



**Annual Report**  
**Beacon AHEAD Institute**

**2019-2020**

## **1. Background:**

**Introduction:** Beacon AHEAD Institute is a non-profit, Registered Trust in India which works for the social development of India by creating innovative products that help people in need and bridge the gap between low cost, eco-friendly technology and community development.

Our Institute follows the whole cycle of creating awareness and products, training, maintaining and ensuring constant use and applicability of low-cost products in order to solve issues among underprivileged communities such as open defecation, illnesses due to contaminated water, smoke from cookstoves, low agricultural yield, etc. In turn, our approach revolves around providing low cost toilets, safe drinking water treatment devices, smokeless cookstoves that produce Bio-char, etc.

Our head office is at Hyderabad, Telangana and we have our branch office in Bengaluru, Karnataka. We aim to create access to better livelihoods and improve the quality of life for low income communities. We work in close collaboration with the Government of India and other social development agencies for providing better

hygiene, sanitation and self-employed livelihoods through innovative products for the people of India.

Beacon Ahead Institute was established in 2012 for creating sustainable impact to promote and revive agriculture, health, education, reviving traditional art forms and designs to support the farmers, deprived populations, physically challenged individuals, families and children in distress.

### **1.1 Our Focus areas:**

Agriculture, Health, Education, Skills and entrepreneurship development as well as product designing and revival of traditional art forms for enhancing the economic opportunities while working in close collaboration with Government, NGO's, research and resource institutions.



We focus on making life better for people, by improving health, livelihoods and quality of life.

Our strength is in reaching out to people and working with them to develop products that they can make, use and sell.

We promote eco-friendly innovation and social entrepreneurship development programs.

## **1.2 How we make a difference:**

- Development of innovative, eco-friendly, low-cost products.
- User Research, to find out what is needed, what works well and best ways to ensure user satisfaction throughout the development process.
- Creating improved opportunities for sustainable livelihoods.
- Creating access to better products that make a difference, to improve quality of life and health for people, communities and the environment.

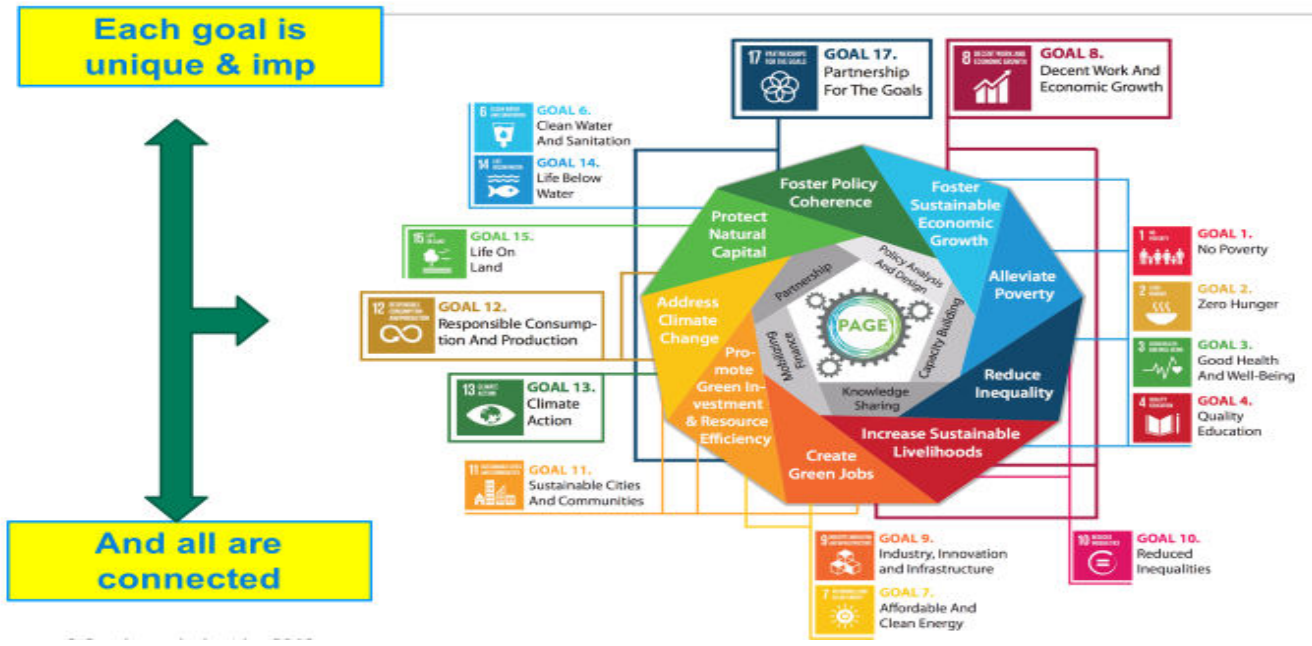
## **1.3 Creating Sustainable Impact:**

We feel happy when we work with others, and observe improvements in their health, prosperity, neighbourhood and environment, etc., and create a long-term sustainable impact in the lives of the children, families and communities.



Beacon Ahead Institute (BAI) is very particular to align its work with the Sustainable Development Goals of United Nations and Global Compact initiatives.

Framework for society's needs & enhanced skills

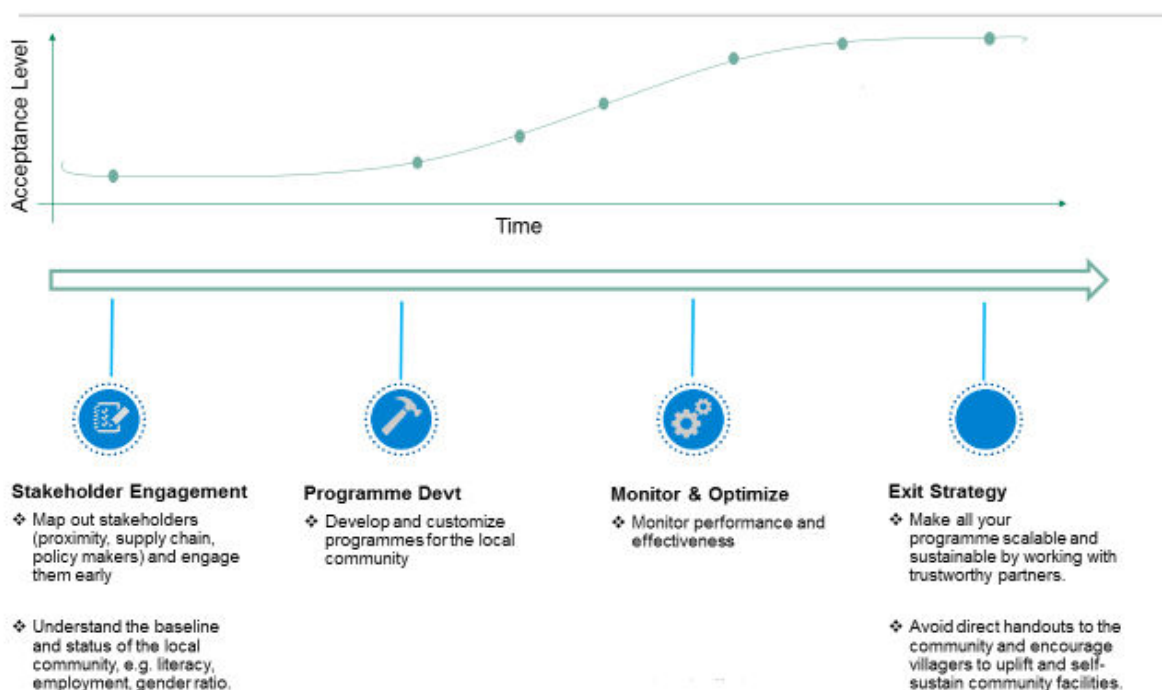


ALIGNMENT WITH SUSTAINABLE DEVELOPMENT GOALS

"Meeting the needs of the present in tandem to enhanced abilities of future generations to meet their own needs"  
 BAI'S Focus areas are : 3,4,6 , 8 , 9 and 11

<p><b>Human Development</b></p> <ul style="list-style-type: none"> <li>1) No Poverty</li> <li>2) Zero Hunger</li> <li>3) Good Health and Well Being</li> <li>4) Quality Education</li> <li>5) Gender Equality</li> </ul>	<p><b>Environmental Development</b></p> <ul style="list-style-type: none"> <li>6) Clean water and Sanitation</li> <li>7) Affordable and Clean energy</li> <li>13) Climate Action</li> <li>14) Life below water</li> <li>15) Life on Land</li> </ul>
<p><b>Economic Development</b></p> <ul style="list-style-type: none"> <li>8) Decent work &amp; Economic Growth</li> <li>9) Industry, Innovation and Infrastructure</li> <li>12) Responsible consumption and Production</li> </ul>	<p><b>Good Governance</b></p> <ul style="list-style-type: none"> <li>16) Peace, Justice and strong Institutions</li> <li>17) Partnerships for the Goals</li> </ul>
<p><b>Social Development</b></p> <ul style="list-style-type: none"> <li>10) Reduced Inequalities</li> <li>11) Sustainable cities and communities</li> </ul>	

In line with the above framework, BAI will focus its work on the above 6 focus areas to meet the communities needs and priorities and are particular about exit strategy as well.



## 2. Projects implemented in 2019 - 2020:

### 2.1 Documentary on developing first of its kind Model Project of Urban Worm-Composting Toilets and Sewage Treatment Plants by PriMove in Pune and Kolhapur Slums, Maharashtra, India.

#### 1. Overview:

Bio-filters based on earthworms (vermi-filtration) are revolutionizing sewage treatment. Toilets and sewage treatment plants based on these bio-filters are eco-friendly, low-energy,

low-odor and easy to maintain. Most recently, PriMove has developed low-cost toilets that are being promoted and tested in homes in urban and peri-urban slums, where the need for safe and effective on-site sewage treatment is very high. The documentary gives an overview of the great impact of PriMove's work, about the challenges people face when they have no toilet at home, and the small (home toilet) and large (treatment plants) sizes of worm-composting systems that are being designed and built in India.

Beacon AHEAD Institute created this documentary in order to increase awareness about this new and effective worm composting systems that have the capacity to create long lasting environmental impact and have the ability for upcycling waste.

## **2. Details:**

- i. To develop this demonstrated worm-composting toilet model, the Team traveled to Pune and Kolhapur and conducted operational research through focused group discussions, individual interviews, usage pattern, mapping challenges, concerns and finally the impact.
- ii. Met with PriMove and Shelter Associates to discuss filming the documentary
- iii. Interviewed users and developers of worm-composting toilets;
- iv. Interviewed manufacturers of worm-composting Sewage Treatment Plants (STPs)

## Interviews



- v. Created the storyboard of the documentary from the interview footage.
- vi. Edited the documentary, and added subtitles and credits.
- vii. Created a YouTube channel for Beacon AHEAD and uploaded two documentary films on worm-composting sanitation options and developments.

### Worm-composting toilets

### Drone for aerial views



### 3. Cost Estimates for potential projects related to Worm composting treatment:

- i. Cost estimate for developing Urban Worm-composting toilet for replication: Rs. 4 to 5 Lakhs for product refinement and testing, in partnership with PriMove of Pune.

- ii. Cost estimate for developing STP for testing and replication: Rs. 2 to 10 Lakhs, depending on size of STP and project scope, in partnership with PriMove of Pune.

**4. Impact:**

- i. Safer communities, with improved privacy and access to toilets.
- ii. Healthier communities, with improved on-site waste treatment.
- iii. Cleaner water systems, by keeping raw sewage out of rivers, lakes and ponds.



- iv. Income generation for manufacturers and maintenance workers.
- v. Fertilizer generated by the worm-composting is also valuable for soil health.

**Worm-composting Sewage Treatment Plants (STPs)**





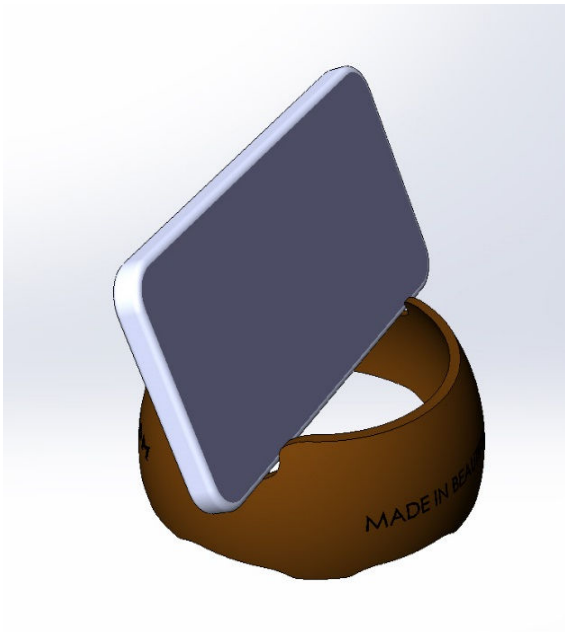
5. Please refer to the following links for viewing the Documentaries:

- i. <https://www.youtube.com/watch?v=rVo13lv9FgM>
- ii. <https://www.youtube.com/watch?v=X7d9T7fq1ws>

## **2.2 Developing Eco-friendly items for enhancing economic opportunities for women and youth entrepreneurs:**

1. Designed low-cost, eco-friendly products made from coconut shells. When coconut shells are smoothed and polished, they have a beautiful dark wood pattern like teak wood. Useful, strong items can be made from this attractive and nearly free raw material. For example:
  - i. Pen/pencil holders
  - ii. Phone or tablet stands
  - iii. Small storage boxes, etc.

Coconut shell Holder for Mobile Phone



Coconut Carving Machine Prototype



2. Designed a low-cost, computer-operated machine to carve the coconut shells, shown above:
  - i. With this machine, people can load coconut shells and then go about their work at home, while the machine automatically carves the shells into beautiful products.
  - ii. The machine was designed with minimal mechanical moving parts. Many CNC machines use threaded rods to create linear motion from the motors. All of the motion in this machine is caused by simple rotation and the use of one cam. This allows the machine to be very affordable, as well as simple to build and maintain.
3. Purchased motors, power supplies, Arduino micro-computers, etc., for making a prototype of the coconut carving machine.
4. **Cost estimate for improving the machines and products:**
  - i. Tie up with entrepreneurs and manufacturers to build these machines, to further increase jobs and livelihoods.
  - ii. Link up with Micro-finance groups to help low income people and/or entrepreneurs to purchase the carving machines from local manufacturers for Rs. 6000.
  - iii. This would include training, support, and machine maintenance.
  - iv. We also would like to make the machine and programming it, an open-source project, so that others can design better machines and interesting new products that can be made with these machines. In this way, the project can grow organically.
5. **Impact :**
  - i. Income enhancement for poorest of the poor families
  - ii. Effective utilization of natural products;
  - iii. Improving social status for the poor families;
  - iv. Avoiding migration to the cities, etc.

## **2.3 Donating Personal Protective Equipment (PPE) during COVID-19 pandemic:**

1. Donated two kinds of face masks, protective goggles and surgical gloves to 3500 front line health workers at:

iii. Gandhi Government Hospital in Hyderabad

iv. Primary Healthcare Centre located at Dharoor, Gadwal-Jogulamba district, Telangana state.



To:  
Beacon AHEAD Institute,  
Flat #8, Meghna Paradise Apts,  
Ishaq Colony, Picket,  
Secunderabad, 500 015,  
Telangana State,  
India

Date: 23/07/2020

Respected Madam,

**Sub:** Acknowledgement for donation of masks used against COVID-19 for Frontline healthcare professionals

We herewith provide our consent and acceptance of your donation of the below mentioned articles:

S.no	Article type	Quantity
1	Disposable masks	445
2	N95 masks	80
<b>Sum Total</b>		<b>525</b>

The above articles have been received with thanks to Sri. Murali Sreeramagiri, Ms. Hari Chandana and Beacon AHEAD Institute who have donated these useful articles to our staff members who represent the Frontline Healthcare professionals during these times of the COVID-19 pandemic.

With best regards,

G. Sravanthi, 23/07/2020  
Medical Officer  
Primary Health Center  
DHARUR.  
Chief In-charge  
Primary Healthcare Center  
Dharur,  
Gadwal-Jogulamba district,  
Telangana State, India

To:  
Beacon AHEAD Institute,  
Flat #401, Inlover Parkview Apts,  
Wilson Garden,  
Bangalore, 560 027,  
Karnataka,  
India

Date: 25-07-2020

Respected Sir/Madam,

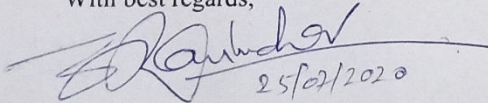
**Sub:** Acknowledgement for donation of masks and goggles used against COVID-19 for Frontline healthcare professionals

We herewith provide our consent and acceptance of your donation of the below mentioned articles:

S.no	Article type	Quantity
1	Disposable masks	1480
2	N95 masks	60
3	Protective goggles	30
<b>Sum Total</b>		<b>1570</b>

The above articles have been received with thanks to Sri. Murali Sreeramagiri, Ms. Hari Chandana and Beacon AHEAD Institute who have donated these useful articles to our staff members who represent the Frontline Healthcare professionals during these times of the COVID-19 pandemic.

With best regards,

  
25/07/2020

Dr. G. Ravindra, Reg No: 11720 HML  
Professor and Head – Department of Cardiothoracic Surgery,  
Gandhi Medical College and Hospital,  
Bhoiguda road,  
Musheerabad, Walker Town  
Secunderabad - 500025  
Telangana State, India  
Ph No: 040 27505566, 08328014724

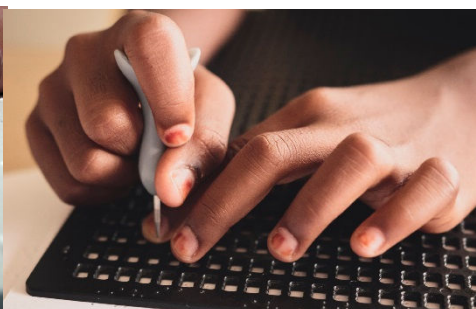
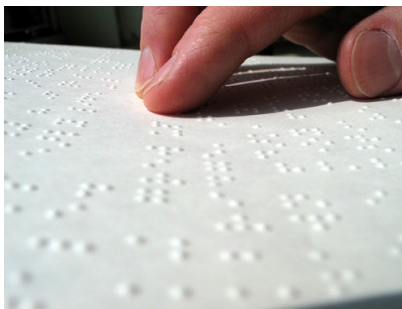
Professor & Head  
Department of CT Surgery  
Gandhi Hospital Secunderabad

## 2. Impact:

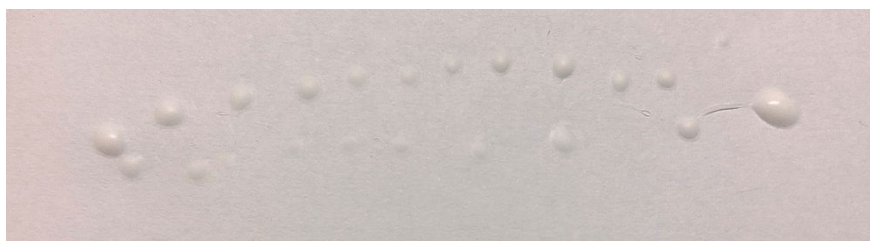
- i. Covid 19 Pandemic mitigation.
- ii. Personal protection for 3500 health workers to provide health care support in challenging times.
- iii. The ripple effect of this small initiative is to provide care, protection and mitigation to support COVID 19 patients and mothers before, during and after childbirth.

### 2.4 Evaluated Braille Printing/Embossing:

1. In India and the rest of the world, majority of blind and sight-impaired people lack access to books for the blind – books embossed with Braille dots that can be read with the finger tips. Almost 90% of people who would benefit from Braille books do not have any hope to learn Braille or buy Braille books:
  - i. Heavy-duty “printing” machines press the dots from the back side of thick paper. The paper, which is usually 150-180 grams per square meter (GSM), is expensive and sometimes difficult to obtain.
  - ii. Braille embossing printers are very expensive.
  - iii. As a result of the expensive paper and the expensive machines, the majority of people who need to learn and read Braille cannot afford Braille books.



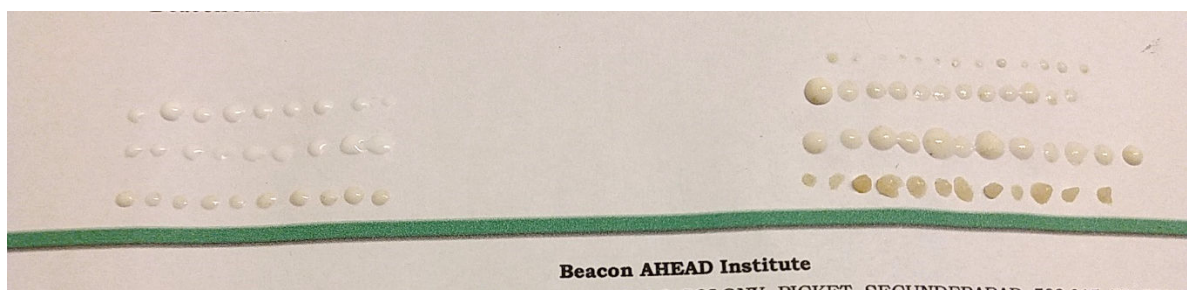
2. Although technology companies are developing Braille tablets and electronic book readers, these are also very expensive.
3. Based on our survey of needs and options in 2020, we started developing an innovative new concept for a Braille printer:
  - i. Instead of embossing the dots by pressing on the back of thick paper, the dots are added to the front of the paper.
    - 3D printers inspired this idea, as computers are able to add small dots of plastic to build up any shape.
    - We realized the small Braille 3D dots would be easy to “print” in a similar way.
  - ii. Because the dots are added to the front of the paper, lightweight and affordable paper can be used. For example, ordinary 60-80 GSM copier paper can be used.
  - iii. In addition, any copier paper could be used – any colour paper, and any paper that already was printed on with text, graphics, etc. Dots could be applied over ‘re-used’ paper that would essentially be free paper! This could mean that Braille textbooks could be made very affordably for schools.
  - iv. We also explored easy-to-buy, affordable materials for the dots themselves. The requirements are that the dots should be smooth, non-toxic and safe, long-lasting and well-attached to the paper. We are particularly interested in mixtures of flour and water, of paper and glue, and or of gypsum powder and glue.
    1. Our experiments with glue versus flour and water dots on plain paper were very encouraging, as the dots were very smooth and strong.



2. When we tested the flour and water dots by pushing and pulling on them, the dots did not break, and the paper finally tore under the dots when the maximum stress point was reached.
3. We tested the ratio of flour to water, and found that the mixture is not terribly sensitive to the ratio.



4. The flour and water mixture were further evaluated, by cooking the mixture to add longevity. This mixture was stiff, which made the dots have sharp peaks on top. So, we added white glue, which helped the dots to flow and become smooth and round on top.





5. When we tested white glue by itself, we found that the glue flowed very nicely, but became stringy as the nozzle placing the dots was lifted away from the paper. The flour and water in the glue prevent that from happening. So, the combination of cooked flour and water for stiffness and cohesion, plus the glue for fluidity and longevity shows a lot of promise.
6. We tested shredded wet newspaper in the mixture, but it tended to clog the extrusion nozzle.
7. We tested blown air and heat lamps to evaluate how fast the flour and water dots could dry. It was somewhat slow, so this is an area that needs further development.

**4. Cost estimate:**

- a. A small project is needed to design and prototype the print head, and to conduct user research on how people would use and interact with the Braille printer. Approximately Rs. 2 - 3 Lakhs would be required for this phase.
- b. Further funding would be required to partner with printer manufacturers to combine their printer chassis with a Braille print head. Approximately Rs. 3 - 4 Lakhs would be required for this phase.

**5. Impact:**

- a. The potential impact for the blind people and service providers is huge:
  - i. We envisage developing and refining this Braille printer design, so that primary textbooks could be printed in schools for less than Rs. 1 each, total cost.
  - ii. This low cost could allow vast numbers of young students to have access to learning to read Braille, and to go on to study for graduation and beyond.
  - iii. These low-cost books could be achieved through donation of the new Braille printers, donation of used

printer paper that can be covered in Braille dots (no matter whatever else was previously printed in ink on the paper!), and the use of simple and affordable raw materials for creating the dots themselves.

- b. The new Braille printers can be replicated by:
  - iv. partnering with Indian printer manufacturers, and
  - v. working closely with the manufacturers and end users, to ensure that the printers are extremely reliable and easy to use.
  - vi. The aim would be to create a Braille printer that costs less than Rs 7000 to buy for blind schools and other institutions for promoting education among the blind.

### **3. Way forward:**

#### **3.1 Worm Composting Toilets and Sewage Treatment Plants:**

- Replication of worm Composting toilets:
  - 1. We are looking to tie up with Community Based Organizations (CBOs) in urban areas to build more urban worm-composting toilets in collaboration with PriMove.
    - a. These toilets are vitally important to provide safety and privacy, especially to children and women in slums.
    - b. These toilets also provide for better health and hygiene, especially when combined with consistent water supply and hand washing.

- Construction of worm-composting sewage treatment plants (STPs):
  1. We are interested in tying up with BBMP in Bengaluru and GHMC in Hyderabad, to teach and consult about the benefits and methods of constructing worm-composting STPs.
  2. As these great metropolitan areas grow, it becomes more and more important to develop sewage treatment plants that are:
    - a. Environmentally friendly on-site treatment of waste
    - b. Affordable, in terms of construction, low-energy operation, and low-maintenance costs.
    - c. Highly adaptable for capacity and space constraints.

### **3.2 Anganwadi and School Improvements:**

- Tie up with rural organizations to design and create model Anganwadi centers and model Schools:
  - Conduct user research with teachers, manufacturers, parents and students.
  - Create an overview of needs, resources, skills, space constraints, etc. vs. budgets.
  - Design and test:
    - Model layouts for Anganwadi centers and Schools
    - Innovative furniture and equipment:
      - Size/Age-appropriate child-friendly furniture and play structures.
      - Space-saving, transforming furniture for the Anganwadi centers and schools.
      - Smokeless, eco-friendly cook stoves for the school kitchens.

- For states that are looking to improve their school infrastructure, this project could:
  - help to improve learning conditions for many children and young people, and
  - employ a large number of people in implementing and renovating these Anganwadi center and School improvements across the state.

### **3.3 Coconut Carving Machine:**

- Build version 2 prototype, based on what we learned with the first prototype:
  1. Incorporate a grinder for smoothing the coconut exterior, into the machine, so that a rough coconut can be completely prepared and carved with the press of one START button.
  2. Improve the cam mechanism for raising the cutter and router, so that it has a better mechanical advantage to lift the weight of the router.
- Evaluate other raw materials and products that could be made with similar computer-numerical-controlled (CNC) machines, to help other low income people to have increased income with less strenuous work.

### **3.4 Braille Printing:**

- Tie up with Snehaddeep Trust in Bengaluru, and others, to learn more about how blind people could interact with a simple Braille printer:
  - Conduct user research on what their main uses and challenges would be
  - Brainstorm interactions and interfaces, etc. for the Braille printer.

- Continue to evaluate and develop materials for the dots, to combine the affordability and availability of household ingredients with the speed and agility of sprayed and heat-cured or UV-cured dots.
- Develop methods of mixing and applying the dots, so that this 'print head' could be added to a regular ink-jet type of printer chassis, in order to make the new Braille printer extremely affordable, so that all schools, organizations and institutions will be able to print Braille books, brochures, etc.
- Create easy ways to print 3D diagrams and shapes on plain paper:
  - Blind and vision-impaired people learn in a physical way.
  - We want to be able to print raised diagrams, math ideas (such as fractions), and maps, etc. to help people to learn new concepts in clearer ways.
- Help blind students to take notes in classes:
  - Evaluate connecting a keyboard to a smart phone, and:
    - Type the notes into the phone, with some auditory feedback from the phone, to confirm that the correct alphabets are being stored in the phone...
    - Then sync the phone to a new Braille printer, so that the class notes can be quickly and quietly printed.
  - A laptop or classroom computer could also be used: for example, the innovative DotBooks developed in India:

<https://drishticonnect.antardrishti.org/2019/02/28/indias-first-braille-laptop-dotbook-40q-and-dotbook-20p-launched/>

DotBook 40Q



Perkins Brailier



- Also, old laptops can be reused and rejuvenated with a free Linux operating system, and set up for easy synchronizing to a Braille printer.
  - Any of the above options would be a cost-effective way to help blind students in school. In the past, heavy and loud Perkins Brailiers, shown above, were used to take notes. These were inconvenient to bring to class and type with, because of the weight and noise.
- 
- Blind people really need something more affordable!



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