

## IIT Hyderabad – A cradle for young start-ups

My journey in the field of architecture and design starts from the College of Engineering and Technology, Bhubaneswar, Odisha. Then, I went to New Delhi to complete my master in product design from the School of Planning and Architecture. I joined a Cosmos Media Product Pvt. Ltd. as Head of Design before opening my partnership design firm “R Square Dezin” in New Delhi. My passion for design and sharing led me to teach, and I taught for six years as faculty in product design at Sharda University and Pearl Academy, New Delhi before I joined IIT Hyderabad to pursue my PhD in product design. Joining IIT Hyderabad had given me many opportunities such as my selection for Joint PhD Program with Swinburne University Australia. It has opened up many avenues which have led to a fantastic journey of innovation and research.

I joined IIT Hyderabad way back in July 2017, and since then I have an incredible journey of research, product development and of a start-up. Starting from the first itself, our faculties, especially Prof. Deepak, Dr. Prasad, and Dr. Neelkantan encouraged and promoted the development of innovative products. They not only supported in conceptualising new ideas and tackling everyday issues but also helped in sponsoring the projects. Their constant support and excellent facilities at IIT Hyderabad helped nurtured my ambition to open a start-up to create products to benefit society at large. IIT Hyderabad, with its many initiatives to promote start-up and entrepreneurship, has developed facilities such as DIC, CfHE, iTIC, etc. In one such facility, I met Nibedit Dey, and it led to the development of IBrum Technologies, a start-up that caters to health and sustainable products. IIT Hyderabad to promote product development and innovation started the Bold and Unique Ideas Leading to Development (BUILD) project which provided monetary support to student

projects. Swatchh Air, Bio-Bricks and Face Shield are three of our projects that got selected, and this led to the development of the prototypes.

### Swatchh Air - A low-cost air sterilisation system

In recent years, most of our government building, corporate offices, hospitals, malls are going for air-conditioning system. But there is a steady rise in the indoor air pollution and circulation of pathogens. With COVID-19 pandemic, which is an air-borne disease, there is a massive demand for an air-sterilisation system that works continuously to remove not only suspended air pollutants but also kills the viruses and pathogens in re-circulated air. Our system is based on the technology which was published in IEEE and won the best research paper award. Swatchh Air will also help in normalising the situation and make the transition to the new normal much easier. Our system can be a great help in quarantine centres, clinics, nursing homes for COVID-19 where the viral load in the air is very high, and it will make it comparatively safe for health-worker to give proper care to the patients.



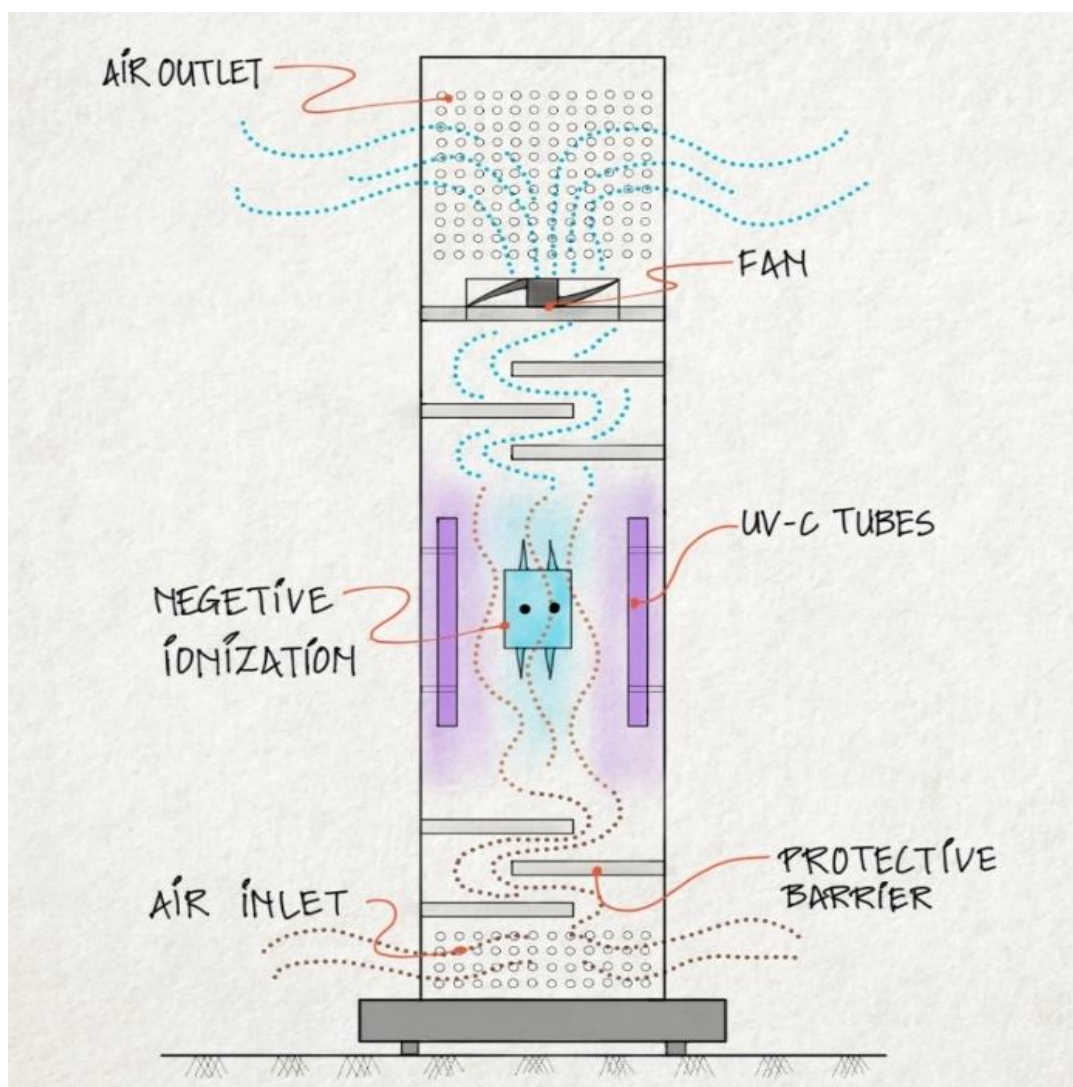
**Figure 2: Working Prototype of Swatchh Air**

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## Working

The air is taken from the perforation at the bottom of the device, and the air is passed through a closed chamber irradiated by UVC lights and bombarded with negative ions. The high voltage negative ions, along with UVC, destroys the cell structure and kill all the bacteria and viruses. Negative ions also remove all the suspended particulate pollutants such as dust, pollens, dust-mists, odour etc. Based on 253.7 nm UVC lights.



## WHO acknowledges 'evidence emerging' of airborne spread of COVID-19

"...The possibility of airborne transmission in public settings cannot be ruled out," WHO technical head said.

Reuters • July 08, 2020, 11:23 IST

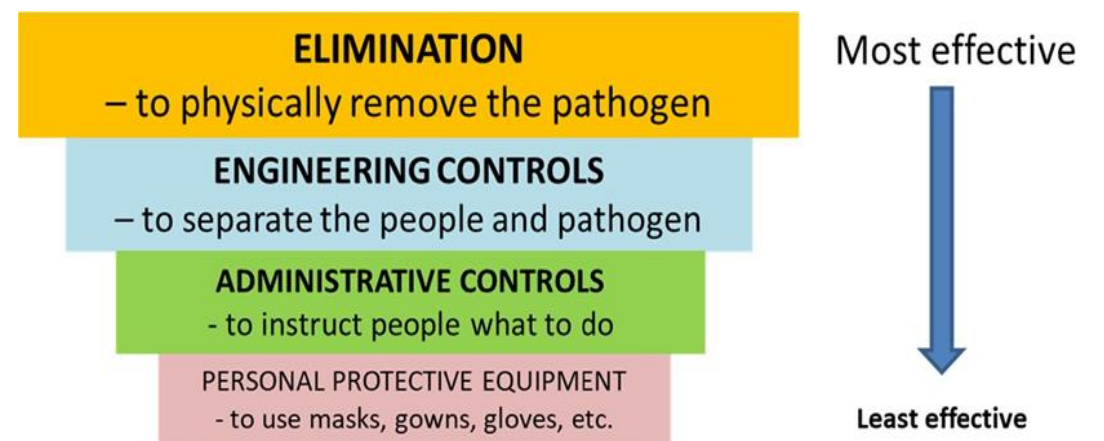


Figure 2: Working Methodology and concept behind Swatchh Air

## Awards

Best Ten Start-up awards at 28th Annual HYSEA Awards on 5th November 2020.

Based on the founder's previous award-winning

## Publication

<https://ieeexplore.ieee.org/document/5735407>



Figure 3: Concept designs for future models of Swatchh Air



Figure 4: Showcasing the prototypes to Dean of Students at IIT Hyderabad

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### Bio-Bricks – a sustainable building material



**Figure 4: Working Prototype of Bio-Bricks**

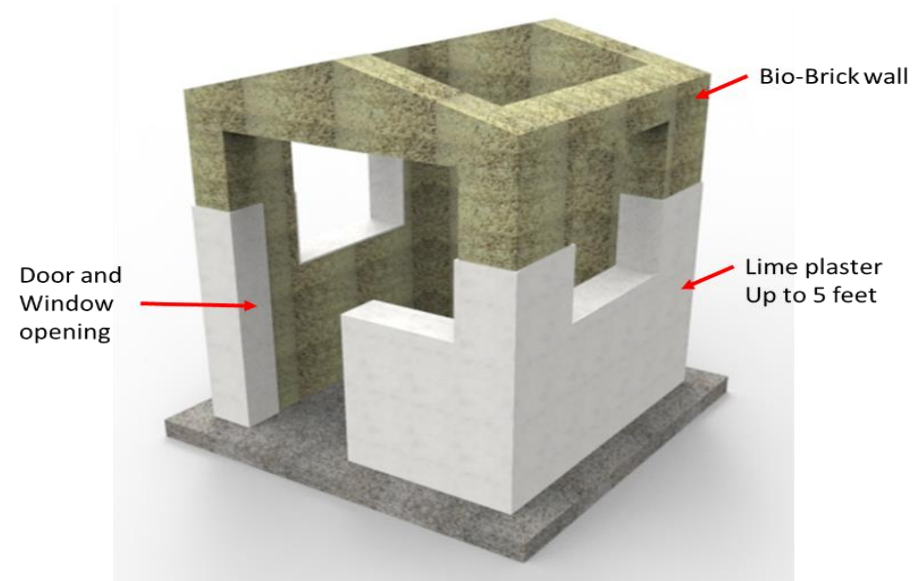
Agricultural waste burning is a significant source of pollution in India, especially after the harvesting season. Bio-brick was developed as an alternative and sustainable building material that acts as an alternative to stubble burning. Stubble burning is prevalent in northern India, which not only causes severe air pollution but also lead to numerous temporary and permanent health issues and even loss of lives. Bio-bricks or agro-waste based bricks is one such material that has the potential to not only create an alternative building material but also create new jobs at the grassroots level. This material has good thermal and sound insulation; it is breathable and helps in maintaining a comfortable living condition during harsh summer or cold winters. Following are a few highlights for the project:

- Reducing air pollution due to stubble burning
- Improving the income of the farmers
- Sustainable environment.
- Inexpensive and local building material for low-cost housing
- Making villages self-sufficient (Atmanirbhar) in building materials.

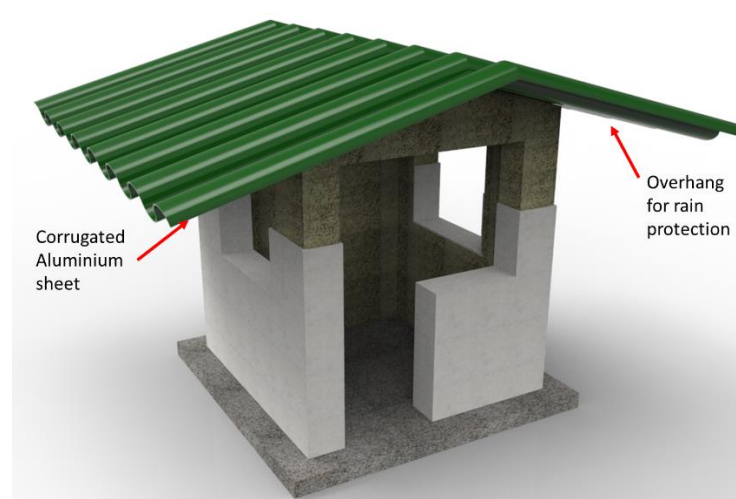
### Guard Cabin Design

As a part of the BUILD project to demonstrate the material and its properties, a prototype of the guard cabin will be designed and executed in the space allocated by the IIT Hyderabad authorities. This sample building will be made

up of entirely of Bio-Brick material with supports from the bamboo framework. The roof structure will be made up of corrugated aluminium sheet with Bo-Bricks panel underneath to reduce the heat gain. The outer side of the wall will be lime plastered up to a height of 5 feet to protect the Bio-Bricks from rain. The whole structure is built on a PCC raft to protect the base from rotting and any damage from insect and rodents.



**Figure 5: Complete Bio-Brick wall with lime plaster on the outer surface.**



**Figure 5: All side overhanging roof with corrugated aluminium sheet**



**Figure 6: Bio-Brick panels to reduce heat gain**

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## Paper Published

- First Paper published in ICED conference 2019 – Rautray, P., Roy, A., Mathew, D. J., & Eisenbart, B. (2019, July). Bio-Brick-Development of sustainable and cost-effective building material. In Proceedings of the Design Society: International Conference on Engineering Design (Vol. 1, No. 1, pp. 3171-3180). Cambridge University Press.
- Second Paper selected for ICoRD 2021. Bio-Bricks: Circular economy and new products
- Priyabrata Rautray<sup>1</sup>[0000-0002-5260-0900], Avik Roy<sup>2</sup>, Deepak John Mathew<sup>1</sup>, and Boris Eisenbart<sup>3</sup>  
1 IIT Hyderabad, 2 KIIT Bhubaneswar, 3 Swinburne University Melbourne

## Awards

The research team received a Special Recognition Trophy for sustainable housing at Rural Innovators Start-Up Conclave 2019 organised recently by National Institute of Rural Development and Panchayati Raj (NIRDPR), Hyderabad.



Figure 5: RISC 2019 recognition for Bio-bricks

Mr. Priyabrata Rautray  
(Architect and Product  
Designer)  
(PhD Scholar)  
Department of Design

