everything we need to fit out the flat.

The first month, we take our dinner in a family for only 500 Rs for a month. It is a good way to speak with local people and to learn more about Indian culture. After we do our own cooking with all the fruits and vegetables available in the market. We can in this way eat some food without spicy!

For the lunch, we went in a restaurant next the institute for 800 Rs per month. We drink always mineral water or water treated with some medicine.

We went during the monsoon so there are a lot of mosquitoes. We had mosquitoes net and repulsive spray, but you can also buy in Phaltan some appliance that you can put in plug.

Restaurants:

We tested some restaurant in Phaltan:

- hotel Madu Deep
- hotel jeet (with a very nice garden)
- hotel Aryaman
- hotel Sahara (just near our flat)

Transports:

We bought bicycles to move in Phaltan (it is possible to resell them in the shop after the training). You can also travel by auto-rickshaw (20 Rs from Jintee naka to city) or by bus (4 Rs). For travel around Phaltan, the best way is the bus (cheap and the bus network in India is very expanded).

Leisure:

There are two cinemas in Phaltan, but the movies are only in Hindi or maharati language. However Bollywood movies contain a lot of songs and dances so you could spend a good moment even if you don't speak these languages. But there are very few girls who go to cinema, when we went we are the only two girls in the room.

If you want to see some movies in English, there is a one shop who borrow some DVDs but the quality are some time not very good.

Places around Phaltan:

- Pandrapur : beautiful temple near a river
- Signapur : temple where we can see some monkeys
- Gondawale : temple where you can take lunch
- Jijuri : an other temple
- Waterfalls : - Dimalwadi : around 10km from Phaltan
- Dhom : near Satara
- The nearest big city is Pune (2h30 to 3h by bus). There are many things to do there :
 - the snake park
 - Koregon Park : nice place with many good restaurant
 - the garden of ashram: beautiful place and ideal to relax
 - there is an English library : (address)



-Baramati : a city bigger than Phaltan where there is a train station. There are some restaurants where you can eat occidental food like pastas (Taj city Inn for example). You can also buy cheese there but we don't test it.

Festivals:

During this period there are lots of festivals:

- 18/07 : Palaki, lot of people walk during one month in direction of Pandrapur
 - 22/07 : Baid Pola, festival of cows (people paint the cow)
 - 15/08 : Freedom day
 - 19/08 : Nagpanshami, festival of snake (all the men play with kites)
 - 28/08 : Raksha Bandham, festival of brother and sister. All the sister give bracelet to their brother, and brother make gift to the sister
 - 04/09 : Gokulastmi : Krisna birthday
 - 15/09 : Ganesh festival
-

Sebastian Steinfeld (February 2007)

My internship at NARI

It all started when I was younger and I first realised that I liked chillies thanks to a classroom dare. That night, I ordered a lamb Rogan Josh from my local Indian restaurant and my love affair with India had begun.

10 years later, I found myself, having graduated with a Masters degree in Physics at Oxford University never having had a gap year, taking the insane decision to move into law where I was to become a lawyer for an intense city firm in London. With my commencement date for imprisonment fast approaching, and having still never been to India, I made the decision to buy the “Lonely Planet” and plan my trip there using every last day of freedom I had left.

Although I originally wanted to simply tour around India, when I saw the “volunteer” section of the lonely planet, I changed my mind. Going into a big city firm I knew that I would never have a chance to do voluntary work again. My new goal was to use all the skills I had developed both in science and law to make life for India’s poor just that little bit better. And I don’t just mean doing something that would make ME feel like I’ve done something, but actually doing something that I could see made a clear observable difference to the quality of life of India’s poor at least in some small way. Nimbkar Agricultural Research Institute stood out head and shoulders above the rest for this purpose.

However, with only 1 month (February) to work, and with NARI’s recommended time period at 3 months, time was fast running out. So with youthful vigour and head first decisiveness I immediately applied for an internship sacrificing covering letter and CV presentations for sheer speed. Within the day I received the following reply: ‘splendid, look forward to seeing you’. “‘splendid, look forward to seeing you’, what the hell was that?” I said as I was sitting on my comfy leather seat in front of my super-speed broadband internet connection in a pleasantly heated house in Central London, the largest city in the first world. “How is ‘splendid, look forward to seeing you’ enough information on which to base a 3000 mile journey across continents from one of the world’s most developed places to one of the world’s least?” The days were ticking down, the obstacles were many, and I could fast see what would probably be the only noble goal I would ever have in my life slipping away. So I

made the decision: I would get myself to NARI's headquarters in Phaltan, India or get severely lost in the countryside of a completely foreign country trying.

I booked my plane for a couple of days time, scoured NARI's website for every bit of usable information and everything went smoothly until I realised that I had forgotten one thing: my damned visa. So, after a frenzy of phone calls to Indian embassies all around the world where it was still day, I discovered eventually there was a way to get that visa in 1 day. At 3:00am in the morning, I left my house, navigated the appallingly limited night bus transportation system and cued over night outside the Indian High Commissioner.

After my visa troubles, I successfully continued my plan by getting on the plane, arriving in Mumbai, flying to Pune and finally arriving in Phaltan where I hoped to simply walk into NARI, say "hi" and receive a reply of "hi" rather than "who are you, what are you doing here?" But that would have to wait for the morning. At that moment, it was dark and I was in a place far from home with all kinds of strange vehicles offering me lifts to some place called "Arrarrar" or something like that. Of course, later, I would find myself taking regular trips to the Aaryamaan hotel, the best hotel in town; because I absolutely loved the food I ate that first tense night. But then, all I was concerned with was getting to the hotel to sleep. After a long 5 minutes of painful negotiations, using all my Charades and acting skills, I agreed with the driver of one of those strange vehicles (that I would later routinely call "an auto") that the "Arrarrar" was in fact a hotel. We then finally moved on to the price. I asked "how much?"

"25 Rupees"

"I know that game" I thought to myself, fresh from the scars of Salvador (Brazil) where some of the most aggressive tourist attacking touts in the world live. This assumption that a Westerner could not be treated honestly outside the first world was to prove my first mistake. About 15 minutes of sheer haggling later, I had succeeded in getting the price down to about 24 Rupees. I had saved myself about 1 penny for 15 minutes work. Not exactly above minimum wage. Feeling ripped off I consented and paced off to the Aaryamaan.

A porter with a dusty and slightly creased uniform picked up my immense bag as I headed into the reception. The floor, in need of sweeping, was lit from bulbs whose electricity wires were clearly visible. After 5 minutes of pointless noises coming from the mouths of both me and the manager, the manager eventually showed me a sign with room prices both in English and some Indian language. I pointed to the room I wanted and he gave me the key. This form of communication was to prove very useful for the rest of my stay.

The room was in no better condition than the lobby with the shower leaking, the windows fragile and the hot water tap proving to be just for show. It took 5 minutes with my hand in the water waiting fruitlessly for the water to get hot before I realised that latter detail. However after everything I'd been through, I was not about to be defeated by a shower whose water supply's boiler was not so much broken as non-existent. When I put my left arm, hot and sweaty after a very long day's journey, into the shower, I felt a short sharp shock going from my arm straight to the pain centre of the brain. 2 seconds later, my bodies natural adaptation procedures subdued the pain. I repeated the process with my right arm; and my legs, body and finally the head. This water torture was to become a daily incident in my life at Phaltan but although I still find it somewhat unpleasant, it became much easier to bear after the 5th time. Finally, shivering but clean, I got the first bit of good rest in about 40 hours.

The next day, after yet another completely unsuccessful haggle attempt wasting another 15 minutes, I caught an auto to “Neemka”. It was crunch time. After 3000 miles of arduous travelling across land and sea, I had finally arrived in a small farm type place recognisable only by a sign saying “Nimbkar Agricultural Research Institute”, three of four surprisingly sturdy buildings and a hut that looked like a cross between a sophisticated high tech University scientific laboratory and the back cover of ‘DIY for dummies’. I walked into the only office where I could see administrative workings going on and declared myself ready for duty.

The poor receptionist whose English is not exactly fluent did not have the slightest clue what I was talking about. Bewilderment shone from ear to ear radiating unstoppably out of his body like gamma rays. A further short conversation between him, me and his assistant resulted only in 2 unstoppably bemused looks in my direction. It was time for the big guns. I had one final card to play and now was the time to use it. I had, for some reason only my subconscious knew, thought it a good idea to print the correspondence of every email between me and NARI right up to the “splendid, look forward to seeing you”. Would it work, or would I have to start heading back to Mumbai? When produced, like magic, the bemused looks faded into normality as realisation of why I was there dawned on them. They told me to wait for about an hour as Professor Anil Rajvanshi had not yet arrived. I was later to learn that that hour contained extreme telecommunications activity as the staff worked overtime trying to learn the purpose of my presence. I was even to learn that my presence was a shock to Professor Rajvanshi who, despite his emails, had never actually expected me to make the journey. But for now, all I knew was that I was simply waiting for the Professor to arrive and that when he did, he would be expecting me and would assign me to a project. I had finally arrived. Now for the final and hardest part of my plan: actually making a difference.

I was given literature to choose my project and I finally settled on a noise problem with the Lantern. To help, I was given a book on fluid mechanics to read from scratch. Despite being criticised for inability to write on the grounds of bad spelling in my CV and covering letters, I also helped with written and presentational issues regarding the centre for sustainable development and I wrote an introduction booklet. This gave future interns the details I would have loved to have known on my first few days in one clear document.

After a week, however, I had really settled into the place. Sure the place was a dump, but it was a clean dump, a homely dump. Just because every wall of every building had at least one crack in it and the paint work often came off on my hands when touched didn’t mean I could not be comfortable, eat well and generally do the things I enjoyed. I had found swimming pools, tennis courts, basket ball courts and all the sporting activities I could want. I had agonisingly slow internet cafes (but none the less, internet), an Indian mobile phone, and ample communications between our village and the outside world. I had countless offers for friendship from the local population who made me feel like a celebrity, and I met a lot of great people. I had butchers with freshly cut meat, fruit markets with some of the tastiest fruit I have ever had, off-licences, clothes shop, even sweet shops selling Cadbury’s chocolates all at a fraction of the price of London prices. I could live like a king, getting everything and anything I wanted when I wanted without any consequences. With great weather on top, what more could one really want????

Okay, yes you’re right. Women. I love women and here, this commodity was in drastically short supply. With no Westerners at all, I had to rely on the local population. And the local population does not supply. I was told that the women all but live completely separate worlds to men. The idea of flirting, parties, mixed social contact is almost completely alien. I asked, “If it was such a social faux pas to meet women, how did anybody ever get married?” The reply was, “by arrangement”.

However, I was told that for a bit of flirting fun the big cities are very different. There one can go to clubs and meet people without the worry that those people might be socially scarred for life. However I did not yet fully explored that option (by 'not fully' I of course lamely mean not at all).

So did I accomplish my goals in such a short time?

Although at the start, I was more of a burden by taking up people's time as they explained to me how things worked, I still like to think I did. The introduction booklet will hopefully encourage more people to come and those new recruits could then do some ground breaking work that would not, but for my booklet, have been done. My contribution to the centre for sustainable development may hopefully encourage greater investment into the rural poor communities which may again affect people's every day lives just that little bit. And my work in successfully solving the noise in the Lantern problems (after a great amount of over time reading and thinking) could one day help the rural poor read at night in a peaceful environment in areas without electricity.

If any of the above turns out to actually happen, then I would be very happy.

My time here has been rewarding, challenging and enjoyable. I am extremely glad I went and I would encourage anybody who has real scientific, business or entrepreneurial skills to do this and make a real difference to potentially hundreds of thousands of lives.



Sebastian hard at work in making a difference!

Impressions of a French intern Elise Levasseur a student of 3rd year in ISTOM, Cergy-Pontoise, France. She worked in NARI for a short time from June 11, 2006 to August 30, 2006.

Work:

I worked on the sorghum program already underway at the Institute. The main aim of this program is to develop a complete technology for producing syrup from sweet sorghum and to develop hybrids containing maximum sucrose at grain maturity.

I carried out an economic analysis on syrup production from sweet sorghum. Through this study, I have learnt the methodology of an economic analysis, which parameters do I have to take into consideration and how to distinguish a traditional farm from a mechanized farm. The farm manager of this institute was always helpful and available to help me in my work

Likewise, NARI wanted to study sorghum resistance to the shoot fly. Thus, I went to count the infected plants cultivated in the plot in order to analyze the shoot fly resistance for each variety.



I also helped another French intern in developing a watershed module for rural Maharashtra. Thanks to the knowledge of the researchers at the Institute, I have learnt how to carry out a research project and how to plan and execute it.

NARI is a good place to tackle different subjects: agriculture, renewable energy, pathology, process of transformation (syrup making from sweet sorghum), sustainable development, etc. Every Thursday, there is an Institute seminar given by a NARI researcher. The topics have been various but most include the work done in the Institute.

Accommodation:

The Institute was kind enough to give me a free accommodation, which I shared with a pathologist from the institute. She was living near the institute (fifteen minutes by bike) with others NARI's workers. They are accommodated in individual houses with basic facilities.

Thus, it was a very good experience to live with an Indian woman who taught me about the Indian culture.

Adrien Jacob from France (April-June 2006)



My internship

I came to NARI in April 2006 to finish my Master's degree in general engineering (Ecole Centrale de Lyon, France) with a 5 month internship. This internship has also validated a non technical Master's degree in "Ethics and Sustainable Development". I've been working on several projects: the centre of sustainable living (CSL), biogas and the analysis of the meteorological data collected by NARI since 1983.

Concerning the CSL, I worked on the schedule of the course. The course would be aimed at CEOs and NGO representatives. The main objective is to sensitize them on energy, agriculture, environment and water issues in rural areas and provide them with concrete technological solutions. A case study on Phaltan would conclude the 5 days course. I also worked on the practical details of the course, following the "hands on" attitude of the institute. Then I went further into the module on water management with Elise, another French intern, and studied the economic viability of setting up rainwater harvesting facilities in each village of a Taluka.

I also realised a program to analyse the meteorological data using statistical tools. The main objectives were to provide average curves and figures on the local weather in Phaltan, and to identify possible trends, especially warming.

Finally I did some bibliographic research on biogas (methane from decomposed organic matter) to give an overview of this technology and raise its main issues.

Thanks to the extensive library and the help of the staff of NARI, I have learnt a lot in areas initially unfamiliar to me (agriculture, irrigation, water harvesting and treatment, biogas) and found concrete applications of theoretical knowledge learnt in school, such as statistics. I have also expanded my knowledge by helping punctually other researchers (statistics in cross breeding for example). Finally, more than knowledge, **I acquired in NARI a pragmatic and holistic way of thinking that is not taught in any school.**

Life in Phaltan

Other interns have already provided thorough information about the life in Phaltan, I will just add a few comments:

1. People

- I confirm that the people of Phaltan are amazingly welcoming and honest. Actually a few days after my arrival I did the unbelievable mistake of leaving most of my important papers (plane tickets

etc.) and a lot of money in a cyber cafe. I got all my papers back and not a single rupee was missing... Also people in my neighbourhood were very friendly and helpful whenever I had a problem (I did fall sick sometimes).

- On the other hand you should be aware that in big cities it's another story. Many people will just try to get as much money as they can from you. That is why you should plan your trip from Mumbai to Phaltan very properly so that people won't be able to fool you (both Elise and me got cheated by people selling fake bus tickets). Once you're in Phaltan you can travel very easily with villagers who will be happy to guide you safely (they will come to meet you on their own after the news of your arrival has spread).

2. *Weather*

- The transition between summer and monsoon is very quick. Weather will change from very hot and dry to cool and humid in not more than 10 days. It is thus advised to be careful in that period since many diseases may spread.

3. *Economics*

- My budget was around Rs 14000 per month. I did go very often to the restaurant (approx Rs 100 per meal), called in France quite often and was living in a flat (around Rs 2000 per month). It should be possible to spend much less by preparing your own food.

4. *Communication*

- Having a cell phone is extremely convenient to call abroad and in India. You can bring your own, unlock it and get a local operator like Airtel. During my stay they launched a very interesting scheme for foreign calls: for Rs 97 per month, you can call European and American landlines for Rs 3/min only! It should be noted though that these operators only sell prepaid cards and that the lower the cost of the card, the lower is the credit you'll get for the same amount of money. For example, a Rs 550 card will only grant you Rs 250 credits, while a Rs 3300 card will allow Rs 2800 talk time. You can even connect to the internet through you cell phone provided you have a laptop and the data cable to connect them.

- Some cyber cafes are getting newer computers and accept USB memory sticks without any drivers. But the connection is still pretty slow.

5. *Transport*

- A bicycle is the best solution to move around in Phaltan and even visit nearby places. Very good tyres are mandatory if you don't want to spend all your time trying to find places to fix your punctures.

6. *Leisure*

- The swimming pool is a nice way to relax after your day of work and it is the only way to do some sport during the hot season. If you go in the late afternoon, there won't be too many people. You can take a monthly subscription (Rs 550) but I advise you to pay per hour (Rs 25). The water is quite clean, even if it is not perfectly transparent...

- There are many places to visit around Phaltan like:

- Singapur : temple on a hill top.
- Jejuri: another nice temple.
- Mahabaleshwar: beautiful hill station.
- Sajanghar: Shivaji fort near Satara.
- Varugar: another Shivaji fort not far from Phaltan.
- Finally there's a nice waterfall not far from Varugar. You can go there by bicycle and swim in it during the monsoon (otherwise there won't be any water).

- Also festivals and functions happen all the time, so it is very unlikely that you'll feel bored.

My Experience Interning at NARI (June- September 2005)

Adam Robinson

Working at NARI

I came to Phaltan in mid June of 2005. I came on a Coca-Cola World Citizenship Program Fellowship. This was organized through the University of Florida International Center. I was extremely grateful for opportunity to travel abroad and study engineering, since this type of is quite rare in my field. I lack only a small bit of paperwork to complete my MS in Mechanical Engineering.



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thing

Working at NARI has been great for the emphasis on practical, hands-research and development. You likely won't spend much time in front computer here, even though I actually did, just due to my particular project. Using Dr. Rajvanshi's philosophy of 'Just Do It', when it comes to research and development, really showed me how to develop and maintain momentum in experimental work.

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While it is true that equipment is somewhat limited here, this fact helps you learn to do a lot with a little. They are quite experts at this already.

I originally came here alone, but as it turned out, two girls from an agricultural university in France came for almost the same time period. They made excellent company and surely a more enjoyable experience. Additionally, the staff at NARI was exceedingly friendly and easy to work with. They were amazingly helpful both at work and away from it.

My Project

While at NARI, I worked on the Ethanol Stove project. This project had been underway for almost a year before I came and was still going when I left. For my contribution, I rewrote and researched the main project report, conducted a new round of user testing, and worked on some design modifications for reduced carbon monoxide emissions. I also helped train some of the staff in certain software applications and made some exploratory work on another project.

For the Ethanol Stove project here, they developed a cookstove to run on an alcohol/water mixture of relatively low concentration. The significance of this is that at least a third of the world's population relies on solid fuels such as wood, coal, or agricultural wastes for their daily cooking needs. This reliance exists because these fuels are often considered cheap, relative to cleaner burning liquid and gaseous fuels such as kerosene or LPG. This assumption however, does not consider the fact that solid fuel combustion is inefficient and polluting, especially when used indoors, as is often the case. This polluted indoor environment in turn leads to poor health quality and then less ability to earn money, creating a cycle of decline. The significance of the low concentration, near 50%(w/w), is that a mixture with this property may be distilled in a single step, using only solar energy, as demonstrated by another Institute project. This means for complete rural independence in production and use of clean cooking fuels may in fact show a viable path to attacking some of the roots of poverty.

Like LPG and natural gas, alcohol burns quite cleanly, producing few pollutants. But in contrast to these fossil fuels, alcohol may be produced renewably, from certain common crops, such as sugar cane or sweet sorghum. So if an agrarian economy, such as rural India, were able to produce its own clean cooking fuel instead of relying on expensive imports of fossil fuels, then serious strides could potentially be made in reducing the persistent poverty here.

General Information about Living in Phaltan

The following lists some basic information one might need if planning to intern in Phaltan, organized by category:

1. *People* – The people of Phaltan have been unbelievably warm and welcoming. Before we were here two weeks we had more new friends than we new what to do with. By the end of the time, we had to fend off dinner and tea invitations just to have a quiet night at home for a change. Living in Phaltan offers an amazing opportunity to get to know a part of the real India, away from the tourist circuit or the big city. The people are so honest and friendly here, that you feel at home almost immediately, even despite the basic culture shock.
2. *Language*
 - English – Most but not all people speak at least a bit of English.
 - Hindi – Most people also speak Hindi. Some may have moved here from another part of India, and so they will likely speak Hindi and not Marathi.
 - Marathi – Marathi is the mother tongue of the state of Maharashtra. There is a long glorious history for the Maratha people, so they hold on with pride to their unique language. If, as a foreigner, you learn some words and phrases in Marathi you may well become a mini-celebrity. It's guaranteed that you will cause a commotion and draw an approving crowd every time you use your Marathi in public.
3. *Weather*
 - Hot Season – April, May – temperatures up to the 40's Centigrade with little air-conditioning available. It's best not to come during this time.
 - Monsoon – June through September - overcast and cool but not cold quite agreeable actually. Some rain. Temperatures during the day generally between 25 and 30°C.
 - Mosquitoes – There are a good number of mosquitoes here, but they are not unbearable. Two girls from Northern France, for example, were constantly eaten by mosquitoes, but managed fine with repellent. This Floridian found the mosquitoes here to be weak and puny compared to the ones at home and was not much bothered by them. For example, no sleeping nets were needed to keep mosquitoes at bay. They sell small appliances here that plug into an outlet and supposedly keep mosquitoes from biting. These seemed to work fine.
4. *Economics*
 - Hotel: AC – Room rates at Hotel Aryaman, the main hotel in Phaltan, were Rs450/day, non-AC – Rs200/day. Aryaman also has a decent restaurant and a very friendly and helpful staff. Also, it is a big landmark in town, which is useful.
 - Apartment – We were able to find an apartment through someone who works at the institute, but it took close to a month to find a suitable one. For one Bedroom, Hall, and a Kitchen, as they call it here, in a nice, relatively quiet neighborhood, convenient to what we needed was Rs2000/month including utilities and minimal furnishings (no refrigerator). There was no air-conditioning at the apartment, of course, but July through September it wasn't necessary anyway.
 - Restaurants – There are several nice restaurants in town. Hotel Aryaman is a pure vegetarian kitchen that serves nice food. Hotel Minar has a very nice garden dining area and serves non-

veg as well as veg food. Meals here may run around Rs 100 per person. Hotel Pink Hill, just across the street from NARI was a regular lunch stop. It was not much to look at, but the food was maybe the best in town. Meals here ranged from Rs.35 to 100 per person. Street vendors sold many things ranging from Pau Bhaji – bread and split-pea soup combination that was quite good – to Chinese food, at prices much lower than restaurants. However, sanitation at these stalls was often questionable.

- Mess – Many of the people who worked at NARI but did not live with their families signed up for a Mess, where a local woman would cook them lunch, which they would pick up before coming to work, and then they would take dinner at her house as a group. This arrangement was quite inexpensive at around Rs10 per person per meal. The food here was basic but plentiful and well made, including a vegetable dish, a dal, rice, chapati (something like a tortilla) and perhaps a yogurt or buttermilk item.
- Cooking – We were able to borrow a gas range from someone at the institute and we had to rent an LPG cylinder from the gas company. The breakdown was Rs900 deposit on the cylinder and valves plus Rs600 in fees and taxes for the gas. We did not need to refill the cylinder during our two months in the apartment, averaging nearly two meals per day.

Fresh fruits and vegetables were readily available in street markets every day, and were quite inexpensive. Fresh chicken was also available at about Rs80 per bird, trimmed, but you have to pick it out while it's still squawking. Basic commodities were available at dozens of small convenience shops all over the city, including milk, eggs, bread, flour, spices, water, etc. One could expect basic meal materials to run between Rs20 and Rs60 per person per meal, depending on their preferences.

- Water – Bottled water was readily available and we remained quite healthy drinking only that. However, the plastic bottle collection was quite an environmental disaster. Most people here filter and boil their water at home, then carry it in containers.
- Bus – The state bus, or ST as it is popularly called, is again, not much to look at, but it gets the job done and does so cheaply. The three hours bus ride to Pune, the nearest big city with broadband internet available, was about Rs60 one way. In Phaltan, a bus left the station for Pune every half hour between 6:30am and 7pm. Some were express buses and some were not, but they all seemed to take about the same amount of amount of time. You could take the ST to and from NARI for about Rs4 each way, but then you had to take a rickshaw (Rs10 to 15) or walk to the apartment from the ST stand.
- Jeep – Another option for going between cities was private jeeps. They would gather and wait at common departure points for a minimum number of people who wanted to go the same direction. The cost of this was generally the same or a little less than the ST.
- Autorickshaw – A small, three-wheeled vehicle that can fit up to 4 or 5 passengers. They run about Rs5/km. The rate ended up being about Rs50 one way from Hotel Aryaman to NARI or Rs 20 maximum for anywhere in Phaltan. Of course, there are no meters on the rickshaws in Phaltan, so you have to negotiate your price every time.
- Bicycle – Bicycles are a very common mode of transport in Phaltan. Though the roads were quite daunting at first, we quickly grew accustomed to the slightly controlled chaos of Indian roads, and managed not to get creamed by a truck for almost three months (then we left). General bike prices were (very) Used ~Rs500 - 800, New Rs2500. Some of us had a lot of problems with our bikes and some didn't so it would be good to get a reputable brand of bike, such as an Atlas or Hero.

- Phone Calls – Mobile phones are available here. A basic phone may run something like Rs2000 to purchase. The calling plans are supposed to be reasonable. We mostly relied on the STD/ISD/PCO public phone booths to make our calls home. Almost every corner has one of these booths. Of all the things likely to kill your budget, phone calls are at the head of the list. A 5 to 10 minute phone call to the US ran about Rs100. While that is reasonable on a limited basis, it adds up quickly if you do it often.
 - Internet/Computers – At this time, only dial-up connections are available in Phaltan, though there are rumors that broad-band will soon arrive. There are several internet cafes, the best being Net Park, just behind State Bank of India. The rate was Rs25/hr, though if there was more than one other person there, the connection could be maddeningly slow. Also, almost all computers in Phaltan are quite old, slow, and run only Windows 98, so any fancy USB gadgets that you want to use, forget it unless you bring the drivers for it. We were however finally able to transfer digital pictures from camera to CD and then get some nice color prints made at Gandhi Color Lab for Rs5 per 4x6 photo. If you bring your own computer, you must absolutely get a quality surge suppressor. One can be obtained here for about Rs1000. It may be good to buy it here, since they seem reasonable about replacing it if it goes bad. One laptop has already been fried because of not using one of these. Depending on the length of stay, it may be desirable to have some more substantial electrical conditioning equipment, such as a CVT (Continuously Variable Transformer), which is available for rent at reasonable rates.
 - Hindi or Marathi Lessons (see section 1 about potential celebrity status) – We were able to take Hindi lessons three nights a week for about 1 hour each session. The fees for this range from about Rs25 to 50 per person per hour. At the very least, it was amazingly useful to just be able to read the Devnagari script (Hindi and Marathi alphabet), since all the bus labels and many shop signs were written in this. A lot of the time, in fact, these signs were simply English words spelled out in Hindi. However, one never had to wait too long for assistance if they needed it.
 - Laundry – There are many laundry services around. The going rate is about Rs10 per piece, no matter what size. We ended up mostly doing it by hand ourselves, just for the convenience of not having to wait.
 - Utility Service – The electricity goes out quite a lot here. Specifically, Tuesday is designated to have at least 5 hours of electricity cut each day. After a while though, the electricity and water cuts just become a part of normal life, and one hardly even notices them. When it is on, the electricity does fluctuate quite a bit, hence the need for a surge suppressor with a computer or anything else electrical that you want to protect.
 - Gym – There is supposedly a gym in Phaltan, but I never did go by to check it out. There are also supposed to be two swimming pools.
5. *Travel* – Please, please plan your stay here so that you have a lot of time to travel before you go home. India is a very large country and travel here is somewhat slow. However, there are some amazing things here that it would be quite a shame to miss.
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Maelle GEDOUIN and Cecile LE DOARE were two interns from France. (They worked for two and half months in NARI from June - August 2005. Here is what they have to say about their internship).

"We are two students of fourth year in an Agricultural University in Beauvais (France). We are preparing a Master of Science (MSc) in Agriculture and Management. Our school asks us to make a training period during at least 8 weeks during the summer to acquire professional experience. As we were able to have helps from the Conseil Regional de Picardie, a French institution, to make a working period abroad, we decided to realise it in India. We found NARI contact, wrote, and they answered immediately.

In NARI, we first worked on a project of a center that would provide courses and give information on Sustainable Development. Its name is "[Center for Sustainable Living](#)". We first thought about a typical weekly schedule. This one could be proposed to the CEOs that would come to the Center (managers, persons that have high responsibilities and influence), with the aim of aware them and lead with them a strong reflection. In relation with that center we worked on a project that consists of finding the maximum number of persons that could be fed from ten acres of land, answering to the human daily needs on the basis of a vegetarian diet. We made the choice of the crops and of their organisation regarding the local situation. Then we calculate the area necessary to answer to the defined needs, with the constraint of an area of ten acres, and found the maximum number of persons that could be fed.

In a second time we modelled on Excel sheets some statistical methods used to analyze agronomic and genetic experiments. This enables people to treat the data more easily and quickly. In NARI there was always people to answer to our questions or to help us, what was really enjoyable. That helped us a lot to complete our work and to avoid loss of time.

In Phaltan we were first living in a hotel, that was comfortable and really OK, but we were soon looking for a flat to rent. We found it easily with the help of someone working in NARI. We were feeling really comfortable in Phaltan. People were very welcoming. They were really curious of who we are and what we were doing in Phaltan, where we come from... There was always somebody to help us if we were looking for something.

During the days off we were able to move a little, but it was not possible to move very far because it is really long by bus. We visited Mahabaleshwar, Pune and around, and it is also possible to go to Pandhrapur and anywhere else in a round of 100 km.

Finally, it was a great experience for us, humanly and professionally. We really enjoyed it and hope we will be able to come back in India in the future."

Sander Greenfield (April – June 2005)



I am a student of the Twente University in the Netherlands. I have a bachelor's degree in Electrical Engineering and at present I am doing a masters course in Microelectronics and microsystems. As a part of the study I did an internship at the Nimbkar Agricultural Research Institute (NARI) for 2.5 months (April to June 2005). During this period I worked on motor-assisted cycle rickshaw, the [MAPRA](#).

I came here at the end of April when the temperature during most days was more than 40 degrees Celsius. It was hot but dry and after a few days I became accustomed to the heat and left my air-conditioned hotel room. I took a room in the house of an Indian family in Phaltan town to be more involved in the local culture. I found living in Phaltan to be very cheap and it was a nice experience to manage things by myself in this rural town. I found the people to be very kind and everyone wanted to be my friend. I also had dinner with my landlord's family a couple of times. I became somewhat well known in Phaltan, because I was the only white man who was living in Phaltan in the hot season at that time.

As a part of my internship I have tried to develop a special controller which can measure the load of the MAPRA. With the use of this controller, depending on the amount of load, the motor will turn on/off automatically. The purpose of this controller is to prevent unfriendly use of the batteries and the motor. The system works with a mass spring system, which measures the pedal force. This mass spring system transforms the pedal force into an electric signal, which is processed in an analog electronic controller.

During my internship I also had an opportunity to explore and manage the controller project myself. First I did some theoretical work and later on I did the practical things like building the mass spring system and the controller. I was completely free to develop my own ideas in the envelope provided by my internship guide Dr. Rajvanshi, the Director of NARI. Furthermore I did sometimes practical work together with the NARI technicians. They are very handy with tools and know how to improvise and build systems with local materials.



The institute is very helpful to the interns. If you have any problems with your project or just in routine life, they will help you out. The people of the institute stand behind you, and you can always walk into the office of the president or director and discuss things with them. They guided me very well during the internship, so that I was able to design, build and finish the controller. Furthermore every week the researchers of the institute give a seminar about their work to share their knowledge. I also gave a seminar about my work on the controller, which I had developed, during my last week at the Institute.

When you have free time you can travel around. There are some nice places, which you can visit like Mahabaleshwar, Panchgani, Goa, etc. You can also visit the market in Phaltan town. At this market there are a lot of nice fruits available. The Indian food is quite good. There are some very nice restaurants in town where you can have a good dinner for approximately 60 Rupees. Furthermore in town there is even a small swimming pool with an attached gymnasium. Almost every day you can take a swim here when you are finished with your work. A bicycle is the most useful way to get around in town and to go to the institute. I also had a bicycle, which was given to me by my intern guide Dr. Rajvanshi. You can either buy a new bicycle or get a good second hand one.

The internship at NARI and living in Phaltan was a really nice experience in my life. If it is possible to come back, then I will definitely do so. There are many things I can do during my return visit such as the analog controller which I made during my internship can be incorporated into a microprocessor. Further there are some improvements which can be done in the MAPRA. I can suggest to students and other persons with some engineering background that they can join this institute if they think they can contribute to the research that is being done here. If you are focused, think independently, like to do both theoretical and practical work and are ready to manage things by yourself in the cultural life of rural India, then I recommend that you come to NARI.



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