





Honeybee Network

# Children's Creativity & Co-creation Workshop



**SRISTI**  
Ahmedabd

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# CHILDREN'S WORKSHOP

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CHILDREN'S CREATIVITY AND  
INNOVATION WORKSHOP 2017

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24TH - 25TH MAY 2017  
GRAMBHARTI, GANDHINAGAR

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## Preface

SRISTI strongly believes that every child is creative, irrespective of his/her socio-economic background and locale. Possibly, what may vary is the degree of creativity because of the degree of exposure they might have. To bring out this creativity among children to the fore, every year SRISTI organizes Summer Camps for Children. This year we organized a 9th edition of the 3-day summer camp for the children, at Grambharti campus, Amrapur from 24th May. This year it was also decided to invite children from the government primary schools from 15 districts of Gujarat. In all 77 children joined the Summer Camp. This group was blended with a group of 5 children from Jammu and Kashmir. This year, we also invited 15 primary school teachers, one from each participating district, so that they can replicate the activity in their districts, after attending the camp and understanding the process of igniting the creativity among children.

We wanted to promote originality, creativity and innovative spirit among the participating children; so that when they become leaders of our society they create an imaginative, inclusive and innovative future for the country. We also strived to make our children more sensitive to the problems faced by disadvantage segments of the society who may not be as blessed as these children could be. Through these workshops an attempt was made not only to arouse their creativity but also to inculcate a sense of social responsibility and sensitivity towards people.

While in the camp, the children were exposed to hard-core problems being faced by rural masses, through field visits. They were also exposed to the methodology of identifying problems and finding solutions to those problems. using their creativity. We would like to put on record that our faith in children's creativity was once again vindicated that they have altogether a very optimistic view and new vision to look at problems and treat them as opportunities; and, then devote themselves to find the solutions untiringly. I must also state that despite facing harsh weather during the field visits, when temperature soared close to 45 degrees Celsius, their enthusiasm remained unfazed. Every child was so enthusiastic to provide his/her own solution to the problems identified by them. But at this stage we tried to inculcate team spirit in them so that they are able to work together with people in future and do not work only as solo-players. After a day's field visit, all the five groups not only could identify a significant problem faced by the farmers that called for immediate solution but also came up with very creative and innovative solutions.

Our experience of organizing the summer camp for children was extremely rewarding as it reinforced our faith in their creativity. We feel reassured that the future of our country is bright in the hands of these creative children, who are leaders of tomorrow.



Prof Anil K Gupta

## About SRISTI

SRISTI for the Grassroots and of the grassroot to Ignite compassion and creativity at the Grassroots SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions), which means creation, was established in 1993 to support the activities of the Honey Bee Network, to respect, recognize and reward the creativity at grassroots. The objectives of SRISTI were to systematically document, disseminate and develop green innovations, provide intellectual property rights protection to grassroots innovators, work on the in situ and ex situ conservation of local biodiversity, and provide venture support to grassroots innovators. SRISTI is devoted to empower knowledge rich, -economically poor people by adding value to their contemporary creativity as well as traditional knowledge. It has helped in establishing GIAN, NIF, MVIF and AAS-TIIK.

SRISTI manages the Honey Bee database of innovations and supports the publication of the Network's newsletter in nine languages, viz. Honeybee (English), Gujarati (Loksarvani), Hindi (Sujh-Bujh Aas Paas Ki), Tamil (Nam Vazhi Velanmai), Kannada (Hit-talagida), Telugu (Palle Srujana) Malyalam (Tenetiga), Oriya (Aama Akha Pakha) and Marathi (Mrudgandh). SRISTI is focusing more concerted ways of hitherto neglected domains like women's knowledge systems; value addition through a natural product laboratory; and, innovations in education. The focus of SRISTI's initiatives is centred round the issue of discovering the abundance of traditional and indigenous knowledge that have made the grassroots innovators knowledge rich. However, the entire exercise of unearthing such web of knowledge is couched in a framework of ethical values that are

central to the existence of Honey Bee Network. SRISTI organises Shodh Yatra (Journey of exploration) twice a year, Traditional food festival, Recipe competition, Biodiversity competition and maintains a database of Innovations and Traditional Knowledge. In the past, SRISTI has been at the forefront of advocating the traditional intellectual rights of innovators upon their products, mobilizing support of various stakeholders to articulate their opinion on issues pertaining to traditional knowledge, grassroots innovations, preservation of bio-diversity, etc. SRISTI had organised several consultative sessions with private sectors, scientists, activists and development workers for discussing various issues related to the access to bio-diversity.

Techpedia, another important initiative of SRISTI aims at putting the problems of micro, small and medium enterprises, informal sector, grassroots innovators and other social sectors on the agenda of the young technology students across the country. SRISTI is providing a platform for the industry and academic institutions to collaborate co-create and foster distributed and horizontal innovations.

To promote culture of innovation amongst the young minds of the country SRISTI has established three national awards for innovative student/faculty projects in engineering, pharmacy, science and applied technologies in the name of Gandhian Young Technological Innovation Award (GYTI) since 2012. It also gives SRISTI SAMMAN to recognise grassroots innovators and knowledge holders, people who have come up with creative solutions to problems of all kinds, especially for conserving and preserving bio-diversity, since 1995.





Children are not sink of sermon,  
but a source of ideas.  
- Prof. Anil K Gupta

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STUDENT'S  
CREATIVE WORKSHOP

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# INTRODUCTION



The Children's Creativity Workshop sought solutions to societal problems in villages around Grambharti, Amrapur, Gandhinagar, Gujarat through the creative ideas of some privileged children from around the country, some underprivileged children and engineering students. It was done by exposing the children to people at the grassroots' level like farmers, mechanics, welders, potters etc.

The children were given an exposure to different real-life problems. They were encouraged to empathize with the people and understand the problems faced by people living in rural areas.

## OBJECTIVE

The overall objective of the programme is to develop an operational framework for empowering children to not only articulate their problems but also to find solutions both individually and collectively. This programme will help us understand how young children can be a significant part of the national innovation value chain. The Inverted Model of Innovation implies that children ideate/innovate; fabricators design and companies/agencies diffuse commercially or socially. Involvement of children in solving their challenges will help us understand micro and macro strategies, which can mobilize the creative potential of children around the world. This may help in overcoming persistent social inertia in developing countries. Thus, children will address: a) The challenges that they face, b) Challenges that the society around them faces and c) Other problems that inhibit the unfolding of their potential. The workshops aim at tapping the dormant creative potential of underprivileged children who probably did not have the courage to articulate their ideas. Likewise, those children and youth who have innovated in some areas may come out with creative ideas in other domains as well.

Students came from different states which includes Nagaland, Haryana, Madhya Pradesh, Arunachal Pradesh, Gujarat, Rajasthan, Maharashtra, Orissa and Delhi. Teachers were also called with students in order to make them understand the objective and procedure of Children's Workshop.

The main concept was to spread the word that how young mind can be channelized to think about innovations and how even a small kid can notice problem with his/ her innocent minds of society which we don't see with more developed mind. They not only feel their problems but also analyze and try to find out the solutions which are sometimes better than a fully developed mind solution for the same problem. This talent of these small children should be taken out through these activities and workshops to impart creative thinking among them.

## METHODOLOGY

### SELECTION PROCESS

The students were selected from all over India. Some of these children belonged to villages of Grambharti, Gujarat, Jammu & Kashmir and other states of India.

### WORKSHOP PLAN

The workshop was held over two days. The first day involved brainstorming, a briefing on field work and then visits to the villages where people still work with hands in this machine-world to earn living. On the second day, the children worked in groups in the Grambharti Hall, sketched the problems and presented their ideas to solve them.



# BRAINSTORMING

6TH MARCH 2017 | VISWA YUVA KENDRA





***“Play is the highest form of research”***  
***Albert Einstein***

## **GETTING READY FOR THE FIELD**

The preparation prior to the visits to the villages focused on understanding the day to day problems faced by people of rural India. Then, developing creative ideas for finding out the solutions. During an ‘on the spot idea competition’ the children came up with brilliant ideas.

Professor Anil K Gupta addressed the students and said, “We need to sow the seeds of curiosity to develop our country”. He mentioned that there is no person in this country who has never experienced a difficulty in his/ her lifetime. But we always learn to live with it and resolve it in our own ways. No one is small or big. Everyone is capable of solving a problem in one way or the other.

Professor told a beautiful real story about how a small village girl came up with an innovative solution of a problem we all must have experienced during our childhood but failed to notice it. The girl named Chhaya resolved the problem of drinking water from taps which used to be at the same heights earlier by providing a solution that they should be installed at different heights. This way the smaller height children can drink water from the lower most tap while the adults can drink water from the taps placed at heights. Thus, every person of every height will be able to access water taps for drinking water.

Professor then said that the first step to identify a problem is to Observe, Draw/ Write, Interact with the concerned person to get more clear understanding of the problem and finally ask questions to oneself to identify the problems. Once the problems are identified, one again needs to ask questions in order to find out the solution for that problem.

Professor said that some things can only be written, some things can only be seen and some things can only be thought.

He ended his session by suggesting that children should work in a group and there should be a variation in ideas just like we have variation in our clothes.



***“Children are magic because they look for it”***  
***Christopher Moore***

## ILLUSTRATING INNOVATION TO CHILDREN

He talked about IGNITE inventions and explained children how they have approached to a particular problem and what was their methodology to resolve that problem. He said that most of the problems taken by these IGNITE students were genuine and very important. Only those who felt such problem thought over it and tried to find out a solution.

He gave instructions for the field visit to children and said that children should first observe the area and try to understand their problems by empathizing with them before jumping to find out the solutions. Further, he asked students to jot down all the problems they think exist in their mind in order to clear their mind spaces for identifying new problems.

Following is the list of few problems written by students:

- The problem is to solve LKG and UKG bench and desk. These children they face problem while sitting in the class, is it possible to solve their problem by having one desk and bench for every student.
  - Proper roads, electricity and water problem.
  - Disposing Plastic bottle bags is a big problem which is causing environmental problems. This is due to lack of techniques for proper disposal of plastic bottle.
  - Some people are not able to guess the fruit if it is fully grown and ripe or not and thus they buy bad fruits
  - When something falls behind the cupboard, how can we get it back.
  - When we are rubbing some written statements on the blackboard, it does not rub properly. Due to this, any user has to rub 2-3 times and it places the shadow black spots on the board so what can be done to solve this problem?
  - In train at the night time, the luggage and cell phones get stolen so what can be done for that?
  - Stairs of Buses are at a good height for aged people to step in the bus to get in.
  - State and central governments implement a lot of schemes for people who are living in rural areas to benefit in every sector of their life but they just remain schemes in papers and never become live. People from rural background never get benefited by them because they are never apprised of such schemes. And because of lack of information they remain unknown to the schemes.
  - Projectors work in a dark room. The images displayed in a projector are usually not clearly visible if the room is filled with light so there should be a projector which works in lighted room as well.
  - If we forget to switch off the Mic after giving a lecture in conference or some other place and then carry forward a secret discussion with another person in the same room with mic on by mistake. This might become a big problem for speaker. What can be done to solve such a problem?
  - Problem of electricity even in this technologically advanced era, there are still some places where people are living in dark and do not have the facility of electricity.
-

- Many people die because of electrical shock as they don't wear proper safety gears. So there should be an awareness programme to encourage such people to take proper safety measures before dealing with electricity as it can be life threatening.
- Train travelers are usually get bothered by some metal people, something should be done to avoid such people to board the train.
- Problem because of plastic: Plastics are non-degradable materials so there is an urgent need to take proper measures to deal with plastic issue.
- Problem of sound pollution in different events.
- Unemployment problems faced by handicapped people.
- Water pollution: Industries pour all their polluted water into the fresh water rivers and pollute them.
- Forget to switch off their lights and fans when they leave the room.
- People usually use plastic cups for tea and coffee and throw it in the dustbin but instead this cups cane recycled and we plastic table can be made out of it. We need to melt all this plastic cups into container and then spread this melted plastic onto a wooden cardboard after applying oil or oil like substance which acts as a sticking agent between melted plastic and cardboard and let it dry for some time. The final product will be a plastic table.
- There should be some solution to avoid soil pollution caused by thrown away used pens and slippers.
- When we walk, sleepers can create electricity. The Frictional force which gets developed between our footwear and floor/earth surface.
- There should be solution of the problem were phone batteries get swollen up and burst which can injure some people.
- The should be a provision for students who study in school but have shown poor performance so that they can improve.

***“When you cease to dream, you cease to live”***  
***Malcolm Forbes***

## FOSTERING IMAGINATION

He is a person who believes in activity based learning. That's why, he organized some playful activities for students.

### **KNOW YOUR STRENGTH:**

#### ACTIVITY:

Firstly, guess how many words can you speak in a minute and then speak as many words as you can in a minute. Finally, compare your guess with your speaking result. With this activity, it was found that we always underestimate ourselves and don't even try to achieve what we are capable of achieving and settle for less.

#### LESSON:

Don't underestimate yourself and Aim for high goals to achieve high goals in life.

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A group of people, mostly men wearing white caps and backpacks, are walking away from the camera down a narrow, overgrown path. The path is flanked by dense green foliage and numerous bright pink flowers, likely bougainvillea, which are draped over the path. In the background, a simple building with a blue door is visible through the trees. The overall scene is bright and lush, suggesting a tropical or subtropical environment.

**DAY 1**

24TH MARCH 2017

*"Everything you can imagine is real."  
Pablo Picasso*





**The children were divided into 5 groups for field visits. They respectively worked in these five groups making observations of the problems faced throughout the different places of work.**



# GROUP 01

Deepak  
Nilesh  
Rohan  
Kyathi

Nancy  
Hemang  
Siddharth  
Bodhi

Paresh  
Sagar  
Kartik  
Iftak

Tamara  
Anmol  
Aviral  
Neel

Pradeep  
Kuldeep  
Lency  
Tarak

Avaneesh  
Ayush  
Aditya  
Ketan

## 1. COBBLER

Name: - Jansari Girish kumar

Village: - Pratapnagar

Observations:

- Backpain (while sitting)
- Palm injury (by ropes)
- Uses electric machine for stitching, if there is no electricity they stitch by foot.
- They only make chappals (in 1hr which cost 170 but they sell them at 300). Initially, they used to make boots also, but because of injury issue he stopped making boots. it takes 3 hr to make a pair of boot.

## 2. MOTOR REPAIR SHOP

Name: - Natthu bhai

Observations:

- They usually make motor, fan and shovel.
- Motor is quite heavy. Thus, making it difficult to lift to the working area. The weight is approximately 100 kg.
- The scissor which they use in repairing work is heavy and hard to use. It takes much effort to press.
- The process of hammering in shovel making is quite injurious as the flames coming out directly affect eyes.

## 3. WELDING SHOP

Name: - Sandeep bhai

Observations:

- While welding, they wear black glasses to avoid sparks which are dangerous for naked eyes. These glasses have net at their sides to facilitate air but that allows smoke to pass too which are coming because of welding.
- They experience at least 2-3 current shocks in a day.

#### 4. ALMIRAH SHOP

Name: - Sanjay bhai

Observations: -

- Uses machine to colour the almirah which takes 3 days.
- Alimirah is quite heavy to move from one place to another place.
- They have drilling machine to drill holes (still renovation needed).
- There is a wheel connected with machine which is used to bend plates and it is extremely difficult to rotate it.

#### 5. MATTRESS SHOP

Observations:

- Machine costs Rs. 25000 which is used to cut cotton and separate the unwanted material from cotton such as seeds and small stones.
- Breathing problem because of cotton flex coming out from the output area.
- They cover output by curtains.

#### 6. AGARBATTI SHOP

Observations:

- Sticks import from China. (12 inches in size).
- Machine costs Rs. 94500/. It is imported from China.
- They cover their investments of machines in 6 months.
- Hands pain usually while they work continuously on machine.
- The materials they use for making agarbati (incense stick) contains zicate (to bind carbon to stick)
- They use different perfume solutions, dip the agarbati stick into it and let them dry.

#### 7. EVENING FIELD TRIP

Village: - Valluah

Observations:

- Paddy cleaning
  - Uses two machines - manual fan and thresher. Manual fan is used to clean paddy from dust and unwanted materials and thresher is used to separate covering from paddy.
  - There was a machine which was used to remove husk from coconut. The machine has two spicks in which one is stagnant at one place and another is movable attached with a rod. The two spicks were put together and coconut was struck into it and use rod to separate movable spick from fixed one.
-

# GROUP 02

Nisarg Patel  
Ravi Chauhan  
Thakur Sandeep  
Ritu Goyal  
Nirav Patel

Parth Patel  
Bhumit Makvana  
Manisha Mahera  
Foram Chandarana  
Lahery Kuldip

Kunjan Patel  
Raju Padaliya  
Dipika Thaker  
Ratan Das

Mahendra Hemani  
Tirth Bhagora Paras  
Chopra  
Mohit Dalal

Sai Siddartha  
Girish Joshi  
Kartik  
Neelanjana Paul

## 1. COBBLER'S PLACE

Name : Keshav Lal

He was a humble old man who makes shoes for living. He explained the process of making shoes lucidly. His arsenal of tools included a Ropi (cutter), Vayra (flattens leather), hammer, iron leg & jumbu (plucking nails). Kids awestricken asked him various questions on his craft.

Observations:

- Pain in back and hand due to hammering.
- Chance of getting injured due to sharp tools and nails.
- Prone to skin disease and allergies to due polish and leather.
- Handmade shoes have gone out of fashion.
- Concern regarding the falling economics of business.

## 2. CONSTRUCTION WORKER

visited a construction worker's home. He along with his wife shared their work life with kids with practical demonstrations.

Observations:

- Device used in throwing cement on the wall was heavy.
- He had to carry a 20 kg bowl of cement until his cementing job is finished.
- He showed a device to level.
- Idea about using plastic as a material for tools was discussed

### 3. METAL WORKSHOP

Observations:

There was a metal workshop that primarily made ploughs for farming. They had a sophisticated machine that could perform multiple functions like hammering, cutting, flattening, grinding & drilling. Unlike the ones available in market that could perform only one individual function. The shop owner Mr. Ismile made it himself in past and now sells it too. Since this was a heavy-duty area and was risky hence kids stayed out and did not participate in the discussion.

### 4. DHOL MAKER

Observations:

Morning's field visit last halted at a shop where two women probably wife and mother-in-law were selling few musical instruments. It was fun to meet them. They even let us play them. They said they don't have many problems. They purchase ready made parts to make their instruments. One problem was that their market was small and they couldn't make sale every day. Their customers come from nearby villages.

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# GROUP 03

Jemin DipakBhai  
Harsh Agarwal  
Rudra Patel  
Sushrita  
Deep Dangariya  
Kenil Patel

Jetho Beeka  
Arpit Bankawat  
Tanuj Vishnoi  
Abhishek Dubey  
Nikita Tiwari  
Divgian Singh Sidh

Trisha Shantilal Maliwal  
Satish Gaurav  
Aditya Kumar  
Haresh Dayabhai Thakor  
Harshikesh VishnuBhai Patel  
Sai Susrith

Ankit Raghuveer Bhai  
Krisha AmarsanghBhai Solanki  
Yash ShaileshBhai Rawal  
Pranshu ChetanBhai Kumar  
Rakesh ManuBhai Thakor  
Rahul Mukesh Thakor

*"Your desire to change the world and the world's desire to change you are constantly competing with one another".*

## 1. POTTER'S SHOP

Village: - Lodhra

The summer school team went on with some school kids to identify the grassroot problems at a pot production unit.

Observations:

Firstly, the potter explained us the whole process of making pots starting from the collection of mud to the complete pot. The team observed things from its raw material intake to the whole process of the development of the final pot starting from the preliminary mixing of mud and its sieving; moving to the process of thumping to soften it and then to its final shaping, coloring and polishing.

On interacting with the potter, he said that they buy mud from a contractor who collects it from the pond. They put it in a water tank and let it dissolve for some time. Once, it is completely dissolved in water, there were two outlets



from that tank from where this mud comes out and separate it from the granules to have the uniform sand.

Observations:

- The team found the conventional potters' sieve to be obsolete and time consuming as it allowed the intake only from a small hole
- Thup Thup Thup! This process continues for about 15 minutes and the matka takes its shape. 15 minutes for just a 12 rupee matka and this is not even half the process.

## 2. CARPENTER

*Village: - Delvaad, Gujarat*

On the visit to Delvaad village, the team visited the house of the Sarpanch of that village. It was the most advanced house in the neighborhood. There the team met Mr. Mukesh Bhai, the head carpenter and other workers, they made farming tools there and were skilled in their job. A Hal was shown to the team. The machines they used were absolute and not at all safe in any manner.

Observations:

- The whole process of tool making from carpentry was a slow and old process
- The process was not safe as it could cause severe damage to a person who is new to those machines. Even if someone is proficient but careless, the person can get injured.
- Process involves a lot of dust and dirt particles which are harmful for their eyes.
- Machines used were very old and inefficient and the connections were also such that the labor could not run only one of the two without incurring any significant trouble.



## 3. MILK STORAGE CENTRE

*Village: - Delvaad, Gujarat*

Milk is an essential component of diet for everyone from children to the old ones, but we have no clue about the intricacies of the process involved. Now wondering what's that?

Milk collection centre is a unit where milkman sell their milk from their small dairy farms in return of a sum which is calculated from the percentage quantity of fat in the milk.

Observations:

- There was a loophole where the contractor can play with the fat figures and the transparency was on stake.
- The summer school team identified that there can probably be a problem with the distribution of adequate money to the milkman (corruption) providing milk to the collection centre.

# GROUP 04

Ghanshya Alpesh Mori Jaswant	Harsh Kishan Shyam	Puja Bindu Mehul	Shreyasvi Shubham	Rounak Hrishikesh	Meru Anurag	Alpesh Thakor Mahammad	Amit Binal
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## 1. PIPE TRADERS

First, the team went to Umiya traders, they were selling iron pipes, bamboo pipes and wood pipes. Also, they were selling cement beams for construction and other iron made structures. So, the place the team visited was the selling shop where all the items were on display for sale but they are manufactured at a far-off place.

Observation:

- Paddy cleaning
- The owner told us that there are two problem which they usually deal with one is the shortage of labour. So the labour is arranged on need basis from a nearby stand, from where other people also take up the labour. But since most labour go to the cities for higher margins, sometime the local region face the deficit.
- Second problem is that of loading and unloading heavy metal pipes, wooden pipes and cement beams by the labour on/from the truck. So, any solution to help the labour reduce their load and transfer the material safely and more efficiently would really be of value.

## 2. IRON HOOK WORKSHOP

Second place, the team went to a workshop for making iron hooks. These are the hooks which are used to link the trucks and trolleys together. The team saw multiple machines and understood the procedure. The procedure starts with a metal rod which is almost cylindrical is heated in a furnace, pressed hard on the bending machine and converted into the shape of a hook. Finally, it is left for drying. The bending machine was operated by the leg of the operator while his hands were used to control the hitting configuration of the iron piece. The iron residue left is sent to kabadiwalas who make iron tablets using the iron filings.

Observation:

The person is standing and the machine demands a posture for strain. Also the machine has irregular frequency for hitting the iron which can be optimised and controlled up to much precision. The owner reported that the spring used in the machine breaks quite often which costs him really.

### 3. METAL BENDING WORKSHOP

Third place, workshop for metal bending. At the workshop, a vacuum pump was being installed and there were no activities to observe.

### 4. METAL SHEET WORKSHOP

At this workshop, there were three operators and three machines for making small metal pellets used for packaging. These pellets are made from a metal drum from which big pieces of sheet metals are cut and which are then sent into compressor to make it uniform. But while cutting using the cutter which he had a risky process, the inner walls of the container also had glue, paint, etc which is manually removed and cleaned. Then this big part of the compressed sheet metal is then cut into strips which goes into the pelleting machine which sprouts out pellets onto a wall which are then manually picked and checked for quality and then packed in packets for selling.

Observation:

- Manual cleaning and cutting of large metal drums which is a bit risky and ineffective. The machine used for pelleting required the operator to sit in an unrelaxed position for quite some long time with one of his hands pouring the metal strip into the cutting machine and the other hand holding the metal strip near the blade for cutting, so the operator confessed that the hands do cause pain to him, which was also evident otherwise. Also, the same machine can be modified to catch/collect the pellets and then through slotting, the quality pellets gets separated automatically and a lot of human time and energy is reduced.

### 5. NAMKEEN SHOP

Fifth place was a shop for spices and namkeen. The owner had done MBA in marketing and their spice brand is in the market since 1988. The facility procures the chilly from Bangalore which is crushed into chilli powder and packaged into a sellable product. There was a storage facility also for storing the procured chillies which had rats. There was also a mixing machine to mix the spices, the entire place was very clean and well kept. The crushing was done through a pulveriser which spreads the chilli powder in the air which we couldn't bear but was normal for the workers. Also, we met two workers who were rolling dough and putting dots in the rolled dough.

Observation:

- Chilli powder in the eyes. The worker need not make 8-9 dots in 8-10 seconds but instead make the same number of dots with one punching machine bringing great efficiency.

### 6. KHAKRA SHOP

Sixth place, manufacturing of Khakra. We were not allowed to take pictures and videos of the place; the place was well managed with women and high-tech machinery. A few points for optimisation and improved ventilation was identified. All the processes were automated, starting from dough making, to dough pressing to hot pressing and driving to hot packaging.

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## 7. EVENING VISIT TO THE VILLAGE

Observations:

The solar panels were really dusted and not cleaned at all. The waste was thrown around and the team also found burning at many places. Cactus was used to fence around their home which they saw being installed with bare hands. The team asked an old man about the facilities available and the problems, he said there was everything and that there was no problem being faced by them. Dung all around. Very dirty lake and pond.

# GROUP 05

**Nitin Parmar**  
**Sanjay Hemani**  
**Meet Ramoliya**  
**Vasim**

**Sachin Prajapati**  
**Rohit Thakur**  
**Kiran Vadecha**

**Akshay Mer**  
**Jaydeep Rathod**  
**Tejasvi Balochiya**

**Mahendra Makwana**  
**Jaimin Solanki**  
**Khushi Patil**

**Raval Mitesh**  
**Patel Adit**  
**Damor Shailendra**

## 1. BLACKSMITH

*Village - Balwa*

The blacksmith's workshop had a semi-automatic hammer press, a drilling machine and a cutting machine. The machines were used to rework worn out ploughing blades during the peak season and make toys out of molds in off season.

Observation:

- Paddy cleaning
- Blades are used for ploughing.
- Blades are heated for 10 minutes before hammering.
- Machine was foot operated.
- Drilling machines were used to make holes in the blades
- One set contains nine blades and he makes 10 sets daily.
- Each set can plough 5-10 beeghas.
- The smith had to bear a lot of heat.
- Hammering created a lot of sparks due to impurities in metal.

- The job gets reduced in size as it is sharpened every time (5-6 rework) leaving scrap in the end.
  - The efficiency was reduced because of rust.
  - Blades became curved when hammered.
  - Blower was used to keep the furnace running.
  - The worker made peacocks out of moulds.
  - It takes time to transfer the job from one machine to another
  - There was a drilling machine and a cutting machine.
  - He charged Rs. 200 per set (9 blades)
-

# gian

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DAY 2

PRESENTATION OF SOLUTIONS  
24TH- 25TH MARCH 2017

Handwritten notes and a diagram on a whiteboard. The diagram shows a large green sphere with a smaller cylinder on top, connected by a line. The cylinder has a label 'GSD' and some text. The sphere has a label 'GSD' and some text. The notes are in Hindi and discuss the concept of 'GSD' (Green Sustainable Development) and its impact on the environment.

Handwritten notes in Hindi:

- प्रकृति से ले आये हुए पदार्थों को कहते हैं।
- प्रकृति से आये हुए पदार्थों को कहते हैं।
- प्रकृति से आये हुए पदार्थों को कहते हैं।

Diagram labels:

- GSD (Green Sustainable Development)
- GSD (Green Sustainable Development)

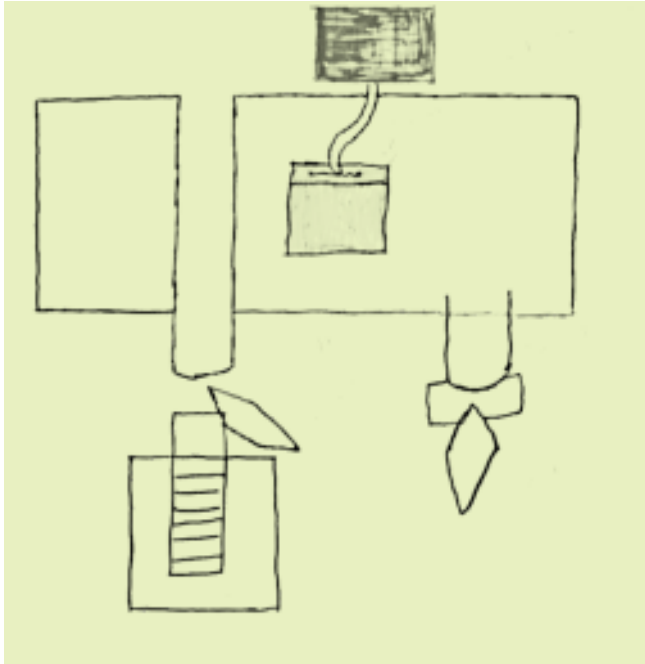
Handwritten number: 6-4



www.grambha

***"Too often we give children answers to remember,  
rather than problems to solve."***





### Rathod Jaydeepsinh D

Group 5

#### PROBLEM ▲

When the worker working with the iron sheets hammer the metal with the machine to thin down the red-hot metal piece. The worker has to stand continuously to perform this task.

#### SOLUTION ▲

There should be an arrangement of a chair near the machine where the worker can sit comfortably and carry out the task with the metal piece and machine. This will reduce the strain in his legs caused by continuous standing.

### Manavadiya Rohit Rameshbhai

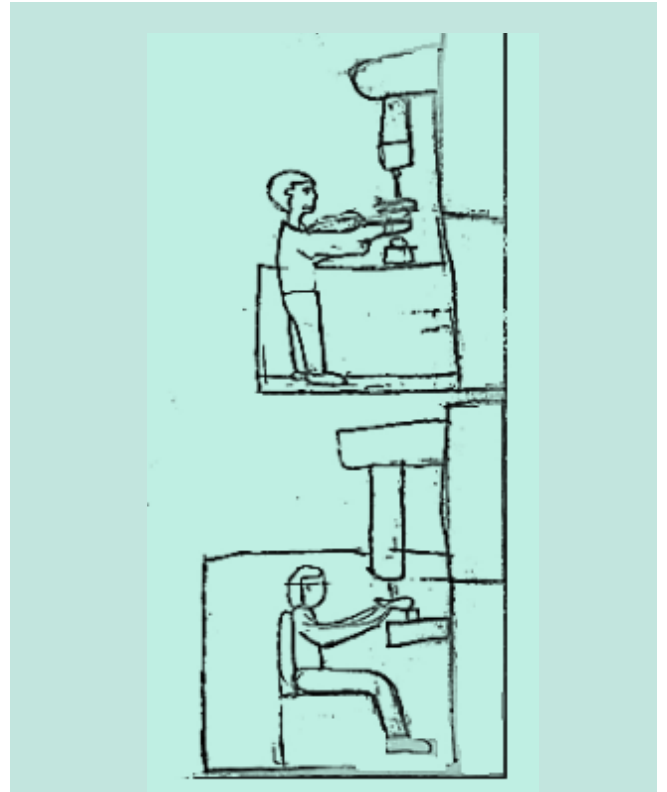
Group 5

#### PROBLEM ▼

The manual labor working at a metal shop has to move from one place to another with the metal to thin down the metal at one place. This increases the processing time of the metal sheet.

#### SOLUTION ▼

The metal cutter should be attached in the same machine which consists of the hammering machine. This will save a lot of energy and time of the labor.



## Khushi R. Patel

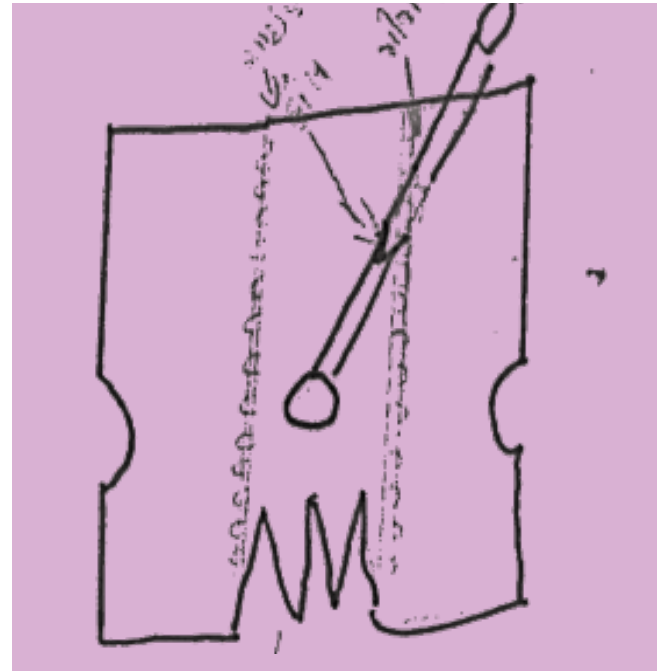
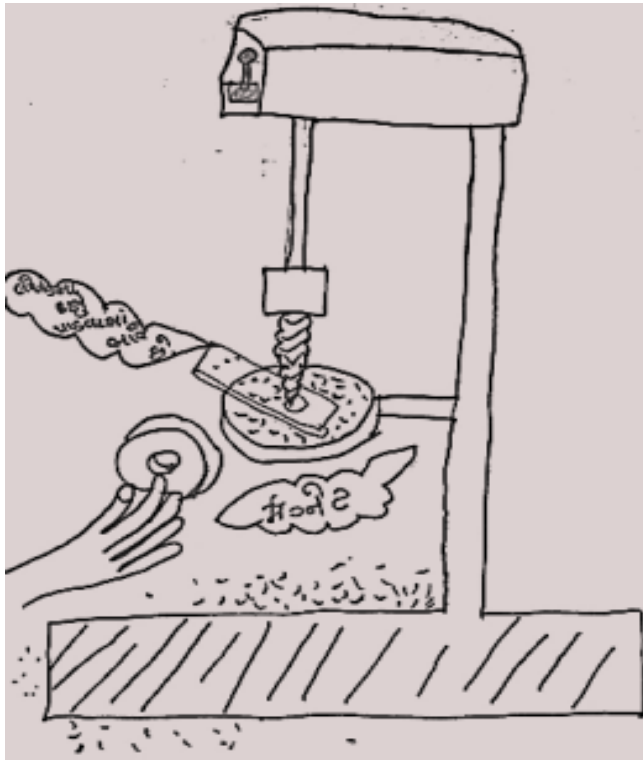
Group 5

### PROBLEM ▼

While using the drill machine, the iron particles can enter the eyes of the user. Thus, there is a high risk of eye damage and other health problems if these small particles enter into the user's body.

### SOLUTION ▼

One should attach a magnet, near the stand where the metal piece to be drilled is placed. This will attract all the iron particles. The iron particles will thus stick to the magnet instead of going here and there.



## Hemani Sanjay KiraranBhai

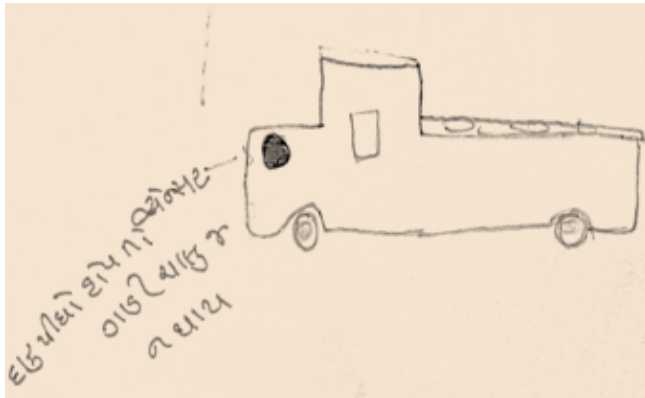
(Group 5)

### PROBLEM ▲

One needs 2-3 type of equipment to dig for planting a sapling. It becomes time consuming. Also, one cannot carry these equipment in their shoulder bags as the equipment are usually big.

### SOLUTION ▲

The equipment shown in the figure is a multi-tasking equipment which is a combination of spade, trowel and rod with pointed end.



### Group 5

#### PROBLEM ▲

If one drives any vehicle after drinking alcohol, one becomes prone to accidents.

#### SOLUTION ▲

To avoid such accidents, there should be a sensor attached to the vehicles which will detect the presence of alcohol in the driver's body. If the result is positive, the engine should not start.

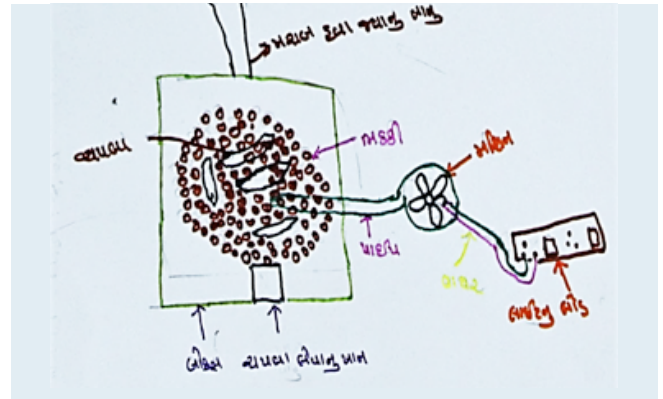
### Prajapati Sachin Kumar Group 5

#### PROBLEM ►

The cobblers face a lot of problem while cutting leather in the shape of a slipper.

#### SOLUTION ►

There should be a stencil with a blade attached to it which will automatically cut the leather in the shape of the slipper.



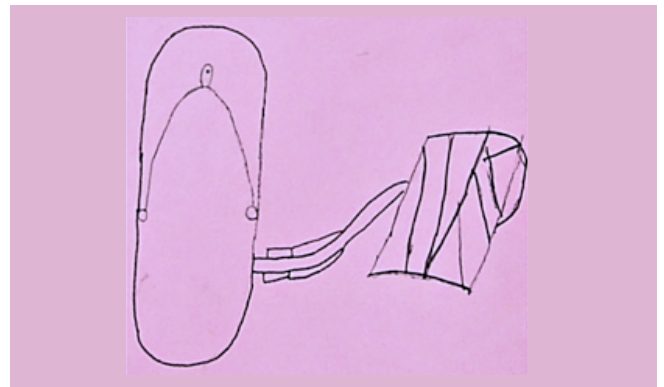
### Manavadiya Rohit Rameshbhai Group 5

#### PROBLEM ▲

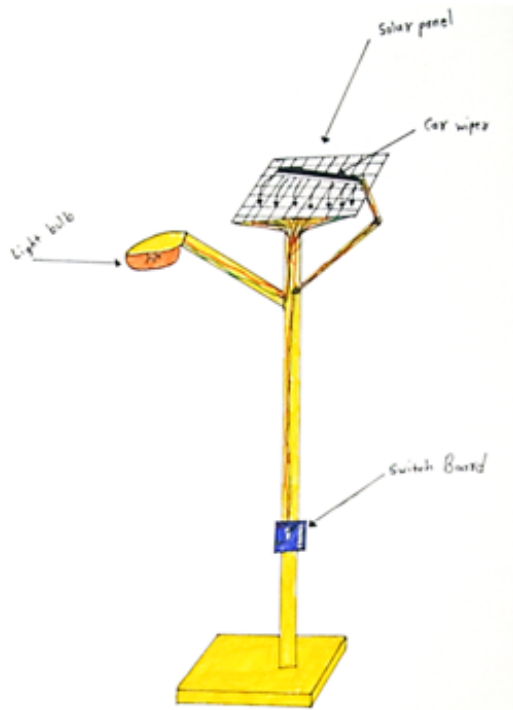
There temperature becomes too high near the furnace. Thus, the workers feel very hot while dealing with the furnace.

#### SOLUTION ▲

There should a facility of fan attached to this furnace, which will cool down the outside temperature of the furnace. Thus, making the workers life comfortable.







## Pratiksha

### Group 2

#### PROBLEM ▲

The solar panel usually gets dirty because of its constant exposure to dirt and dust which decreases its efficiency.

#### SOLUTION ▲

There should be a wiper attached to this solar panel with a switch at the end of the pipe. One can clean the solar panel whenever required with the help of the switch.

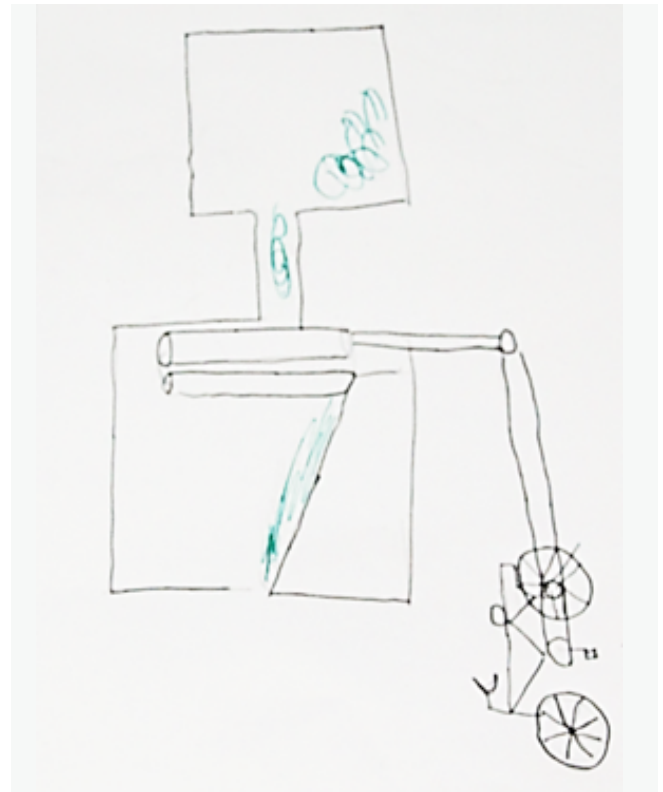
## Group 1

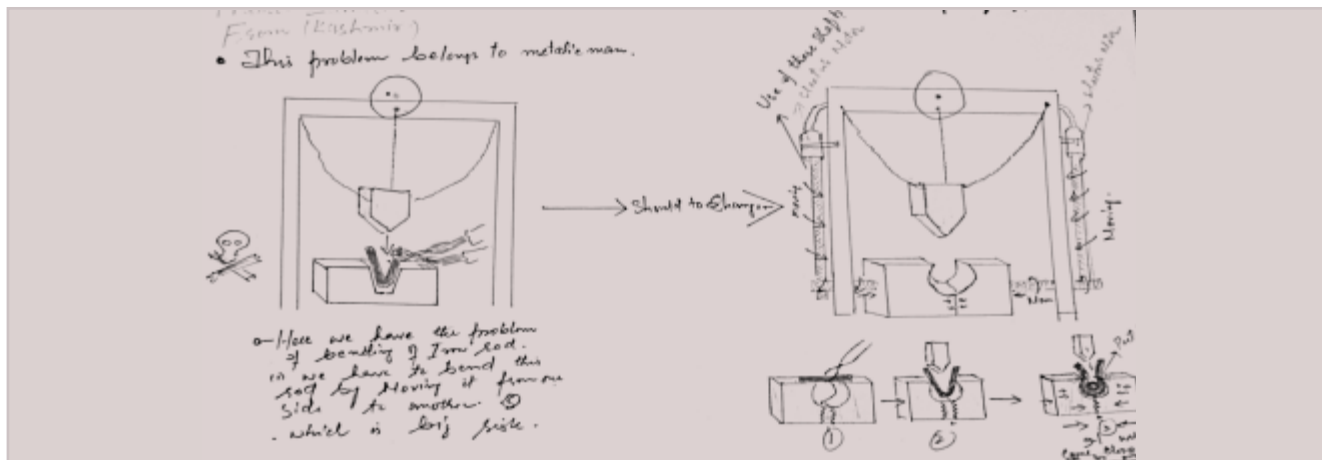
#### PROBLEM ▼

There is no proper technique to clean cotton from the piled cotton. Because of this, the rate these cotton workers get for cotton is very less.

#### SOLUTION ▼

The kids has designed a machine which consists of a box containing cotton so that it doesn't fly away here and there. From one side, the cotton will be pumped, being lighter, it will be collected in another box and dust will fly away.





## Jiya

### Group 2

#### PROBLEM ▲

The iron rod needs to be bent due to its large size, it becomes difficult for workers to bend it.

#### SOLUTION ▲

Instead of a man putting that larger piece of iron into the machine, there should be an inlet pipe from where one can insert the iron rod which will bring it to the middle part where the machine will bend it. And finally, it will bend the iron. This will come out from the other side.

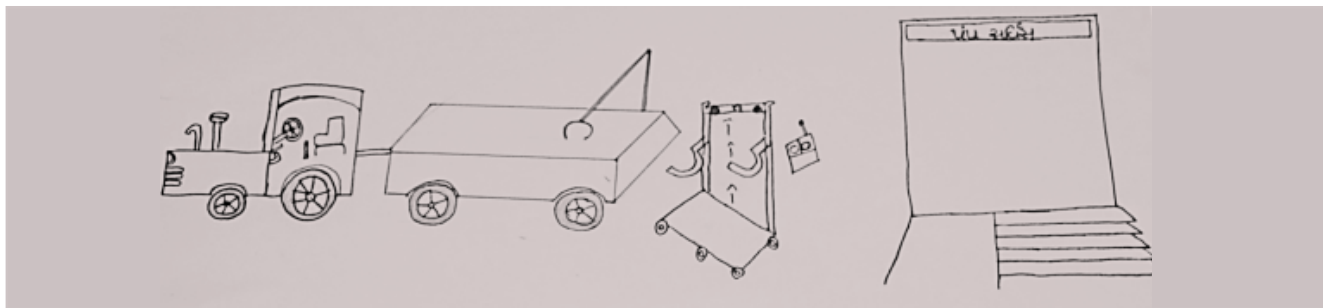
## Group 1

#### PROBLEM ▼

When the workers must transfer heavy load objects from tractor or truck to the storage place, they face a lot of difficulty.

#### SOLUTION ▼

Instead of a man carrying those large objects from the vehicle to the storage place, there should be a trolley equipped with wheels which can transfer the load easily from one place to another place. This will save time and energy of the workers. Also, it will reduce the injuries caused by falling of these heavy objects.





## Zahid

Group 4

### PROBLEM ◀

One old man was lacking sight in one of his eye. Due to this, he faced a lot of problems while doing tasks.

### SOLUTION ◀

An advanced spectacle should be made which will help him in doing his tasks even with one eye.

## Harsh, Amit, Alpesh Mori, Mohammad, Alpesh Thakor, Puja

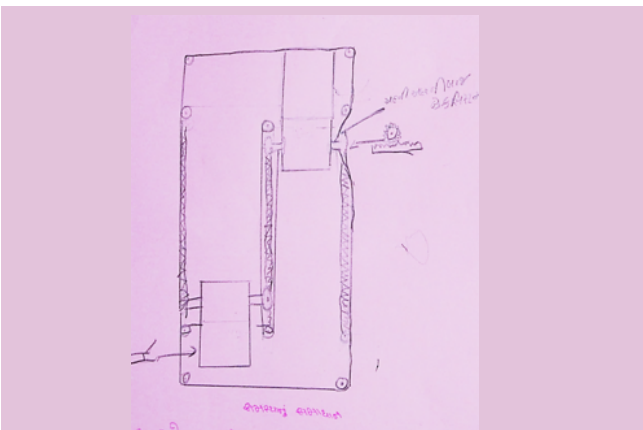
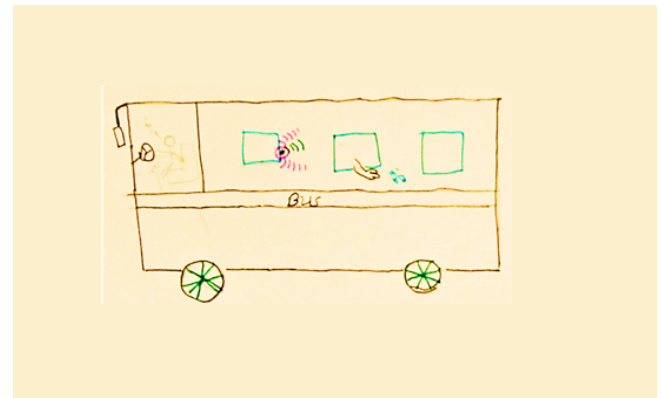
Group 4

### PROBLEM ▶

Passengers in a bus usually throw garbage outside the bus in open spaces through the window.

### SOLUTION ▶

Bus should be equipped with a sensor which will not allow the passenger to throw their garbage outside and will also alert the driver with an alarm about the same.



## Puja Jagdishbhai Patliya

Group 4

### PROBLEM ◀

Handicapped and old people face a lot of problems in climbing stairs

### SOLUTION ◀

The pulley like arrangement should be there which will facilitate the climbing of such people in an easy manner by sitting in a basket attached to the pulley.

## Mohammad Rizvan

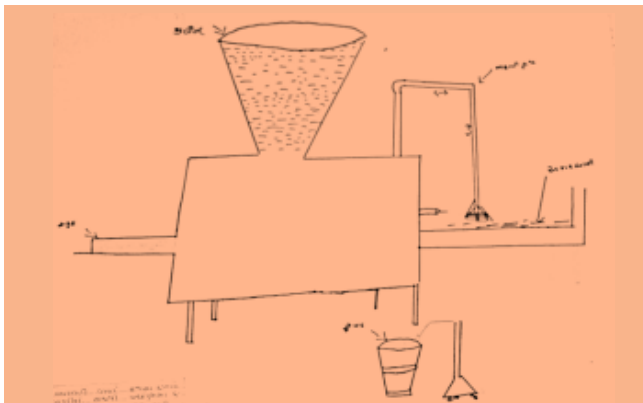
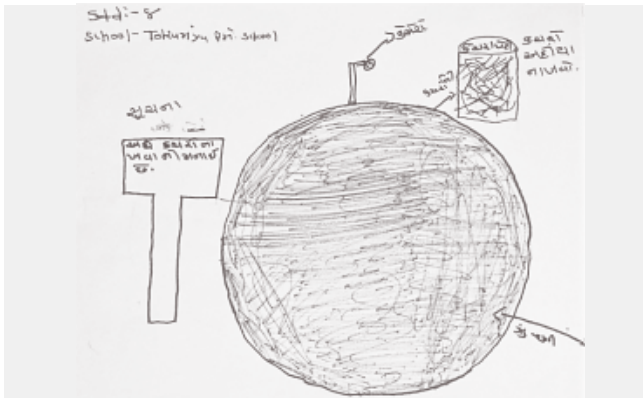
Group 4

### PROBLEM ▼

People throw waste material while using ponds water and pollutes it.

### SOLUTION ▼

One should put a warning board in front of the pond and there should also be an arrangement of the CCTV Camera.



## Patel Parth, Patel Man

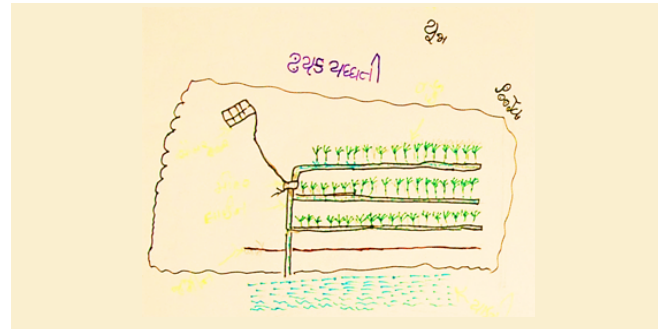
Group 2

### PROBLEM ▼

When we irrigate crops, a lot of water is

### SOLUTION ▼

The irrigation should be performed in such a way that the water loss is minimalized while irrigating crops. The row should be one above the other, this way if we supply water to the first row, it will step down the first row, get absorbed and the extra water will go into the second row.



Group 1

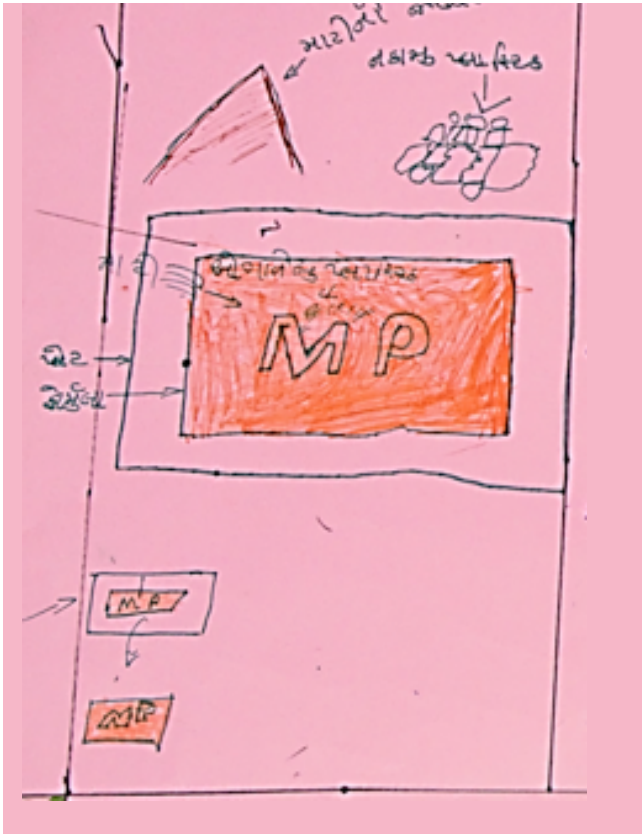
### PROBLEM ◀

Incense sticks making requires a lot of effort. The hands of the workers ache due to this repeated activity.

### SOLUTION ◀

There should be a machine where one has to just put the materials and switch it on. IT will automatically make the incense sticks and will come out from another side.





### Group 1

#### PROBLEM ▲

A lot of plastic is being used by us now-a days. The major problem with plastic is it's decomposing. Being non-biodegradable, it creates lot of waste on earth.

#### SOLUTION ▲

One should mix plastic with soil used for making bricks. This will not only decrease the weight of the brick but will also increase it's strength.

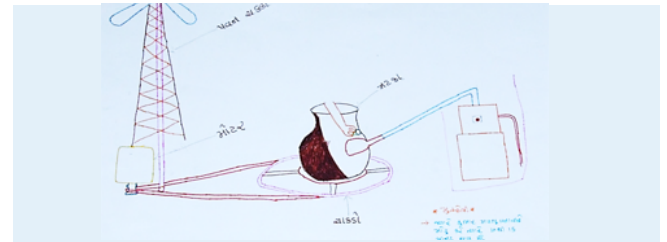
### Group 1

#### PROBLEM ▼

The workers who do welding protect their eyes but not the rest of their face and head, thus putting them in danger.

#### SOLUTION ▼

The welders should wear helmets as shown in the figure in order to avoid damage to the head and face from the harmful particles while



### Mahera Ankit Kumar Raghuvver, Malivad Prishaben shantilal

### Group 3

#### PROBLEM ▲

The potters use electricity to make give shape to the pot. This increases cost of making pot.

#### SOLUTION ▲

Instead of electricity, the potters who stay near coastal region should use wind energy and solar energy to reduce their cost of manufacturing of the pots.

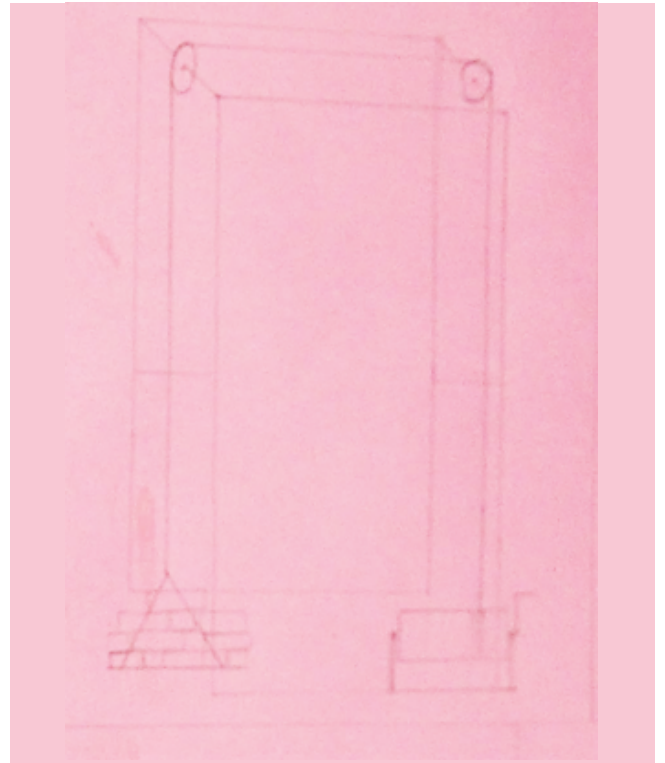
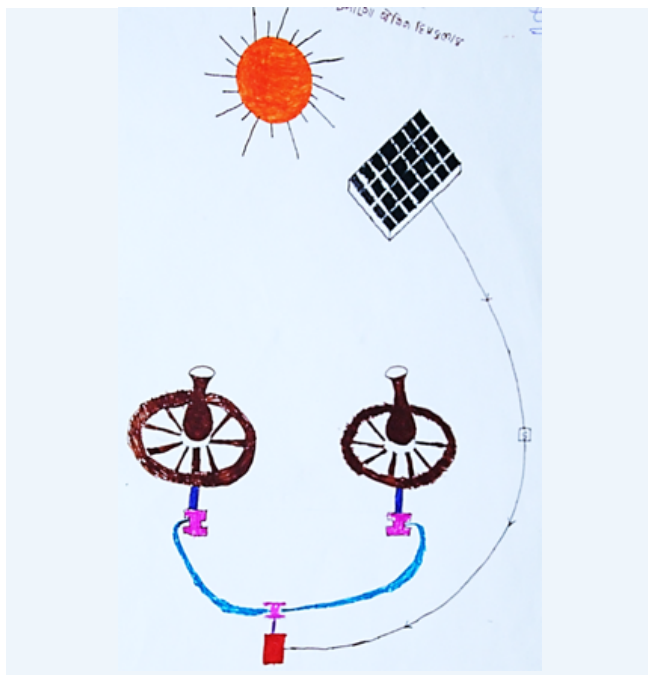
**Padaliya Raju, Thakor Dipika, Hemani Mahendr**  
Group 2

**PROBLEM** ▶

Manual workers face problems of back and shoulder ache when they need to carry bricks from one floor to another. Also, sometimes they slip and get injured.

**SOLUTION** ▶

The pulley system should be made as shown in the figure. One can join two pulleys and with its help, one can take large number of bricks by operating the pulley manually from the other side. This will reduce the work and will save a lot of time. Also, the risk of getting injured will also decrease drastically with low cost.



Group 3

**PROBLEM** ◀

The potters have to put a lot of efforts while making earthen pots. But these pots do not give them good return value according to the labor required in making these pots. Not only is it a tedious job but it is also very time consuming.

**SOLUTION** ◀

The machine used by potters to give shape to the soil should be made in such a way that it operates on solar energy as well as electricity. So that in summer season, potters can utilize solar energy and cut down on electricity bill.



**Sandip, Tirth, Nisarg, Raju**  
Group 2

**PROBLEM ▲**

The workers who plaster on the wall carry their cement baskets in one hand and do plaster from other hand. This increases the time in which they carry out the process.

**SOLUTION ▲**

One should make a suit which should have a basket attached to it as shown in the figure in the front, where the cement mixture will be kept. Through this, they will not have difficulty in carrying out the process and they will also be able to utilize both their hands which will increase the overall speed of the process.

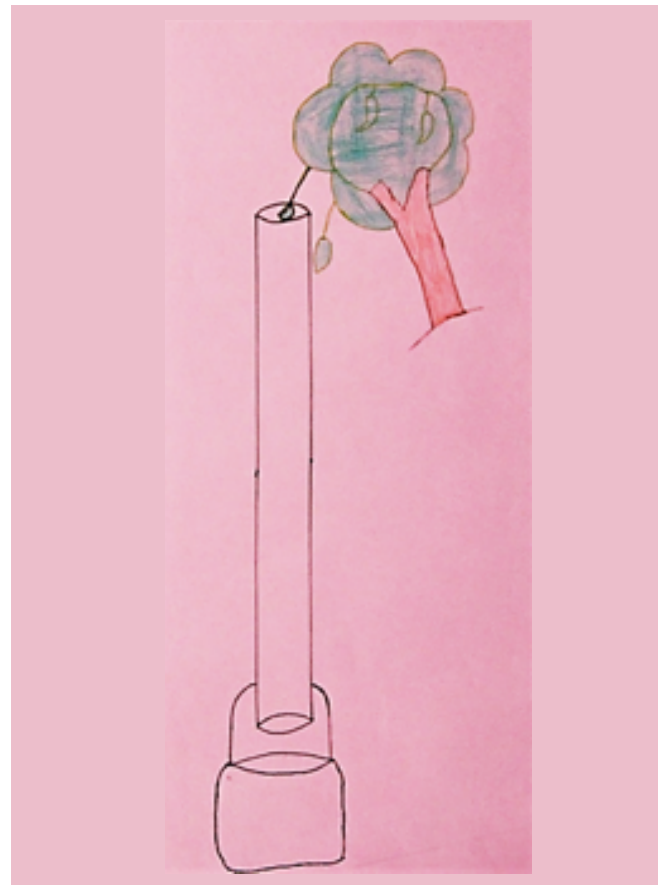
**Sandip**  
Group 2

**PROBLEM ▼**

When fruits are fully ripened they fall from the tree. Due to this, many fruits get spoiled. Thus, reducing overall yeild.

**SOLUTION ▼**

The farmers should use a pipe which contains a hook at the top end and a basket at the bottom to pluck the fruits as soon as the fruits get ripened,





### Ramoliya Nirav

Group 2

#### PROBLEM ▲

The manual labour when use equipment like Ropi and polishing stone become prone to skin diseases. Sometimes, they also get rashes in their hands which hampers their daily health.

#### SOLUTION ▲

One should make a cost-effective rubber glove to protect their hands and their skin from such diseases while working with such equipment.

### Pranchu Patel, Harshikesh Patel

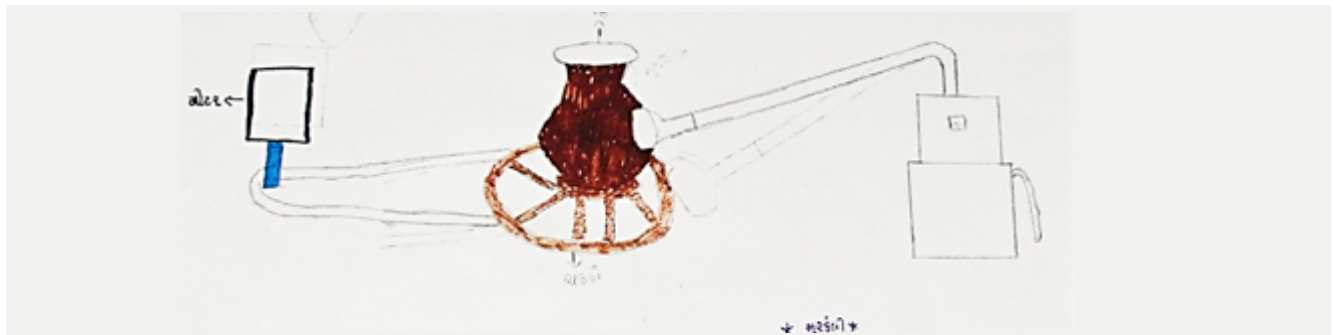
Group 3

#### PROBLEM ▼

While giving shape to the pot with the help of the stone and thumping process, the time consumption is huge and the end product doesn't return enough value for the pot.

#### SOLUTION ▼

Instead of a man carrying out this process. There should be a machine as shown in the figure where the wheel will be rotating the unshaped pot, the stone attached to the belt will be thumping the pot and giving it a proper shape.





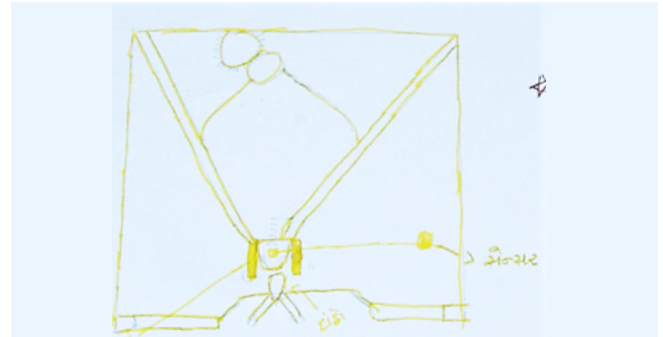
**Mer AkshayKumar**  
Group 5

**PROBLEM** ▶

The workers at the metal workshop use their legs for operating the thumping machine to thump the metal.

**SOLUTION** ▶

There should be an automatic machine which can be used to thump the metal without the requirements of a man.



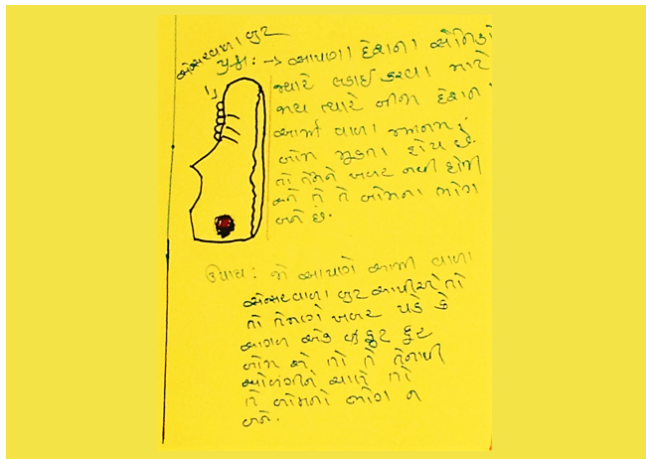
Group 4

**PROBLEM** ▲

We suffer a great loss when we lose out army because of the land mines which remains undetectable and kills them as soon as they step on it.

**SOLUTION** ▲

There should be a sensor attached to the shoes which can detect and warns the army about the land mines beforehand. So that they become precautious before passing through this area.



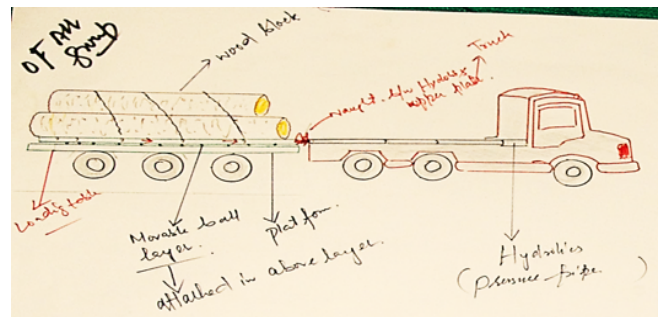
Group 5

**PROBLEM** ▶

When one needs to load and unload heavy items from one truck to other truck, the task becomes very tedious and dangerous.

**SOLUTION** ▶

To make it an easy task, one should put hydraulic plates on both the trucks. When the load has to be transferred to another truck, hydraulic systems has to be used. This will reduce the danger and will make it an easy task.

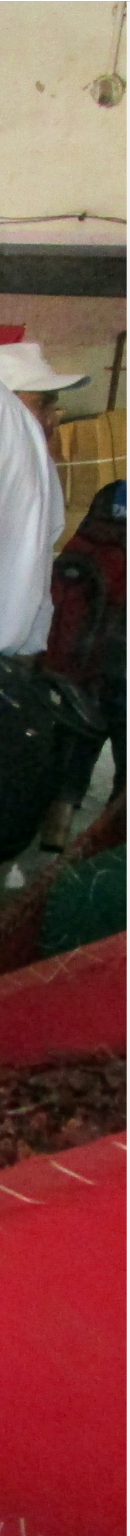


# FIELD VISITS

26TH MARCH 2017







***Innovation is change that unlocks new value.  
- Jamie Notter***



## BALWA THE BLACKSMITH

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*May 26, 2017*

On a hot sunny day, in a crowded van, the group of 8 participants accompanied with 12 children, made a trip to the rural area of Balwa, a remote village of Gujarat. On arriving, the first encounter was with a blacksmith's workshop. In a small area of 350 sq ft., the blacksmith had established his workshop and his house. The very first impression was it was very spacious, situated by the highway and surrounded with ample number of trees which helped beat the scorching heat.

The curiosity of the children led them into the workshop which was very well organised, work-space was well kept which is impressive considering his limited knowledge of material handling system. The team was warmly welcomed by the blacksmith who was already working on some jobs. The inquisitiveness led them to asking him questions about his work, his mode of income and his daily chores.

From what the team inferred, he deals with worn out blades which are used in the tractors for ploughing. His major work includes hammering and cutting the blades to hone them for repeated use. From what we observed, the process of hammering required the blades to be heated until dash temperature. For this he used a traditional open clay furnace that required burning of coals as shown in the picture.

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From our conversations with him, we understood that the majority of his profit was minimized because of the excessive consumption of coal owing to the open-air design of the furnace. We noted down this problem and continued our conversation. He further explained his process which began with taking the blade with a metal tong and putting it on the hammering table. While observing his work process, we noticed that he frequently had to cool the tong by quenching it into water as the handles of the tong got too hot to handle. We noted down this as well and figures that little alteration can ease his workload and hence improve his efficiency.

On completing our detailed technical talk, we jumped on casual topics like the sources of his income in off season. His main source of income was mainly crop season dependent and the rest of the days of the year, he indulged in making toy molds which he sells in the local fair, where the profits were marginal. We concluded our visit by thanking him for his essential time and returned with mix emotions.

In the evening, while having a cup of tea which is unusual given the high temperatures, we casually talked about the problems that everybody had noticed and unanimously concluded towards solving the problem of excessive consumption of coal and heating of the tong. While the second problem was quickly solved as we reached to the solution of using a simple wooden holder to cover the metal part of the thong that touched the hands, the first involved brainstorming on different ideas of closing the furnace and saving the heat. We finally designed a closed furnace that more or less depicted a pizza-oven. On presenting our solutions to prof. Anil Gupta, we were questioned on multiple fronts that involved the thermal efficiency of the closed furnace, required drafts for air circulation and the internal dimensions of the furnace. We will be visiting the workshop tomorrow to get a clearer idea about the requirements of furnace.

Sristi innovations being open for all, we invite the technocrats and creative minds to reach us out if a better solution or the unanswered questions are answered.

## Day 2

We visited Babubhai, the blacksmith of Balwa the next day itself to discuss our thoughts on the solutions we had come up with. We talked about the first problem of excessive consumption of coal due to open furnace and he replied saying that he understands that the solution is feasible but closing the furnace would change his work flow and he wouldn't like to adopt the idea. We further talked about the use of wooden handles in the tongs he used to which he said that the wooden handles would increase the diameter leading to inconvenience in holding the blades firmly. Then we had a detailed talk with him regarding source of income for the family of eleven with only two earning members and we understood that his real problem wasn't the less efficient work style, rather it was the lack of opportunity for employment.

As designers, this was an eye opener for us as we all realized that sometimes we try to improve their efficiency of the work whereas the real problem is very much different, urgent and requires much more brainstorming. This incident has definitely shifted our paradigm towards identifying the actual grass root problems.

***“Listen to the mustn'ts, child.  
Listen to the don'ts. Listen to the  
shouldn'ts, the impossibles, the  
won'ts. Listen to the never haves,  
then listen close to me.. Anything  
can happen child. Anything can be”.***

Shel Silverstein

## THE SEED PEELING EFFORTS OF ALUVA

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May 26, 2017

On a warm evening, a village 'Aluva' was visited by a team of 15 children accompanied by soon to-be 7 engineers. Through our exploring skills, we discovered a hidden household. Inside the house we found some farmers having a cup of tea. The first machine that struck our eyes was a winnowing machine. Its job simple – to remove the chaff from the wheat. The second machine was far too complex for our young minds, but with the helpful input from the farmers/owners (thanks to our translators) we found that the machine was used to remove the husk from the castor seeds. The machine involved a semi-circular clockwise and anti-clockwise motion. The misfit team concurred that both the machines were being operated at low efficiency and involved far too much manual labor.

The operator was found saying – 'Iss machine se hume toh 10 kilo beej milta hai' (This machine yields 10KG seeds)

Through inclusive development with the farmers we came across several ideas ranging from increasing the output/efficiency to reducing the human effort involved in the machine. Therefore, we proposed a twin machine which fulfills the above mentioned two requirements in a single machine. Upper half of the machine has a seed extractor for processing the seeds (to remove the husk) and lower half is attached with blower for winnowing processes.

The proposed plan involved that machine would be powered both by the solar energy and mechanical energy obtained through bicycle.

The upper part of the machine which is used for castor seed

makes use of motor which can be operated by solar energy as well as powered by bi-cycle with geared connections. Gears are used as their engagement and disengagement is easy and reliable. Solar energy can be of battery storage type which will give them reliability in carrying out daily works related to grain handling and making them independent from grid supply.

We expect this solution will also reduce the farmer's dependence on modern solution which have high diesel consumption which will indirectly reduce carbon emissions.

When we were reviewed by Prof. Anil Gupta he was quiet impressed by usage of different sources of energy (solar+human powered). Only point of consideration is in designing the bicycle so that minimum human effort is required.

***"Never doubt that a small group of thoughtful, committed citizen can change the world. Indeed, It is the only thing that ever has."***

Margaret Mead

## HOMEMADE SHOE/ CHAPPAL INDUSTRY

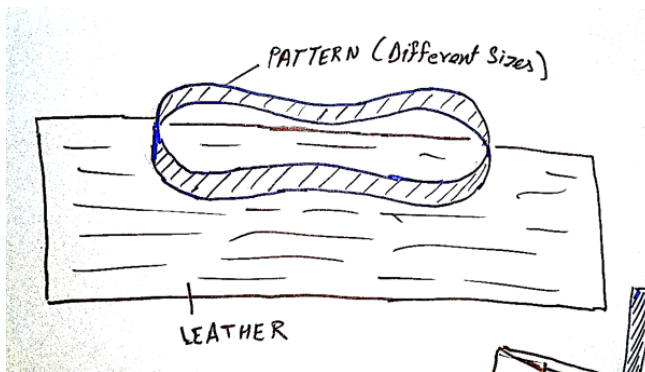
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May 26, 2017

Our first visit was to Pratapnagar, an amazing village we had ever seen. This village has so much to teach to others on self

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reliance and hospitality. First shop we visited was of Girishbhai jansari. In this era when everyone wears a brand in their foot last thing we were expecting to see was a shoe and slippers making shop. When we started interacting with Girishbhai we get to know that the range of number, for shoes he make ranges from 0-15. He said "it is quite interesting situation to meet such person whose shoe number is 15". he told us that he is making these chappals and shoes from ages. He has a model for each number of chappals and he cuts the material from rubber by putting that model over that rubber pad. He uses electrical machines to make surface of rubber rough. He uses electrical



machine for stitching and if there is no electricity around then he uses manual labour. manufacturing cost for one pair of chappal is Rs 170 and he sells these at Rs 300 each. major problems he was facing while making chappals was

- Back pain
- Palm injury
- Time he devote in strape making and cuts he get while making holes in strap of chappals by nails.

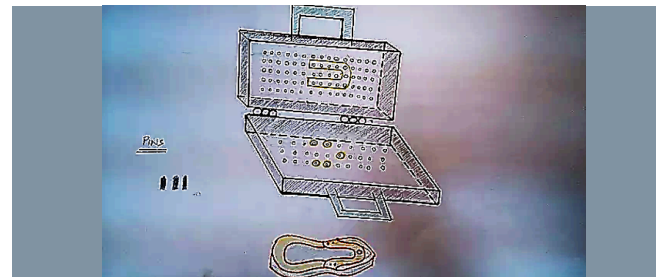
By lots of brainstorming our team came up with some of designs to solve our dear Girishbhai's problems.

Basically, we designed a box which looks very much like Chessbox but there is a space between two flaps of the box. We thought that inspite of cutting leather with hand we just should make a blade with shape of chappal and of different size as of that of

chappals. One has to put rubber sheet on one flap and then has to put that model of chappal made with blade over it. Then we have to close the other flap and then press it hardly so that that rubber can cut that rubber in shape of chappal.

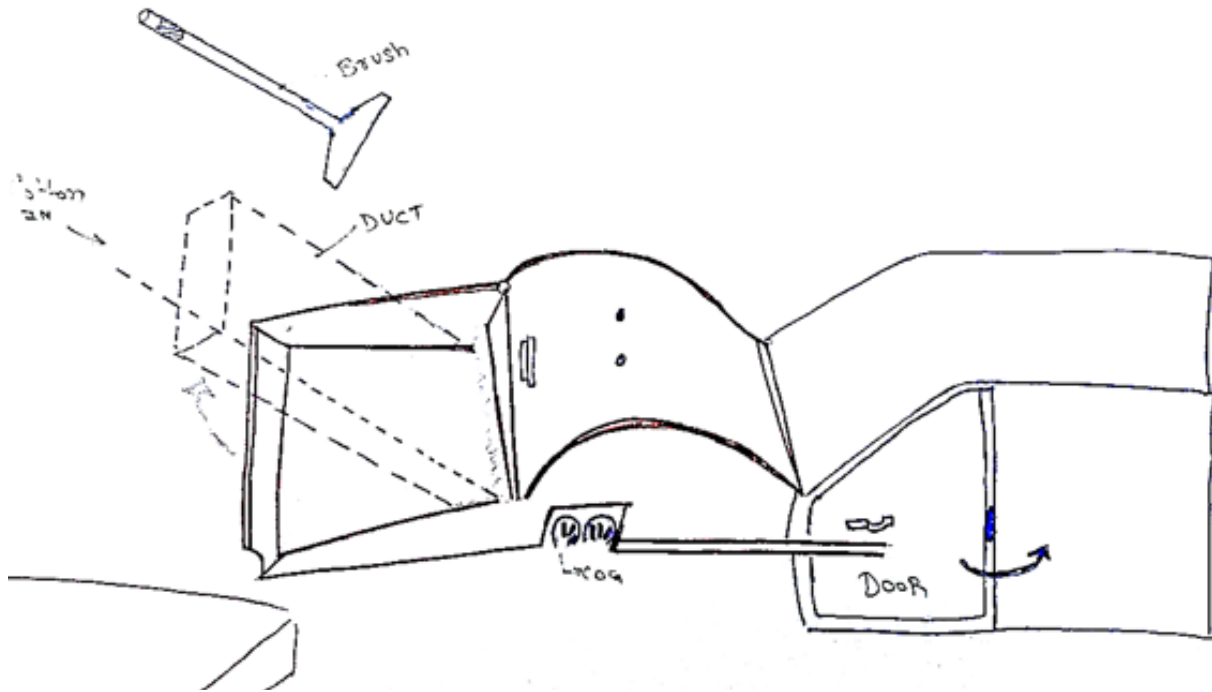
## FEEDBACK

The most obvious feedback we got was from prof. Anil gupta. He told us that rubber is quite hard and we can use the system but we have to modify the model. Either it can be warming our blade model or doing something new. For strap making we proposed a different solution which was on principal of punching machine. We took the same box which we were using earlier but we had had fine holes in both flaps. Person had to insert fine sharp screws in upper flap and tighten them according to design he wants to draw on strap of chappal. then he had to put leather strape on the lower strap and close the box. Since both flaps have overlapping holes screw after penetrating throw leather will go into lower flap. Since here strap were thin this seemed feasible.



## Day 2

On our second visit to Pratapnagar, we were quite excited to meet Girishbhai and discuss our solution with him. But Girishbhai was not at his shop as he had some work in other village. We tried to talk with other people of family but they told us that they know little about Girishbhai's work. We asked them for the leather piece which we had to cut for our design and contradictory to our believe that was not leather. It was so easy to cut it increased our confidence in our model. Girishbhai perhaps would have loved our model.



## MATTRESS SHOP

May 26, 2017

After the visit to submersible pump repair shop, the team was taken to the household of Kamla behen. She has set up a mattress and pillows selling shop in her backyard. She has a machine setup to clean and fluff the raw cotton which is later used to stuff the mattress and pillows. She brings the raw cotton from Ahmedabad and purchase the sticking cloth from local market.

After reaching her home, this is what she had to say about her work load, difficulties and much more.

**Sristi Member (SM):** Ma'am can you explain the entire process of making a mattress.

**Kamla Behen (KB):** I get the raw cotton, then this machine is used (shown in figure in the next page) to clean and fluff the air.

**SM:** Sorry to interpret but why do we need to fluff the air?

**KB:** Beta, finally the mattress should be comfortable to sit on, so the cotton should be compressible. The cotton will be flat and can not be directly used to fill the mattress. So, the flat bed of the machine is used to put the raw cotton, then the roller machine will do the job. The processed cotton will be collected on the other end which as you can see is covered by a curtain.

**SM:** Why have you covered it? To prevent it from getting dirty?

**KB:** Not just that the output cotton also has small particles



which stay afloat which can cause dirt in the house.

**SM:** Does it also not cause respiratory problems?

**KB:** No Beta, we have been doing this for years. No one has ever been effected in the family.

**SM:** What about the mattress? Once the cotton is processed, what next?

**KB:** Then we use the dimensions provided by the customers to cut the cloth and stick it using the sewing machine. If there is no electricity then we have to use the manual mode.

**SM:** What about any other complication or any difficulty that you face while working? Can we provide any technical help?

**KB:** Sometimes, if the large amount of cotton is put on the machine it falls from the side and is wasted. Also we have to push it from hand for allow the rollers to work. There is a risk for hand injury.

**SM:** How much does the raw items cost and what price do you sell your products at?

**KB:** A mattress cost around Rs 100 to make and I sell it at Rs 150. A pillow touch coast around Rs 30 and I sell it at Rs 50.

**SM:** Ma'am can you demonstrate the rolling process?

**KB:** Sure Beta.

*Kamla Behen took a small amount of cotton and inserted it into the machine. Then she started the machine and showed the team the entire process.*

**SM:** Thanks Ma'am for all your time and patience.

**KB:** Would like some cold water?

**SM:** Thanks for asking ma'am but we are carrying water with us.

After departing from the household, the team discussed possible problems that can be addressed. The following problems were chosen :

- Reduce the cotton wastage
- Reduce floating cotton particles
- Eliminate the possibility of hand injury

Again, after a brainstorming solutions were posed and the infeasible were shot down and eventually the following modifications were finalised to solve the shortlisted problems.

The input flatbed to be replaced by a slanting duct - the duct will ensure that there is no spilling over of raw cotton and preventing

any wastage. The duct also ensures that there is minimal cotton particles entering the air from the input side. On the output side the curtain is replaced by a sliding door to minimise any wastage and prevent any cotton particles that were escaping the slits and openings in the curtain. The accumulation of raw cotton on the input side can now be dispersed by using broom action in the duct. This will prevent hand injury for the machine operator.

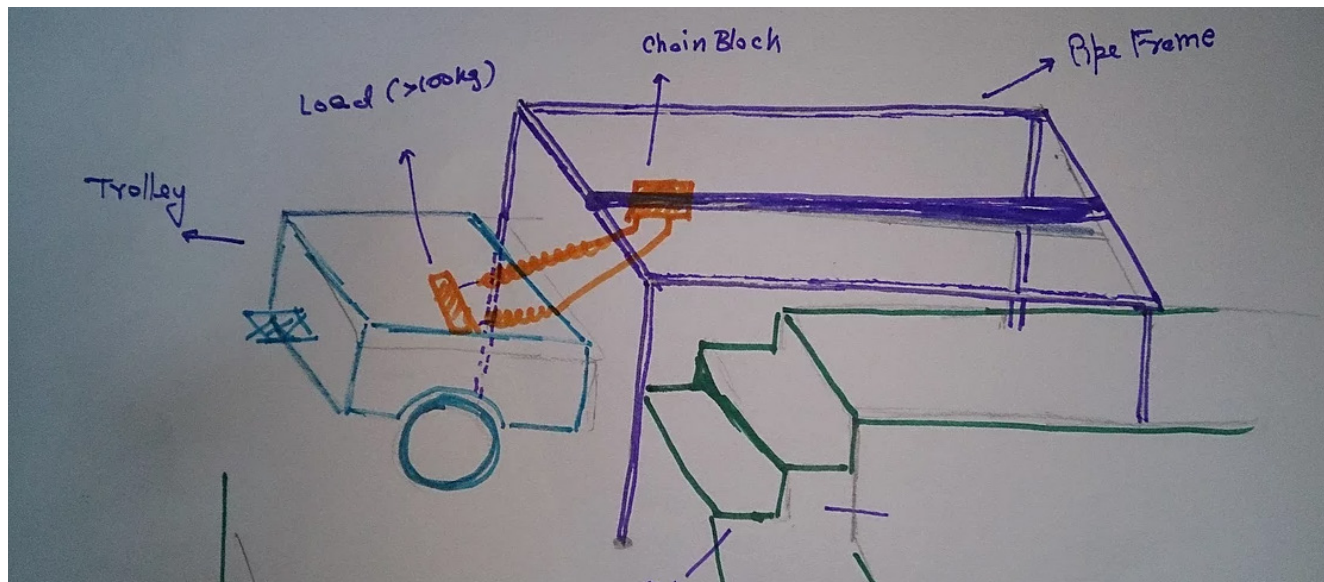
After return from the field trip the team presented the solutions and the modifications were praised and were asked to present them to Kamla behen as well.

## Day 2

We returned to Pratapnagar with possible solution. When we approached Kamla behen, with the solution we had, she was surprised. She saw our solution and said that it looks good but she doesn't need it. She has a grandson who was quite curious and excited to see our proposed solution. He told her to at least try it. This was the moment of breakthrough for us as she not only accepted our solution but also told us how one of her son had damaged his hand in the machine while pushing cotton inside. She shared her life stories and other problems like how much she would like to have a fan besides her on her sewing machine and how she her ancestral inhabitant is in Rajasthan. On return, we were more resolved to solve her problem.

***"What lies behind us and what lies before us are tiny matters compared to what lies within us."***

Ralph Waldo Emerson



## NATTHU BHAI REPAIR SHOP

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May 26, 2017

For the Summer school of Innovation 2017, the first visit was in the village Pratapnagar of Gandhinagar District of Gujarat. It's a small village but a striking observation which one cannot miss are the various micro scale factories setup in almost all houses. These businesses provide multiple sources of income to the rural people in addition to earning from farming.

One of such business was operated by Nathu Bhai. He may be in 80's with old and wrinkled skin but his energy and dedication to share knowledge about his workshop was immaculate. The old man owns a metal workshop, which primarily does

repairing of submersible pumps. While new submersible pump costs about Rs 55,000-95,000, the repairing costs are about Rs 5000-10,000. Thus, the small workshop receives submersible for repair quite often. In the backyard of the shop, the Nathu Bhai's family also makes shovels.

He showed our team a ceiling fan fully fabricated by him. As if this was not fascinating enough he also informed the team that it was powered directly by Diesel Engine which powered the Lathe Machine.

While observing the repairing process and also, on enquiring about any hardship faced by him in the overall process, Nathu Bhai explained about how he has to employ 4 people to shift a submersible from tractor to shop interior on its arrival in tractor trolley. The shifting process is tricky as the pumps can be as heavy as 100kg, with no proper grip. Also, those 4 people have to climb 2 steps while carrying the pump, which makes the process dangerous. The team decided to work on this specific problem.

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For solutions, various ideas were discussing and discarded because of various constraints like cost, space requirement, complexity etc. After much brainstorming, the team agreed on two simple solutions.

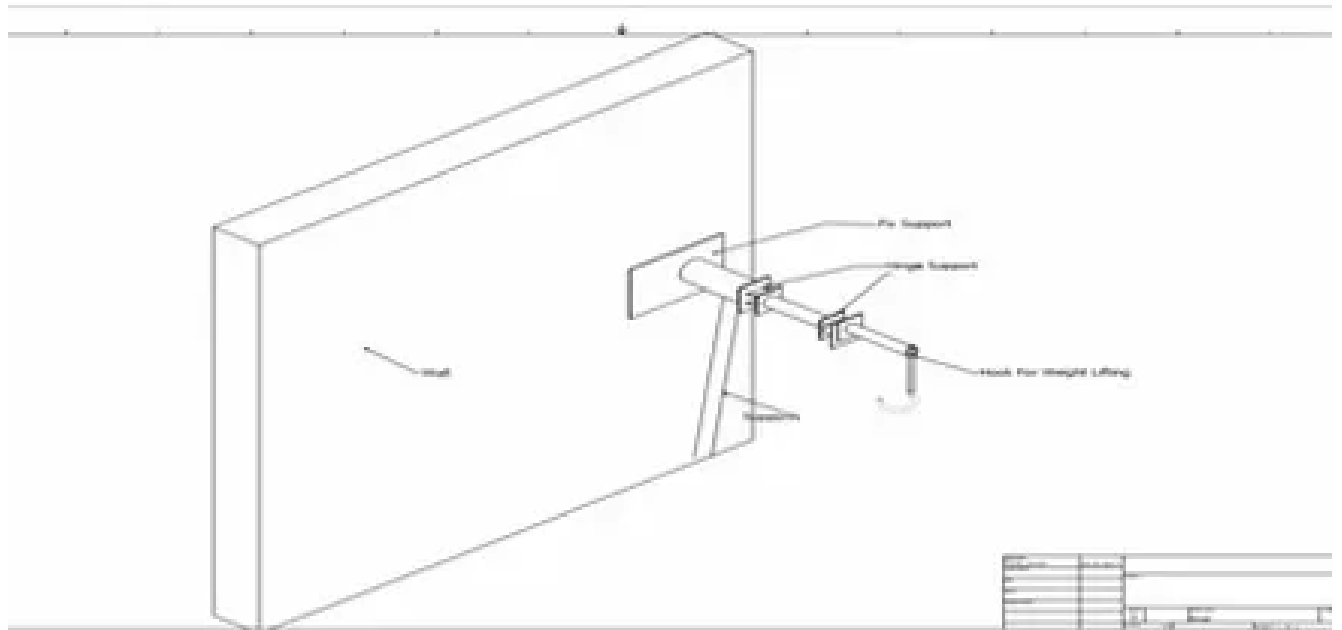
The First solution is using pipe frame structure and chain block mechanism to lift and shift the submersible pump from the tractor trolley to the shop floor for disassembly and repair. The pipe frame has legs which are longer on the trolley side and shorter on the shop floor side to adjust for the height difference in ground. The frame is also fully detachable for easy storage when not in use.

The solution will be discussed with the Nathu Bhai and family for feedback on concept when we visit them for next field visit. The second solution proposed by team involved

a design inspired by human arm movement. It had three members connected by two hook joints. First member is embedded in wall on one end and other end is supported by pillar member to transfer load to the ground. The combined angular movement by the two arms is 180 degrees.

### Day 2

The solutions were presented to Nathu bhai. He listened to both solutions very keenly and gave feedbacks about the designs. The first design was preferred by him and he readily helped the team to improve our design with his insights. The team felt inspired and motivated by his enthusiasm.



## NEW BEAM BINDING APPROACH

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### *Construction Site Visit:*

For the second field visit, the team visited the village by the name of Alua. The village is situated on an elevation. This elevation is due to an artificial hill made by the residents, about 200 years ago, to prevent waterlogging during rains (which was a bit unacceptable for the team because the region was very dry!). The first thing the team saw was a coconut opener in front of a house. None of the team members had ever seen the device. The owner of the house demonstrated its functioning and it simply amazed us due to the simplicity of its design and its effectiveness. Besides this house there was a house being constructed. The newly made roofs were supported on cylindrical beams commonly called as 'balli'. In case the beam was smaller than required its length was adjusted by attaching a small beam. The attachment was done by using two wooden planks and nailing them to the two beams. The team found this arrangement to be ineffective and unstable. As an improvement, the team suggested a clamp like structure made of a sheet of metal which would join the two beams. It can be tightened with the help of nut and bolt. The structure would provide support on all the side, compared to the previous arrangement providing support only on two sides. Thus, it was safer. One of the concerns raised during the presentation was that the metal could bend during use causing collapse. The solution given for this was to use a long pipe instead of a sheet which would have a better support and less risk of bending.

After that, the team went to a farmer's house. He had a mechanical thresher, a castor seed remover and a winnowing

machine, which could be rotated using a handle turned using hands. He had some buffalo which had barcodes on their ears for identification. Moving on, the team decided to visit the Sabarmati River which was not very far from the site. The path to the bank was not an easy one. The path was kuccha with very loose soil. From time to time trucks were coming against us, which were carrying sand for construction purpose. They throwing a lot of sand in the air, leading to difficulty in breathing. Finally, we reached the river bank. The whole area looked like a plain with no water in sight. Algae were deposited on the ground where the river flows during monsoons. After roaming a bit, the team returned to their bus and came back to Grambharti.

### **SOLUTION PROPOSED BY THE TEAM FOR THE BEAMS CONSTRUCTION SITE:**

For the second field visit, the team visited the village by the name of Alua. The village is situated on an elevation. This elevation is due to an artificial hill made by the residents, about 200 years ago, to prevent waterlogging during rains (which was a bit unacceptable for the team because the region was very dry!). The first thing the team saw was a coconut opener in front of a house. None of the team members had ever seen the device. The owner of the house demonstrated its functioning and it simply amazed us due to the simplicity of its design and its effectiveness. Besides this house there was a house being constructed. The newly made roofs were supported on cylindrical beams commonly called as 'balli'. In case the beam was smaller than required its length was adjusted by attaching a small beam. The attachment was done by using two wooden planks and nailing them to the two beams. The team found this arrangement to be ineffective and unstable. As an improvement the team suggested a clamp like structure made of a sheet of metal which would join the two beams. It can be tightened with the help of nut and bolt. The structure would provide support on all the side, compared to the previous arrangement providing support only on two sides. Thus it was safer. One of the concerns raised during the presentation was that the metal could bend during use causing collapse. The solution given

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## MASON FIELD VISIT

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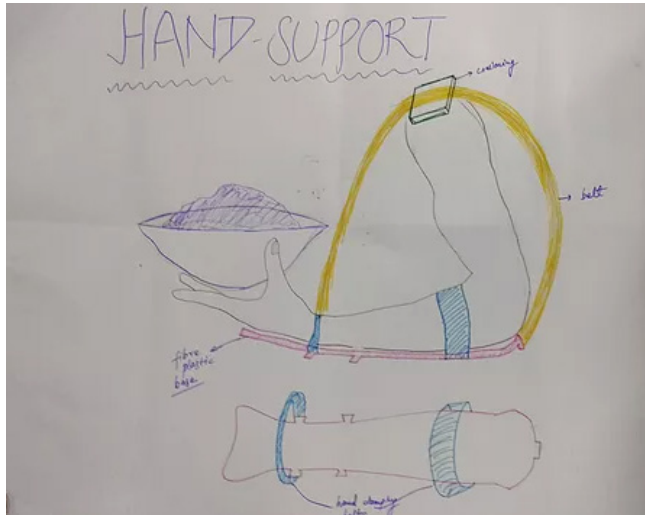
*May 26th, 2017*

In the morning visit, the team also went to Kanti Bai chagan bai's house, a mason in the village Sadra. The family welcomed the team warm heartedly. He discussed about his work, the

tools that he uses at construction site, methods that have been used over the years in the village and modern machines that exist for easing the work.

Major issues discussed by the mason were travelling long distances to work place, carrying heavy load of bricks on head, strain on the wrist and palm due to carrying tasla for a long time duration during plastering, water wastage in sprinkling water on newly plastered walls and long time taken in sieving manually as compared to modern sieving machines that separates sand from pebbles effectively.

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Children gave innovative solutions to mason's problems. One of them was using a pulley to lift bricks to higher floors. Another was using a belt to hold tasla thus freeing the hand.

Given below is the description of problem and its solution in detail.

**PROBLEM:**

Water wastage occurs in sprinkling water on newly plastered walls. Currently they use a pipe to sprinkle water on walls three times a day. Water is not sprinkled evenly and is wasted.

**SOLUTION:**

One basic solution is to use a nozzle on the pipe. The shape of this nozzle resembles that of a shower head. This would lead to even water sprinkling. Another solution would be to



use a machine similar to a sprinkler used in watering grass in fields. Here the head of sprinkler contains holes in the upper hemisphere (as shown in the figure) and water pressure is regulated according to the size of the room. Using this we could sprinkle water simultaneously on all the four walls and the roof also minimizing its wastage.

#### **PROBLEM:**

Masons have strain on the wrist and palm due to carrying tasla (which weighs around 20 kg) when plastering walls.

#### **SOLUTION:**

The team has proposed a hand support for transferring the weight to the shoulders. There is a plate made of plastic which provides support from elbow to the wrist, two bands for clamping it to the hand: one near wrist and another near elbow, two straps: one running from elbow to the shoulder and another movable strap from wrist to the shoulder. This movable strap provides mobility to the arm in lifting the tasla.

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## A VISIT TO A MUTLI FUNCTIONAL METAL WORKSHOP

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May 26th, 2017

Our team reached a metal workshop in the last where we met Ismaile bhai and his son Nazir Hussain where they showed their traditional art and machine made by them.

The astonishing part was that that machine was made before 40years and one motor drive incorporated 6 different functions namely:

- Drop hammer for forging process
- Cutting machine(saw) for wooden blocks
- Amry/ grinder for finishing/smoothing sharp edges
- Drilling holes in metal sheets or wooden logs
- Air refilling machine
- Sharping knives and crop cutting tools

The different functions can be accessed by using desired belts and cluth plates and gear mechanisms.

The hammering machine was the biggest part as it used a slider crank mechanism to convert the circular motion by the motor to a horizontal motion and a circular leaf spring also absorbs the shock by hammering to reduce the wear and tear of the tools and machine. The machine worked on AC power electricity and the human effort was minimal.

We could help him manufacture more such machines and spread the practical knowledge that he and his son has gained through years of experience.









# ADDRESSING PROBLEMS OF OLD AGE HOME

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May 26th, 2017

Wisdom is something which develops with age but it is absolutely hard to digest the fact that the same old people who have been the prime reason for the existence of many have been left abandoned in old age homes under extremely tough conditions.

Bearing the flag of SRISTI we as a team went to these particular old age homes and were keen in observing their problems and come up with possible engineering solutions to help people living over there. We were quite amused to see how they lived in tranquility and happiness despite of the limited luxuries they had to live with.

Children who had accompanied us played an important role in indentifying the existing problems. With their innocence unmatched we were quite taken back on how they were able to find problems which were not visible to engineering students.

As a group primary problems observed by us are listed below.

- Health and Hygiene
- Meeting Financial Needs
- Physical & Emotional Problems

## HEALTH AND HYGIENE

Technological advancement is one side of the coin while on the other the important aspect is letting people stay healthy to take full advantage of the existing technology. Health is something

old people tend to ignore and the prime reason is they tend not to pay attention on the same. Common health related issues in old people Low Blood pressure, High Blood Pressure, High Sugar level, Low Sugar level.

So, one of the group member had suggested developing a sensor based bracelet or necklace embedded with medicines. Fundamentally when the sensor detects the existence of a fluctuation in the normal or permissible limits of the above mentioned possible diseases the sensor goes off reminding the bearer to have a remedy which is embedded in their band.

Sensor based solutions are expensive and thus taking the cost into consideration, trusting human instincts they can take the medicine which will help them not only to recover but also to cut down unnecessary motion just and kill the excess strain on their legs, Joints etc.

## PAYMENT GATEWAY

The old age home with a population of around 110 persons was self-reliant in terms of meeting their need of food supplies. However, upon talking with them, it was evident that they were most of the times in short of cash even for meeting their other requirements. They said how they had to rely on generosity of some passerby even to bear the expense of their auto fare for a visit to hospital. The world is still a beautiful place,

***"Knowledge, like air, is vital to life. Like air, no one should be denied it."***

Alan Moore, V for Vendetta

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because there exists people willing to contribute for such social causes. However, many people could not and do not be a part of such organizations because of various reasons like lack of information and time, and sometimes even laziness.

We are proposing a platform (android/ web based) that can bridge the gaps between the two entities. People can contribute in terms of Cash, kind and services. In addition to regular services and donation, a quick response alert will be generated on situations like medical emergencies and anybody willing to contribute for the cause can come forward.

### SMART HELMET

Something common in all the women there was the concern for the past. One woman we went on to discuss her main reason for existing here was the death of her son due to an accident. To let people who have met with accidents get admitted in the hospital in time we have come up with a model which sends out an SOS as soon as the person meets with an accident.

### SECOND VISIT AFTER FINDING SOLUTIONS TO GET THE FEEDBACK

The team went to Kailash Dham old age home to ask for reviews about the solutions they had thought for the problems like lack of funds and lack of access to medicines. They proposed solutions to Arjun Singh Rathod, the trustee and manager of the old age home. He seemed to contradict the problems stated by residents of the old age home. So according to him the solutions proposed by the team did not have much desirability.

To get a different view on the solutions the team went to a different old age home in Amrapur. This old age home had all the amenities for its residents and there was no problem of lack of funds but the idea of having a wrist band with medicine was appreciated. When the team talked to one of the residents he was happy that the children came to talk to him to hear his grievances because their major problem was that they have no one to talk to. A possible solution to this could be constructing old age homes near parks or schools so that they could interact with children. Another problem was that old people generally forget taking medicines so a new design is proposed with an alarm that would ring whenever medicine has to be taken.





The team also observed very innovation designs for bird nests. They had hung clay pots and plastic cans on trees so that birds could lay eggs in them. So, we would like the potters to produce more such nests and increase their market.







**STUDENT'S  
CREATIVE WORKSHOP  
PERSPECTIVES ON FIELD VISITS  
TO PEDHAPUR AND MANEKPUR**





***Anurag, Hirikesh, Jaswant, Shyam, Shreysvi,  
Meru and Shubham***

The team which constituted of 8 school students and 11 engineering students which visited two villages Pedhapur and Manekpur. In the village Pedhapur the team interacted with multiple manufacturers and workshop workers which is mentioned below. The team was given a brief orientation by Professor Anil Gupta on openness and observation. After the field visit, the school children and the college students were made to brainstorm first independently and then mutually to share their insights and the problems which everyone observed. For each of these problems, students brainstormed and drawn solutions which Professor Anil Gupta listened very patiently and gave constructive feedback to everyone.

# 01. VISIT TO UMIYA TRADERS PVT LTD IN PETHAPUR

## FIELD DESCRIPTION

The team went to Umiya traders which is known for their iron pipes, bamboo pipes and wood pipes. They were also selling cement beams for construction and other iron made structures. So, the place the team visited was the selling shop where all the items were on display for sale but were manufactured at a far off place.



## PERSPECTIVE BY ENGINEERING STUDENTS:

According to the group of engineering students, the owner told them the problem of shortage of labor. So the labor is arranged on need basis from a nearby stand, from where other people also take up the labor. But since most labor go to the cities for higher margins, sometime the local region face the deficit. Second which the team identified was that of loading and unloading heavy metal pipes, wooden pipes and cement beams by the labor on/from the truck. After discussing the team to help the labor reduce their load and transfer the material safely and more efficiently, the team brainstormed for ideas and came up with thoughts of a belt to hold man rods together and carry it easily.

## PERSPECTIVE BY SCHOOL STUDENTS:

The children quietly observed the whole field and asked very few questions. But later all of us found that they had observed a lot. They noticed that the iron rods could rust in the rain so we all should do something about it. It was so honest and practical problem which the children observed as they mentioned that there was no shed over the rods and the material which was being stored. As reported by the owner, they also noted the problem of lack of labor which they later told us during the discussion. They observed problems which the team of engineers couldn't see with a sense of relatedness which the group of engineering students couldn't demonstrate. It made us all ponder, if it was the children who were more empathetic and open or our engineering students have got a narrow field of view.

# FOLLOW UP VISIT TO UMIYA TRADERS

## PROBLEMS IDENTIFIED WITH DISCUSSION :

Need for a mechanism to reduce labor efforts during loading of iron rods – The team had identified the problem to constitute of labor loading the iron rod into the truck one by one resulting in slow loading rate. To increase the number of rods carried per cycle of loading, the team proposed a design of an iron belt to tie a number of rods which have handles on its surface which would help the labor hold and load many rods during one cycle of loading.

The team tried to test the idea by holding and observing how the labor currently loads the rod and how would he load it with the solution. On close observation, the team rejected the idea as it was discovered that clustering the rods together with belt will increase its weight making it difficult for the labor to lift and thus increasing the load further for the labor instead of reducing it.



## CONCLUSION

The people visited in the followup meeting were very happy to see the team. At Umiya Gram Udyog, the team was welcomed and was offered Coca-Cola also but at that shop as the team pointed out flaws in their shops which was causing problems for their labor, the owner got offended and turned conservative as the team uncovered their inefficiencies. After this field, which was their first visit the team took time to reflect to understand what made the owner uncomfortable and how to be more open and ask their recommendations instead of telling their flaws and selling them the solutions. Thereafter, the same scenario didnt happen. The workers at the pellet making shot were very happy to see us as the team is very concerned about the cuts they get daily due to sheet metal insertion and apply anti septic cream every day.

## 02. VISIT TO IRON PELLET MAKING WORKSHOP

### FIELD DESCRIPTION

The groups then went to a workshop for making iron hooks. These are the hooks which are used to link the trucks and trolleys together. The teams observed multiple machines closely to understand the procedure. The procedure starts with a metal rod which is almost cylindrical which then in a furnace heated and then on the bending machine pressed hard and converted into the shape of a hook. Which is then left for drying. The bending machine was operated by the leg of the operator while his hands were used to control the hitting configuration of the iron piece. The iron residue left is sent to waste pickers which make iron tablets using the iron filings.



### PERSPECTIVE BY ENGINEERING STUDENTS:

The person is standing and the machine demands a posture for strain. Also, the machine has irregular frequency for hitting the iron which can be optimized and controlled up to much precision. The owner reported that the spring used in the machine breaks quite often which costs him really.

### PERSPECTIVE BY SCHOOL STUDENTS:

Children got really excited with the machine which was used to beat the iron piece. The children kept looking at the machine which they found very fascinating. When the craft man was heating the iron piece, they asked us there also and after in discussions that the team should do something about the heat radiation also. They also asked the worker about the iron flakes which was being wasted but by being told that the flakes are used for making iron base Ayurveda medicines, their eyes got lighted up.



# FOLLOW UP VISIT TO IRON PELLET MAKING WORKSHOP

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## PROBLEMS IDENTIFIED WITH DISCUSSION :

Need for a protective gear to prevent injury while inserting sheet metal in pellet making machine – For this problem the team decided to make gloves for the workers but on sharing the idea with the workers they rejected the idea. The team got to know that they had tried the idea themselves also but it gets in the machine and with time it wears out as the sharp edge of the sheet metal cuts the glove with time. So, the idea of glove was rejected. Further the team observed the whole process more carefully, looked at the parts of their hands which gets cut during the operation. The team found out the workers has a safely anti septic cream for the cuts as they were so frequent.

Need for a pellet collecting chamber directly from machine to eliminate manual aggregation – The pellet making machine hurls the pellets in all directions which are then later picked up by the workers and then packed into packets for storage. The team's idea of diverting all the pellets directly from the machine into the storage machine was rejected as the process of manual picking each pellet was necessary for each piece for quality check.



## 03. VISIT TO METAL BENDING WORKSHOP

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### FIELD DESCRIPTION

Third place, workshop for metal bending. At the workshop, a vacuum pump was being installed and there was no activities to observe.



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### PERSPECTIVE BY SCHOOL STUDENTS:

At the center, the children were looking very curiously at the tools which the workers were using for the installation. We didn't spend much time, at the workshop as some major installation was being done. But the kids curious did ask the cost of the machine and noted. They did not ask about what the machine was about or what it did but they kept looking at it.



## 04. VISIT TO METAL PELLET MAKING MACHINE FROM SHEET METAL

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### FIELD DESCRIPTION

The team then visited a sheet metal workshop. At this workshop there were three operators and three machine for making small metal pellets used for packaging. These pellets are made from a metal drum from which big pieces of sheet metals are cut and which are then sent into compressor to make it uniform. But while cutting using the cutter which he had a risky process, the inner walls of the container also had glue, paint etc which is manually removed and cleaned. Then this big part of the compressed sheet metal is then cut into strips which goes into the pelleting machine which sprouts out pellets onto a wall which are then manually picked and checked for quality and then packed in packets for selling.

### PERSPECTIVE BY ENGINEERING STUDENTS:

Manual cleaning and cutting of large metal drums which is a bit risky and ineffective. The machine used for pelleting required the operator to sit in an unrelaxed position for quite some long time with one of his hands pouring the metal strip into the cutting machine and the other hand holding the metal strip near the blade for cutting, so the operator confessed that the hands do cause pain to him, which was also evident otherwise. Also, the same machine can be modified to catch/collect the pellets and then through slotting, the quality pellets gets separated automatically and a lot of human time and energy is reduced.

### PERSPECTIVE BY SCHOOL STUDENTS:

At the workshop, the children accompanied us and didn't ask much questions. The children watched all the machines very closely but these three children during discussions gave us really great insights as on how the sitting posture and the improper hand position was affecting the labor who was working. One observation which they noticed, which we, the so called grown-ups and engineers didn't think of was this process in the machine in which the machine pellets were flying away onto the wall and the kids pointed out that the pellets could get into someone's eyes so it was dangerous.

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## 05. VISIT TO UMIYA GRAM UDYOG AT PEDHAPUR

### FIELD DESCRIPTION

The team then went to a shop for spices and Namkeen. The owner had done MBA in marketing and their spice brand is in the market since 1988. The facility procures chilly from Bangalore which is then crushed into fine chilly powder and packaged into a sellable product. There was a storage facility also for storing the procured chillies which had rats. There was also a mixing machine to mix the spices, the entire place was very clean and well kept. The crushing was done through a pulverizer which as a result of crushing spread the fine chilly powder particles in the air which the team couldn't bear but was normal for the workers. Also we met two workers who were rolling dough and putting dots in the rolled dough manually with a knife which the team found to be quite inefficient.

### PERSPECTIVE BY ENGINEERING STUDENTS:

Chilly powder in the eyes concerned the students as they experienced inhaling the chilly powder. The workers need not make 8-9 dots in 8-10 seconds but instead make the same number of dots with one punching machine bringing great efficiency.

### PERSPECTIVE BY SCHOOL STUDENTS:

Children see all the things very carefully and try to understand what problems they face. Like in case of chilly grinding they observed that the powder of chilly may go into the eyes and may be inhaled by it may cause some serious lungs problem. It not only they observe some negative things or observe only problem. In filter machine they pointed out that it is the purely natural it does not involve any kind of chemical about them they usably studied in their regular course. One of the school student noted all the products available in the shop with price list in his notebook.





# FOLLOW UP VISIT TO UMIYA GRAM UDYOG

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## PROBLEMS IDENTIFIED WITH DISCUSSION :

### Need to prevent hole making time in puri –

The team observed that the labor employed at the center was using a knife to make 8+ holes in a flat piece of dough which took him around 8 seconds for single piece and the team proposed him an ergonomic tool with multiple spikes to help him make many holes in one go and thus reducing his time per piece significantly. But on discussing about the same problem with the owner, the owner said that the market demand for the particular product is not that much so they weren't looking for increasing their production capacity. Though they were aware of many such tools in the market but he hasn't bought them as of yet but will get them as per demand.

### Need to prevent chilly powder inhalation by workers –

The crushed chilly spread the fine particles in the air which was being inhaled by the workers. The team thought of building a mask for the laborers but upon discussion, they said that they don't feel the need of any such mask and they also pointed that the mask would cause irritation and will cause sweating. So they rejected the idea.

### Problems of rats in the shop –

On noticing the rats in the shop the team asked the owners if they are looking for any solutions to shoo the rats away and to prevent them from feeding into the grains. In response the owner told us that they have no problems with the rats and they in fact feed the rats. They had never thought of rats as a problem which the team felt a bit counter intuitive.

### Multiple logos on their products –

The team noticed that their products had multiple logos so the team discussed the issue and recommended them to use a consistent logo which would help them differentiate their brand from the competitors.

### Low height of stove –

The team identified the stove which was placed at a low height which the team found to be causing back pain to the workers but the owner told the team that that's how it's done everywhere and the labor has never complained.

### Exposure of hand to chilly powder causing irritation in hand –

The laborers in the shop use their bare hands for mixing the chilly powder and experience intense irritation. The labor use a tool for mixing but still while pouring the chilly some powder falls in his hands. The team discussed why don't they use gloves, they said that the task is needs to be done with gaps with multiple tasks in between which cant be performed using gloves and thus if the gloves would have been there, they didn't like the idea of wearing and removing the gloves again and then.

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## 06. VISIT TO KHAKRA MAKING UNIT

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### FIELD DESCRIPTION

The team then visited to Khakra making unit. The teams were not allowed to take pictures and videos of the place, the place was well managed with women and high tech machinery. A few points for optimization and improved ventilation was identified. All the processes were automated, starting from dough making, to dough pressing to hot pressing and driving to hot packaging.

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### PERSPECTIVE BY SCHOOL STUDENTS:

The final visit of the first stage of field visit was made in a local area where manufacturing of food items called "khakhra" was taking place. The manufacturing unit was a hybrid with both man power as well as machine working in a systematic order and at a really fast rate. Majorly, the young visitors from SRISTI took a deep interest in knowing more about the working of different types of machinery, mechanical as well as electrical that were involved in manufacturing of the food items.

Apart from the machines, some of them asked some very interesting questions to the women workers that were involved in carrying out some part of the work in the industry and getting a deeper insight about the problems that they faced as well as ways in which optimization of the industry can be carried out. Though, the manufacturing unit was already very well optimized, amazingly, several other areas of optimization were also observed by the children such as the need for a well-ventilated room for the workers as well as the inability of the devices used to provide a cool environment for the workers to comfortably work on.

The young visitors from SRISTI also identified several minor areas in the area where many other things could be easily automated as well.

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# FOLLOW UP VISIT TO KHAKHRA MAKING UNIT

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## PROBLEMS IDENTIFIED WITH DISCUSSION :

Need to reduce strain caused due to bending while packaging – The team identified that for packaging the workers were bending which could easily be corrected by putting an elevated level to ease the flow of operations. The proposed a design of a table for the operations which the owner was willing to buy.

Need for automating oil dripping in Khakhra making – One step in khakhra making process involved oiling of khakhra which was done by a woman using a spoon and a bowl full of oil. We suggested a mechanism for automatic oil dripping mechanism to the owner. The owner was genuinely interested in the team's idea and had 80-100 other customers for the problem. The owner also told the team that due to lack of time and resource he wasn't able to make this so if you develop this He was so impressed that he gave us his number for further communication.

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## 07. VISIT TO VILLAGE MANEKPUR

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### PERSPECTIVE OF SCHOOL & ENGINEERING STUDENTS

In the evening, the team visited Manekpur village, where they first met the Sarpanch to know about the issues and provisions in the village. The Sarpanch seemed confident about the improvement he had carried out in the village. The team was divided into subgroups and went to observe the village and learn about the problems of the villagers. The children initiated conversations with the villagers and asked them about their problems. The children observed that some roads were missing and were not maintained well. They had piles of burnt garbage at different corners. It was also observed by a very keen child that the solar panels for the electric poles were dirty and that would reduce the efficiency of the solar panels.

While walking around the village, the team observed that the houses had used cacti for fencing. That gave the teams an insight that installation of the fencing could be a problem. The children directly asked the villagers what their problems were and the villagers were touched by their innocence. However, most people said that the village was improving and that the sarpanch had done a good job. Further inside the village, when the children were asking a woman about her problems she looked at us with hope and said that her husband consumes alcohol and can something be done about it. The children further asked an old lady about the village and she confidently said that there are roads missing and the village remains dirty. The woman said that she lived alone as she was a widow. This was in contrast with what most others said in the village but similar to what the children themselves observed. One child even suggested that there could be a board asking people not to throw garbage on the roads.

### FOOD FOR THOUGHT

Some of the engineering students noticed that breaking the ice with some school students gave most of the unique observations as compared to the other school students. Did talking to a school student motivated them or get them to open up or were they already smart and intelligent with a great eye or detail. Most of the problems which the school students gave and the engineering student gave different kind problems if we were to classify them, we can say that children problem identification was more analogous and from experience knowledge whereas the problems from the engineering students were more intellectual and analytical in nature.

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## VISITING A COBBLER

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Our journey in search of grassroots problems began from Sadra village, Gandhinagar, Gujarat. We, ten engineering & design students with more than a dozen of primary school kids visited Mr. Keshav Lal Daya Lal Mochi. He is a cobbler by profession who loves his craft. The objective behind this was to understand what private troubles do people from his profession face and how can we provide a solution by innovating. He explained the process of shoe making to the team lucidly.

His arsenal of tools included a Ropi (cutter), Vainu (flattens leather), hammer, iron leg and jumbu (plucking nail). All tools in total only cost about Rs.500- Rs.600. Iron leg that he used was 100 years old and was serving from last two generations. It's made of pure iron, such that's rare to find today. Nowadays they make it with 'bid' which cracks on continuous hammering. There are following types of leathers available in the market like Bullock (Rs.20-Rs.25/Kg), Desi Goat (Rs.200/Kg), Aeroplane rubber (Rs.70-Rs.80/Kg), Seat, GBR, Rexine, and Fibre.

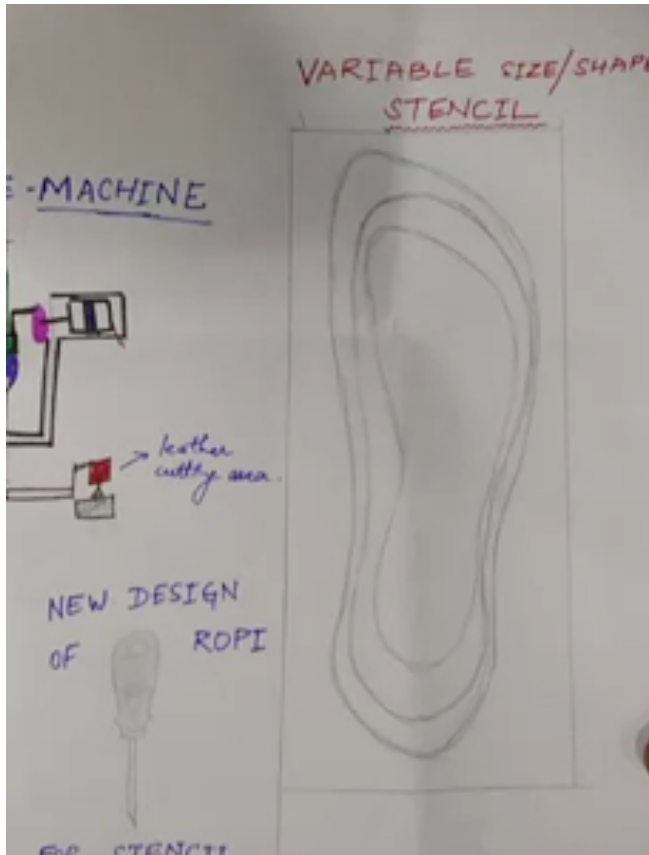
One pair of shoe takes 2.5 days to prepare and they can hardly make Rs.20-Rs.25 in profit by selling one. In a town with population less than 5000 even selling a shoe daily is tough. They claim that their shoes are long lasting and can work for up-to 5 years. His display included twenty different pairs of shoes & sandals. All of them looked like the one you'd see in a showroom from outside but they lacked a good 'sole'.

Kids awestricken asked him various questions on his craft.

Following are few of their observations with probable solutions.

- Pain in back and hand due to hammering.
  - Chance of getting injured due to sharp tools and nails.
  - Prone to skin disease and allergies to due polish and leather.
  - Kids suggested the use of aerated gloves.
  - Handmade shoes have gone out of fashion.
  - Concern regarding the falling economics of business.
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## VISITING A COBBLER



Our engineering and design team looked at it from the perspective of improving economics. We understood one thing that people will only accept our innovation if it improves their economics. Following ideas were suggested by our team.

Creating a platform to sell their products online. This will increase their market reach. It can be a marketplace for customized shoes. Since most of their cuttings were based on experience hence there was no standardization. We designed a variable stencil to cut leather.

Formal shoes can be rented to college students on daily basis that they occasionally need like in cases of campus placements or while giving a presentation. Our team also worked on the design of a universal machine that would semi-automate their work hence increasing their productivity, we called it 'Cobble's Friend'.



# STUDENT'S CREATIVE WORKSHOP

## PERSPECTIVES ON FIELD VISITS TO LODHA AND DELVAADI





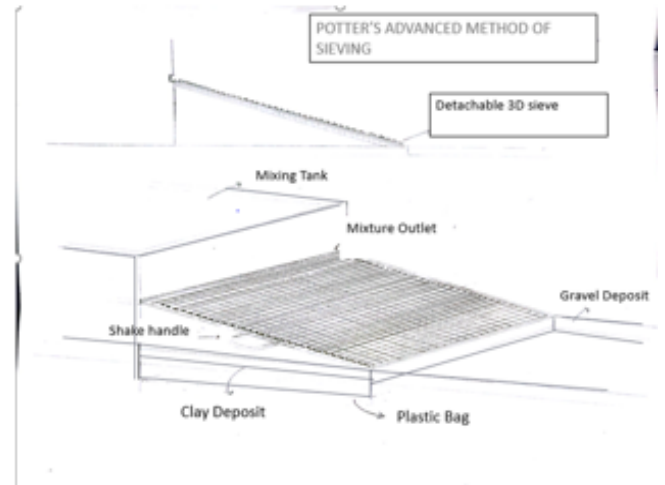
*"Innovation is change that unlocks new value".*

## 01. POTTER'S SIEVING MESH

May 24th, 2017, Lodra

The summer school team went on with some school kids to identify the grassroot problems at a pot production unit. We observed things from its raw material intake to the whole process of the development of the final pot starting from the preliminary mixing of mud and its sieving; moving to the process of thumping to soften it and then to its final shaping, colouring and polishing.

The team found the conventional potters' sieve to be obsolete and time consuming as it allowed the intake only from a small hole. In the proposed design, the sieve is placed slightly below the inlet, the mesh of the sieve is designed as two layers which are completely detachable. The design is intended to drop the gravel and the clay into their respective deposit pits. The handle of the mesh is used to shake the mesh to drop any deposited gravel and to remove it for any other interests. The mesh is made of aluminium aiding to an easier flow of water, clay and gravel. First layer of the mesh is the traditional one but adding the second layer to it enhances the deposition of clay since the kinetic energy of the flow is obstructed and thus, leads to better deposition of water and clay as the pressure increases. Because of the above-mentioned pressure, the mud slurry gets spread across the entire surface of the mesh due to which frequent clogging of the mesh is avoided to a good extent. Any gravel deposited on the mesh can be removed by using the handle to flatten the ridges created by the interleaving of the 2 layers, causing them to fall out into the pit.



### PROPOSED DESIGN

The deposited clay after the resting period was initially manually extracted in multiple turns. The placing of a polythene cover or any plank would ease the process for the potter to take it to the drying process. Since the filtration of the mud is an integral component of the quality of the pots and the whole process. This design aims to reduce the time and manual effort that was involved earlier and make the process a whole lot more efficient. An approximate increase in the efficiency would be 37.5%. (The proposed design is expected to bring down the time involved from 120 min to 45 min.)



## THUMPING

This process continues for about 15 minutes and the pot takes its shape. 15 minutes for just a 12-rupee pot and this is not even half the process. Doesn't seem fair, does it? Following is a description of what we tried.

We revolved around some ideas to address the problem but there were some things we could not adhere to. We can put the pot on a rotating platform and suspend the marble stone with a rod from the inside (The distance from the centre remains the same as it is a sphere). And the thapa is suspended on the outside with a steel rod. The motions of both are coordinated and this process shapes the pot.

This will reduce the time by at least 2/3rd allowing our potter to increase his produce by up to 3 times.



## POTTER TOOL ADVANCEMENT FEED-BACK

### *Field Trip Visit Day 2*

The team went to obtain feedback & explain their solutions to the porter. We interacted with another porter to determine his problems & propose a solution. The field offered some new insights which were overlooked in the previous visit. He was ready to adopt the sieving technology which we proposed & which could prove to be cost effective in longer run.

For secondary step-thumping, we got to know that the government was already providing a machine at subsidized rate of 5000rs. He has to produce the stock in excess as manufacturing could not be done in the rainy season. But the The team went to obtain feedback & explain their solutions to the porter. We interacted with another porter to determine his problems & propose a solution. The field offered some new insights which were overlooked in the previous visit. He was



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For secondary step-thumping, we got to know that the government was already providing a machine at subsidized rate of 5000rs. He has to produce the stock in excess as

manufacturing could not be done in the rainy season. But the pot is retained in rainy season. Cost of the wood used for baking the pots was very high & so being the land rental. Approximately 20 out of 100 pots broke in the process. Thus, we identified that somehow efficiency is a problem which needs to be addressed with solutions at different stage of process.

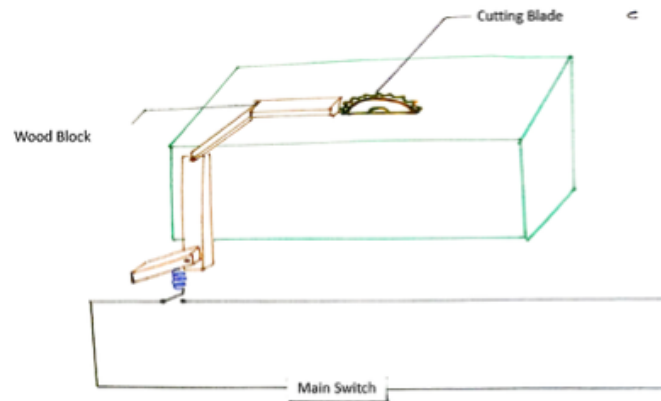
## 02. LOW COST SAFETY MACHINE FOR CARPENTERS

May 26th, 2017, Delvaad

On our visit to Delvaad village, we visited the house of the Sarpanch of that village. It was the most advanced house in the neighborhood. There we met Mr. Mukesh Bhai, the head carpenter and other workers, they made farming tools there and were pretty skilled in their job. We were shown a Hal. The machines they used were absolute and not at all safe in any manner.

### PROBLEM STATEMENT:

The whole process of tool making from carpentry was a slow and old process, the process was not safe as it could cause severe damage to a person who is new to those machines and also even someone proficient if not taken the required precautions. The process involves a lot of dust and dirt particles which are harmful for their eyes. Machines used were very old and inefficient and the connections were also such that we could not run only one of the two without incurring any significant trouble.



### **SOLUTION 1: WOODEN BRAKE, PEDAL STOP**

With the help of a little change in the starting mechanism, safety features can be improved. We have proposed a design such that a pedal controls the power supply of machine and stops the blade as well (the inertia of the blade does not allow it to stop at once). What we have proposed is that we can attach a pedal to the main circuit of the machine which can control the starting/stopping of

the machine, and also, we attached a mechanism which make a wooden log touch the blade and thus stops its motion (friction baby). The pedal is attached to a spring so as to get it back when released. Its other end is attached to a switch connected to the main circuit which completes the circuit when pressed. As the pedal is released, the circuit breaks and the wooden block also shifts towards the blade again. This machine is very feasible and can be easily implemented in the existing machines.

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## **03. DAIRY FARM AUTOMATION**

*May 26th, 2017, Delvaad*

Milk is an essential component of diet for everyone from children to the old, but we have no clue about the intricacies of the process involved. The summer school team identified that there can probably be a problem with the distribution of adequate money to the milkman (corruption) providing milk to the collection centre. Now wondering what's that?

Actually, collection centre is a unit where milkman sell their milk from their small dairy farms in return of a sum which is calculated from the percentage quantity of fat in the milk. So, we realized there is a loophole where the contractor can play with the fat figures and the transparency is on stake. So, the team decided to automate the fat data storing and compute the amount payable to the milkman according to the day's market rates.

### **SOLUTION:**

Use of automation for storage of quantity of fat in the milk. This will require an Arduino/Raspberry-pie based machine to transfer output of the fat machine to the Computer. Then by use of Internet of Things we plan to get the current value of milk in compliance with

the unit of fat Quantity. This rate is multiplied by the fat measured of the milk to get the price to be paid to the corresponding milkman.

Storing of this data in the online database of Government for regular checking. Also, it can be used to pay the milkmen digitally using their bank accounts.

### **MAJOR REQUIREMENTS:**

- Arduino controlled device to store data from machine to computer.
  - Milkman providing milk to be provided with a specific registration number.
  - Code to store data from machine to an online as well as offline database with the milkman's registration number.
  - Running internet connection for calculation of the amount to be paid per day.
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