Small is Beautiful

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The Thulir Experience

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How we landed at Thulir

We heard about Anu and Krishna through Asha. They are both Asha fellows and we learnt more about what they were doing on a conference call in which Krishna spoke. We were interested not only in their work in alternate education but also in their trying to lead a more organic life - Krishna had briefly mentioned solar panels and dry composting toilets and we wanted to learn more.

We had moved to India with an idea of spending time with a few grassroots efforts. Thulir happened almost suddenly. We had a bunch of weddings to attend and after a couple of weddings and a few trips to different urban spaces; we were starting to get restless. We then contacted Anu and Krishna to check if they would be willing to have us over for about 10 days. They quickly figured out where to put us up and in a few days we were traveling to Sittilingi.

Getting to Sittlingi

Feb 12

We started from Chennai at 4:00 am, so we could reach Sittilingi by 2:00pm. The plan was to get to Tiruvannamalai in time to catch the 10:30 a.m. bus that goes all the way to Sittilingi. The only other bus was at 3:30 p.m. so we had no intention of missing this bus J. We first went to Kottapatti (CMBT bus terminal) to catch the out-station bus (platform 6) and reached by 9:00 a.m. with plenty of time to spare for our connecting bus. We had iddli, dosa and coffee at Ashoka Hotel and reached Sittlingi by 2:00 p.m. We got of at the Tribal Health Center (called the Sittlingi Hospital stop). We mentioned Thulir and were led to the center of the hospital from where we were driven a few km to Tulir. Krishna

was at the gate to greet us. Funny as it was, the call taxi to take us to Kottapatti cost us more than breakfast and the rest of the journey.
posted by Gemini @ 12:29 AM 0 comments

About Anu and Krishna

History: Anu and Krishna are both architects and have worked for a long time in constructing houses in rural areas. We enjoyed talking to them about how they got interested in this field. 1988 was declared as the year of homes for the homeless (by the UN I think) and the theme for the annual architects meet was decided to be the same topic in 1987, in order to prepare for the main conference the next year. This exposed many of the students to the problems faced in the slum and rural areas and encouraged them to think about constructing houses using local materials etc. Anu and Krishna were deeply influenced by this conference and since then, they have been working with different NGOs, first with Gandhigram near Madurai and then with a group near Gudalur. Gandhigram has many cottage industries. They both worked on mud houses there. At Gudalur, they worked on teaching the tribals construction methods. Their goal was to make them self-reliant in some skills and to eventually empower the tribals so that their (Anu and Krishna) presence would not be needed. They worked with children who had dropped out of school and later, also spent time teaching younger children. They trainees were able to do estimating, draw out plans and analyze costs. **How did they come to be at Sittilingi?** Anu and Krishna's friends, Regi and Lalita, doctors by profession, decided to move here in 1992 – 1993 since the place had poor human development statistics. They set up a hospital, called Tribal Health Initiative. Anu and Krishna were interested in working with the children in this area. After a year of travel to various such efforts in India, they moved to Sittilingi in 2003 - 2004 and Thulir was started.
posted by Gemini @ 12:27 AM 0 comments

About Sittilingi - Anita

Sittilingi is located in a beautiful valley, surrounded by hills on all the four sides. It is one of the villages in the valley and the population of the valley is about 10,000. The place was difficult to access till about 6 months back when a road was laid connecting it to Salem. Most of the people native to Sittilingi belong to the Lambadi or the Malayali tribes, the latter name derived since the valley is surrounded on all sides by hills, ie, "malai" in Tamil. Most of the people own some land, which is because of their tribal chieftain who handed over land pattas to the natives and registered them as Tribals when Sittilingi was made part of India. The main occupation here is agriculture. Until about 2 years back, people practiced subsistence agriculture. People grew their own food and perhaps the excess was sold in Kottapatti, the nearest market and Salem. Also the methods used were sustainable compared to mainstream agriculture – organic methods were employed and people did not engage in unseasonal irrigation. Only recently, with the connection to Salem and thus a market, they have been growing more cash crops and using chemical pesticides and fertilizer. Sugar cane is one of the cash crops grown here - we saw a few tractor-loads of it leaving for the market. They also grow turmeric and cotton. They also grow industrial tapioca which industries use for starch. Most of the tribals grow tapioca and turmeric. The tribals who have dug wells and use pumps are the ones growing sugarcane, the rest do not due to the amount of water sugarcane requires. Sittilingi does not have any active market. We wanted to purchase some fruits but all we

could find in a makeshift shop cum rudimentary hotel were a bunch of bananas, whereas one would find local farms growing papayas and guavas!
posted by Gemini @ 12:25 AM 0 comments

February 13
Porting Sugarcane
The first morning in we got up early and decided to see if there is any help we could do around the house or at Tulir. There was a load of dried sugarcane leaves in the entrance of Tulir that was brought to build the roof of the technology shed, but turned out to be too short to be used as that. It was decided to use it as mulch for the organic garden that is part of the Tulir campus (in the back).
We were checking the hay with a stick and piling it up first on a wheelbarrow (and once we realized the lack of utility on uneven ground) and next to be carried by hand to the garden.
We ported half the mulch the first day and the other half the next day with the help of Maboo.

Interacting with children in technology course
After a bit of manual labor (which later we replaced with early morning walks) the first activity of the day is working with the elder boys on the technology course.
The technology course was started this year as a way to engage with adolescent children. It is a one-year course over which Tulir works with children who have dropped out of from class X. It refreshed my idea of technology as not just IT. The children learn about construction of homes, plumbing, electrical wiring of homes, etc. The children are also taught to value their work and calculate how much man-hours it took to get something done and evaluate a fair price to charge for their work. Additionally, different visitors have their expertise and they get a chance to learn some of these like working with clay. Also, since at their age they is constant pressure from family and peers to take up unskilled labor they are also provided a stipend. The time spent is also used to help the children pass the Xth class exams.
This being the first year of the course they decided to start with only boys. More about the course can be read off the Tulir website. During our stay there were three boys – Balu, Perumal and Senthil. We learnt a lot about these boys over the course of the next few days.
That day the children were going to get a primer on computer hardware from Maboo the other visitor to Tulir. Maboo had helped fixed the really old computers that were donated to Tulir and were on their last leg and was helping the boys learn how to detect what is wrong when a computer conks out and basic usage.
It was mentioned that the children had learnt boolean logic in the past and I sneaked in a brainteaser that involved a ruthless king and his plan to eliminate his political prisoners by making them stand in a line and put black and white hats on their heads and they had to guess what was on their head. You can take a look at the puzzle on Tuku's brain teasers page.

Home schooled children

In parallel with the technology course, 5-10 of X grade children come to Tulir and study through the morning. They find Tulir a conducive environment to study and can also get their doubts clarified. Apparently, having worked with other teenage children in Xth grade and helped them pass Tulir has got the reputation that any Xth class fail child who goes there passes. (The local school now goes to grade X and all children pass till grade X irrespective of their learning levels). This is also a time to train the two new local teachers to make their fundamentals strong.

Additionally, Chutti and Bharathi are two children who are getting schooled at the center itself. Chutti is being home-schooled at Tulir this was our first introduction to children who were being schooled at home. He was exceptionally well read for his age and had a knack of picking up books and reading them whether in English (LOTR) or history or mathematics (probability). He also got along amazingly well with other children.

Bharathi had attempted to study in local schools, but was never comfortable in the environment. When his parents attempted to take it a notch further and put him in a private school where for the benefit of the children they are whipped he would fall sick every week. His parents asked for him to come to the center till the age for his fifth grade. I'm not clear how long he has been here, but he is exceptional at Tamil and guides Chutti in the same and is amazing with 3D puzzles. He solved the Navarang is 10 mins flat. He can't explain the math behind it, but can do it quite easily.

Additionally, another home schooled child Badri (Chutti's friend) was visiting him for this week. The previous week Chutti had spent at Badri's place. This way the parents form a small community and help the children continue socializing and interacting with others.

I had my little pottli of puzzles and games and the younger group was quite interested in them. The got busy solving them one after the other.

First Evening Class: Getting children to make their own puzzles

The first class was with the first group. These were the advanced learners and had children generally between grade 4 and 8. Chutti and Badri were part of this group. Anu had taken the precaution of leaving us (me, Anita and Mabhu) with the kids after checking that I could communicate a few words in Tamil.

I had put down an analytical puzzle with four people sitting around a round table with three constraints. The children solved it in a few minutes. After this I divided the group of 10 odd kids into three teams. Ani and Mabhu also joined two of the groups. The plan was for the first team to come up with a puzzle for the second team, the second to come up with a third and the third to the first.

This worked out really well, it was amazing how the children were working with one another without distinguishing age or learning capacity. Two of the groups continued to use the four people around a table. The third group came up with a six-person puzzle with two fixed locations and five constraints. This time around I asked that anyone solving it also keep in mind the constraints they used and the order. It turned out that only three of the constraints were needed.

Here is my recollection of the puzzle. Enjoy:

A, B, C, D, E, F

(Actually, it was much more colorful than this since the alphabets stood for the first

letters of names in Tamil, English and Chinese)
Locations 1 2 3 4 5 6 are around the circle. Location 2 = A and 4 = B. Condition:
a) C and D sit next to each other
b) E does not sit opposite C
c) D sits next to A

Learning Circuits (LC) I: Let there be (some) light

Krishna had collected a bunch of different types of LEDs over time with the hope of being able to make torches out of bamboo. He had also hoped to use the LEDs to make lights for the 24 V DC supply that comes from the solar panels and battery.

The effort to grow while keeping in mind the environment and the consumption to a certain extent is quite a remarkable aspect of Tulir. Tulir's activities of the school and technology course as well as Anu and Krishna's home work off solar power.

The villages do receive electricity. However, the supply is erratic (just as the telephone lines that were down a good part of our visit there). Apparently, during the summer afternoons when it's hot and people want to be indoors the power would tend to be out. The people who live near their farms and not in the villages itself do not receive any electricity. General lighting on the roads is pretty minimal and only on the main street that is lined with homes. The poorly lit street that is presently being constructed is perhaps a reason why most of the children go home near sundown.

As I started the class the younger children who are also at Tulir in the morning also joined us. The class started with me bringing up the puzzle I had given for them to solve the previous morning. I was surprised that they had not even attempted it. I tried giving hints, but realized that the boys were too scared to try to understand it. By this time the younger children had start to get it and I was worried that I was probably hurting their confidence even more by doing this. At this time someone had a good idea of doing it physically. We made some hats with newspapers and made the people stand one behind the other and calculate the color of their hats by the hint given by the last person in the line. After a few attempts and explanations the children started to get a slightly watered down version of the puzzle and it seemed to make them happy.

The rest of the curcuit class is not much to talk about. I had read in a few scraps of paper that Krishna had collected that the voltage of the LEDs are in the ballpark of 3.6V. Beyond that I had made no preparations. I built a simple cuicuit with the LED and a resistor and the positive was that the resistor lit up. I decided that the best thing to do will be to measure the voltages and then learn about why different voltages are such. As we measured the voltages we realized that the battery voltage had dropped from 8.5 V to around 8 V. I tried explaining the resistance of the battery and realized that they hadn't heard of ohm's law. Then I tried to explain the resistors as fat and thin pipes, but I had not thought through all these and the kids understood the explanation but not how it was connected to the circuit at hand. This was especially because in their jargon current, voltage, power and resistor all meant the same thing. At this point I decided to give up think through my analogy and explain it the next class.

An early morning visitor

At around 3:30 a.m. I (Sanjeev) woke up with a start. I sat up and felt I had been stung pretty bad by something. Ani also got up and we turned on the light and started dusting around. Ani mentioned that she saw something in the sheets and as I dusted the sheets a centipede slid out and started sprawling into the next room. I don't know if it was because it looked posinous and creepy or it was because I was stung I instinctively picked up a shoe and squashed it. As I was about to squash it I was not sure if I should, it was away from us and not an immediate threat. Consequently, as the sting started feeling better (no more than what it feels like with a red ant bite) I started feeling worse for killing the centipede.

Ani was visibly shaken. The sisy house had been like a fortress of stone and concrete with every window and door lined with nylon netlon to even keep small insects out and here was a five inch visitor. She said it was a Jerry and something she ran away from as a kid. Perhaps, if I was as smart as her when she was a kid I would have been happy that it was running away from us and not created ant fodder. I let her know that my sting was feeling better didn't feel life threatening. We took a picture of our ill fated visitor to show it to Anu and Krishna to confirm what it was and that there should be no long term effect of the sting. We applied some cream over the area and as we didn't seem to be sleeping started talking about risk.

We convinced ourselves that the risk was no more than being hit in traffic and reminder ourselves that we were not even taking basic precautions like laying the mattress fresh and dusting it before we slept.

I also clarified my ideas of explaining voltages and currents using a water model of tanks, watermills and pipes of different dimensions for my next class.

They were not kidding - Sanjeev

I decided to run the ideas for my next class through Krishna in the morning and walked to their place. As I entered everyone seemed to be focused on the storeroom N outside choola room. I asked Anu and she said that the cobra that she had mentioned was back. Kannagi was holding a really long stick with a hook near the snake so it didn't move from the room while Anu went to the back of the room to scare the snake into a drum she had placed at the entrance. She did manage to scare the snake, but naturally the snake choose to use the edge of the bamboo door to get out and hide in a whole bunch of drip irrigation pipes which looked quite like it. Anu and Krishna slowly removed the pipes to expose the cobra. Anu again tried to encourage the snake to get into the drum and rolled the drum towards it. Naturally, the snake didn't think it was wise to get in. It then started wondering if it should look for an opening to get into the house and go elsewhere. The long stick kept it from moving about too much and with much ado it finally decided to check out the drum itself. The snake was now sitting in the mouth of the drum and we had no way of turning the drum vertical. Anu was then quite courageous and took the lid of the push drum and silently went behind the drum and in one swift move closed the drum with the snake inside. The drum was then turned vertical and the snake fell in and was loudly hissing inside. I also decided that it was time for me to step down from my bench where I had been perched while observing all the activity.

Anu and Kannagi tied the drum to a stick to drop it off in the jungle. Anu was worried that the locals might see the snake and kill it (which she pointed was the fate of most of the snakes). They didn't take a stick with them and I decided to follow them with the long

stick. We went to the edge of the forest near a stream untied the stick and put down the box. Anu offered to open the lid after knocking at the lid a few times so the snake goes to the back of the drum, but I finally decided to intervene and offered to open the drum using my long stick and hook. I was able to get the lid to open with a few clean stabs, but not able to encourage the snake to leave the drum. We tried to turn the drum upside down with the stick, but the maneuverability with the stick was limited and now we were left with a open can, a not so pleased snake and a stick stuck to one of the arms of the drum. Then some locals walked by and came down to see what we were up to. Anu was very worried because the locals usually kill the snakes immediately. We continued saying that we had brought it this far because we didn't want to kill it. The gentleman pulled out our stick from the arm of the drum and turned it upside down to drop the snake on the downhill and the snake quickly found it's way to the forest.
All through the process I realized that the snake was only trying to get away from us and never tried to rush towards us or harm us. It make me think of what Krishna said that most animals and rightly so and much more afraid of us than we are of them.
I decided to put aside our centipede story for another time :).

LC II: A different approach

As part of the preparation we discussed that we could show the effect of different currents by putting multiple resistors in series with the LEDs. We put one, two and three resistors in series with two LEDs (bulbs, as the kids called them) and make three circuits at different locations on the breadboard.
However, as we found out there were different types of LEDs/bulbs that varied in brightness much more than what current was being pumped through them. *[You can be skip this section without loss of continuity. This stuff is keeping track of what we did so we can use it for the next course.*
We had only three types of resistors a 33 ohm (1/2 watt), a 210 ohm (1/4 watt) and a 10 kohm (1/4 watt). The power supply was a 9 V battery that on loading of all three circuits would fall to around 7.8 V. The two LEDs took around 3.2 V - 3.4 V each. The currents correspondingly were around 33 mA down to 10 mA. When the current was down to 10 we could see the bulbs a little dull. Note: We had colored all the positives with a blue pen to help visually distinguish the terminal without having to look at the lengths.]
I was hoping that the little kids would not be around and I can get down to discussing the water analogy (that hoped they would understand due to their background in plumbing). As it happened the younger children were asked if they want to attend the class.and I overheard Bharathi say '*yes, but I would like to get a chance to do something*'. This really got to me. I wondered if I wanted to teach in a particular way because I was comfortable with it or if I really felt it was what the children required. I immediately disposed off the idea of going over the theory.
We started the class by looking at the three circuits with two glowing LEDs with different resistors. I asked everyone to look at the circuits carefully and that we were going to have a game after that. With the idea of the game all the children looked at the circuits carefully.
Then I asked the younger kids sitting on one side of the table to turn around and asked the elder kids to disconnect one wire from the circuit. Senthil immediately pulled of one of the ends of the power circuit "delighting" all the bulbs. Then the younger children then

got an opportunity to return the favor and pulled off a ground. Since it was quite easy to detect a hanging wire I asked one team to remove a wire and keep it with themselves. This did get quite interesting and the children realized that the grounds were as important as the power supplies. Along with this they also started registering the right colors to use for power supply and ground.

After a few rounds of this the children were getting quite comfortable with the circuits. I didn't like the present division of the children and I paired up one of the younger children with an older one each and asked each of them to look at one of the circuits which they will need to make on their own using all the components they have.

The children I think felt that it would be easy and it was not until the circuits were pulled out in front of them and the components given to them that they realized that they were probably not completely comfortable with the idea. I was hoping that one of the LEDs would be connected flipped so they could understand that it is indeed different from a bulb and is unidirectional. I was happy that this did happen in the mistakes that were made and learnt from. Here are the lessons learnt we wrote down in class as we were building circuits: Things to be cautious of: - complete the ground for the circuit to work - direction of diode - understanding how a bread board works: The outer lines are connected vertically. The inner part is connected horizontally Interesting things we learnt and did well: - connections can be changed (R can be interchanged with LED in single circuit) - power supply can come on top or bottom as long as the circuits are the same. As a next phase they switched circuits and tried making circuits they had not focused as much on. To aid them I drew the circuit they were making on the board and they started associating the circuit with the physical circuit.

That was it! I really enjoyed the class and I could see that the children enjoyed the class in their faces.

I realized that this is a very different way of learning circuits than I did, but comparable to the many teaching techniques we encourage teachers to use to make teaching fun and easy to learn.

LC III(a) My homework: making a torch

One of the ideas of taking the course was to make touches that first the children could use in the evenings and also to sell them as a source of employment for the boys. We had the casing obtained from a torch made at Timbaktu collective of which a couple of LEDs had stopped working. On opening the torch we realized that there was no current limiting circuit and the torch had been placed on the mercy of the characteristic of the LEDs as four LEDs were connected in series.

We had an alternate circuit Krishna had seen on the net and I had corrected could potentially be a constant current circuit which seemed quite preferable for longer lifetime as well as protection for the LEDs for any odd over-voltages.

I had to split the board into two pieces; one for the leds in the top and another for the circuit which was to be inside. We also wanted to change the switch to something that didn't need to be pressed as long as light was needed. Ultimately, it turned out to be a bit of a squeeze, but we managed to put it together and get the kids excited all about it.
More than the kids though Krishna seemed very excited and carried the torch everywhere for the next few days :).
posted by Gemini @ 7:50 PM 0 comments

Group Discussions: Fear
With the elder kids who come in the morning (those studying for the Xth grade and the children who participate in the technology course) Tulir conducts a group discussion on Monday mornings. One of the ideas of these discussions is to draw out issues that the children are facing and help them talk it out and get it out of their system. I think this is an extremely useful exercise with adolescents especially the technology boys as we found out.
The discussion this week was about fears that we have. It started with different children talking about their fears from snakes and creepy crawlies, to being uncomfortable in crowds, beating of parents and even singing in public. It was quite nice as the adults guided the discussions and at the same time participated and shared their fears e.g. Gauri (one of the teachers) talked about her fear of being in crowds. The interesting thing was that all the girls were talking but the two tech boys Balu and Senthil didn't talk much at all. Senthil maintained that he had no fears at all and Balu would just say he didn't know. I said that one is only afraid of the unknown and Maboo said that he was afraid about his future.

The discussion then moved to other kinds of fears like that of not being accepted by a group or not being able to say no. The fear of being ridiculed or ostracized by the groups they want to belong to. Most of the girls said it was not a big fear and that it had happened to them in the past but it worked out. Krishna also gave example of pressures from family when they decided to home school their kids. I spoke about the family pressures to visit them in my earlier trips to India when I visited projects instead.
Though this seemed somewhat of a natural extension of the talk quite honestly it was trying to bring at least one of the gentlemen in the technology course to talk about the various trouble they have always been getting into in the village with being part of the village boy gangs. This is one of the reasons that Tulir takes an effort to keep them occupied with activity almost throughout the day including closing up and sleeping there after they have dinner at home. I think this effort to work with troubled teenagers is very commendable and I am very hopeful that it will be successful.
We then spoke about fears that we had overcome and I talked about the entire centipede episode. The children were very curious to know how the bite felt J. The girl who was afraid of snakes mentioned that if there is a small snake she is not afraid anymore and just kills it.
Then the discussion shifted to a slightly different fear of "what people will think". The discussion went from why few of the children wanted to pass X so as not to be thought of as dull. Anu asked if the children were worried of being made fun of when all of them went to the village and picked out the plastic to stop it from flowing through the stream to other villages. Most children didn't have a problem. Someone asked Senthil and Balu if they were made fun of to which they responded that no one dare do that do them. Anu said that she herself was afraid of doing it a couple of yrs back when Tulir started with the fear that parents will not take it well and think that when they send their children to study here they are made to pick garbage.
The final part of the discussion was regarding whether fear is good or bad. The first suggestion was that fears are good. The girl mentioned how she is afraid of her parents and this makes sure that she behaves herself and doesn't get into trouble with her. I asked her about the case of the fear of snakes. Does she think she is better off now that she is not afraid or before when she was? She replied that she was better off now. I responded that perhaps fear is being confused with respect or responsibility. Maboo pointed that fear of future seems important and it is making him work hard. If he works hard he will have a good future. I pointed out that it seems more of a cause and effect kind of relationship. Anyway, the session ended with the mention of one of Krishnamurthy's books on fear that is available at Tulir to read if anyone wanted to read and explore more.

LC IV: Checking components

I wanted to introduce the kids to being able to use the multi-meter to test the components before they made any boards with them. We used the resistor measuring facility to measure the resistance. However, since we had only three kinds of resistors they already knew what the value was and it wasn't much of a challenge. I then started making networks of resistors and asked them to measure it.
When the resistor setting is too high the value of the resistance appears very close to zero and when the setting is too low the meter gets stuck to a single digit one. They

understood this quite well. I then pushed it a bit further and started asking them to guess the resistance between different corners of a square made out of a 33 ohm and three 10 kohm resistors. Senthil got the answer I asked from him and now the other two were curious how to “guess”. I finally got my opening to squeeze in my water analogy and there were able to understand series parallel resistors and an idea of what would be a limiting resistance if two of them were way off.
We then went over checking if an LED was working using a battery and a resistor. Earlier in the morning we had sort the LEDs and found some bright, dull and busted. I gave them three each and asked them to sort it out that they did.
Having done something that they were comfortable I introduced the transistor as a three leg device a little different from the two leg elements they were used to. Luckly, the multi-meter had a way of measuring the npn bipolar transistors and I didn’t need to come up with a circuit to identify it. I drew the symbol and explained the names of the terminals as simply as I could and asked them to identify the terminals and crosscheck with the multi-meter.
Here are some notes that Ani took in the class:
Transistor: Collector – base – Emitter
When flat side faces you, the right most leg is the emitter. You can test it in the multi-meter (NPN transistor – all transistors now are NPN). It gives you a parameter of the transistor (HFE). Mine had a value of 292. If you do not put it in the correct setting, the multi-meter shows a much smaller number (around 1/10th).
How do you check if an LED is working?
Test it using a battery. If a 9V, then add a 210 ohm resistor in series to test.
We then built the circuit of the torch (with the constant current) on the breadboard including the transistors. They seemed comfortable to throw in a three terminal element they could test.

LC V : Building boards and getting to know the boys better
We got down to business of soldering circuits together. To do something different we decided to build lights for the 24 V DC that comes out of the battery of the solar panels. One of the practical difficulties was with leaving the inverter fully powered on since all the rooms were built with a thatch roof and they are always careful about fires. One thing they were careful was to turn off the inverter when power was not required. This, however, meant that when the children come back after dinner there would be no lights till they got into the rooms and turned on the inverters. This was meant to be a low power light that would fulfill this purpose.
This involved pretty much the same current limiting circuit as the torch, but had 7 LEDs. I gave some basic guidelines, but let them arrange the LEDs in fashion that they liked. I also reminded them that they should test all components and in case of LEDs mark the positive ends with the blue marker.
I let them know that for a circuit everyone has the same components, but how you arrange it and solder it shows a bit about yourself and speaks of your work. That they might not think through some aspects of placement that they will learn with this exercise.
With the two soldering irons Balu and Senthil started their circuits. Senthil is an extremely smart guy. Unfortunately, he knows it and that makes him quite cocky. Following which he didn’t test his LEDs and tested only one of his transistors and

decided he didn't need to mark his LEDs either. Balu on the other hand followed the directions. In the mean time one of the students who had been sick for a few weeks came and I asked Perumal to explain how to test different components and build the circuits. Senthil soon finished, but there were a few bugs in his circuit that I could see visually and he decided to work on it in the next class. Perumal, the dedicated student that he is, took his time with the placement and his circuit worked on the first attempt. Balu also finished his circuit and although I could find no obvious mistakes, his circuit also didn't quite work. He was really disappointed I had really hoped that his circuit will work given the care he took to build it and it would have given him a lot of confidence. In the evening Krishna also wanted to build the circuit himself and was also able to get it to work on first attempt.

February 25, 2007
LC VI: Testing and fixing
This was my last but one day and I really wanted everyone's circuits to work before I left least it turns them off the subject totally. There were only two techniques I had to offer to test and fix the circuits: a) Visual Inspection by peers b) Measuring voltages in circuits that worked (and if they were consistent) compare them with the ones that didn't.
I pointed to Senthil that one of his LEDs seemed backwards. He said that most of them are correct. I told him that even if all but one were backwards it wouldn't help. Most of his LEDs were not marked and as Perumal looked over Balu's circuit Senthil pulled out his LEDs and Balu tested them for him and marked them. Balu had understood the connections correctly, but the three leads of the transistor were perhaps too close and seemed to have shorted out.

I encouraged him to pull out the transistors and spread out the leads and re-solder them. He

did it for one and his LEDs glowed, but quite dull. We measured the voltages and found that one of the node voltages in the other transistor did not match. He then did the same to the other to get his circuit to glow nice and bright. Senthil had not understood something from my explanation, but with a short chat with Perumal seemed all enlightened. He pulled out his complex labrynth of connections and re-soldered them in the way he understood and his circuit worked too. Attached is a pic with each person holding their working circuits out just before I was starting for Chennai.
That evening the kids started preparing a farewell gift for me, the first in-house bamboo Tulir torch which two of them are holding out when they rushed to the bus stop to give it to me.