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**Affordable Housing** 



## **Affordable Housing**

Affordable housing at AnantU has a solutionary approach - we analyze the challenges, look at best practices, possible solutions and their impact. We partner with institutions, organizations and governments from across the world to better address the challenges of housing. Our work is multi-disciplinary and geography agnostic. Our academic programs take the same approach and are offered across undergraduate, graduate and executive levels.

The multi-disciplinary team brings together a diverse range of backgrounds across the industry, public policy, research, investments and civil society. The Affordable Housing team is at the forefront for research in this space and has published extensively.

During COVID-19, the Affordable Housing team presented a comprehensive plan to convert underutilized buildings into COVID Care Centres (CCC). The Centre implemented the proposal by setting up more than 27 CCC across 6 states. We also pioneered the use of recyclable corrugated furniture for healthcare and delivered a range of emergency and testing vehicles based on rickshaw platforms. These are some of the cheapest such vehicles in the world.



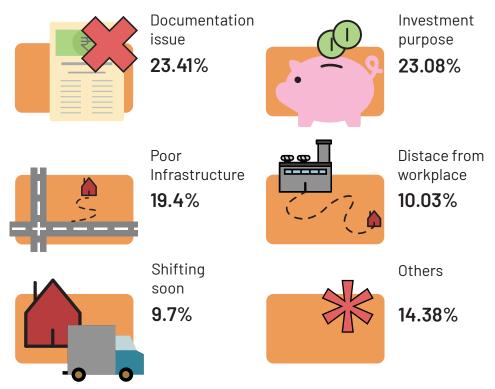
## **Vacant Housing**



India faces a crippling shortage of urban housing while nearly 14% of houses in cities lie vacant. This is endemic to all urban areas in India. The Centre has planned to better understand this phenomenon through a series of city reports starting with Ahmedabad. This is because Ahmedabad has one of the largest stock of vacant housing in the country. The report was based on an exhaustive primary survey covering 50 government and private

housing colonies spread across the city. The survey looked to identify what could be the structural reasons and what could be city or location-specific reasons for this phenomenon.

The report culminated in recommendations for a number of specific short and long term interventions that can be done by the government to incentivize occupation of the vacant homes.



Major reasons for vacant houses in Ahmedabad

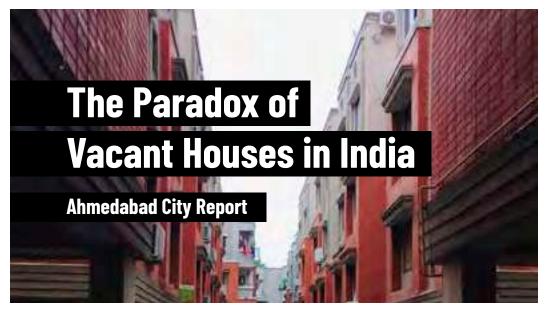


### Report:

## The Paradox of Vacant Houses in India: City Series

The report examines significant determining factors of vacant houses in Ahmedabad in the context of the mismatch between the shortage of housing and an abundance of vacant housing. The report identifies several reasons. some of which are endemic to the whole country, some which are specific to the dynamics of the city and the state, and some of which are specific to a particular building type (government versus private). The report enumerates the reasons that make decent housing and dignified living conditions difficult in the cities. The report delves into

statistical analysis of the housing situation such as the condition of the houses, ownership, government schemes among others in the context of urban and rural areas. Further, the report recommends measures such as longer-term financing options and higher taxation of vacant houses among others to make housing available for all. The report highlights determinants of vacant houses such as lack of infrastructure, delayed documentation and exorbitant rents among others. It also offers solutions to address these issues.





## Dream stations - boarding the street kids of India in vacant government schools

Sustain Labs Paris partnered with Anant Centre for Sustainability for an open call to the students and Faculty to give 11 million children living on the streets of India, a home. The call was met with enthusiastic response from the AnantU community. Gowri Manalan and Vipul Sirvi came up with a stellar design solution for boarding the street kids of India in vacant government schools.



We have to specially mention Hasti Majithiya, Gazal Bhatia and Sagar Soni who came up with fantastic ideas and work.



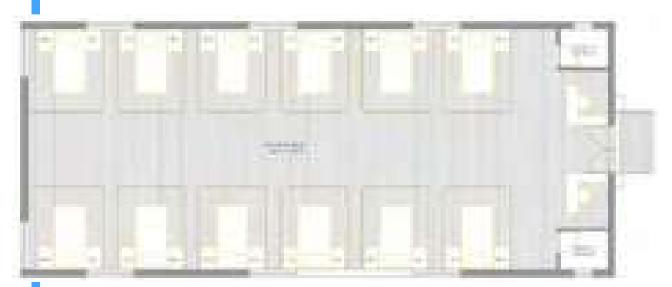




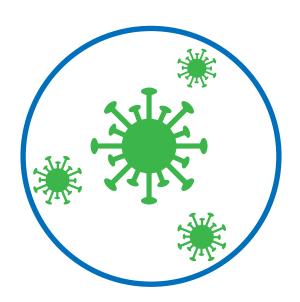
## White paper: Implementation Plan on Using Vacant Buildings as **COVID-19 Recovery Facilities**

During the first wave of COVID, there was very little information available for the authorities to design and implement a plan for hospitalization and isolation centres for COVID infected patients. There was no clear line of treatment and the existing infrastructure was overwhelmed with the demand. Logistically and financially it was not and layouts with low cost furniture possible for the government or the private sector to set up greenfield hospitals and isolation centres.

The Centre for Sustainability at AnantU presented a model to the Prime Minister's Office to convert empty or unoccupied hard infrastructure, such as, projects with vacant housing, community halls and commercial buildings into temporary COVID hospitals. The Centre proposed model plans solutions. These recommendations were adopted and implemented by the PMO.







## **Affordable Healthcare**

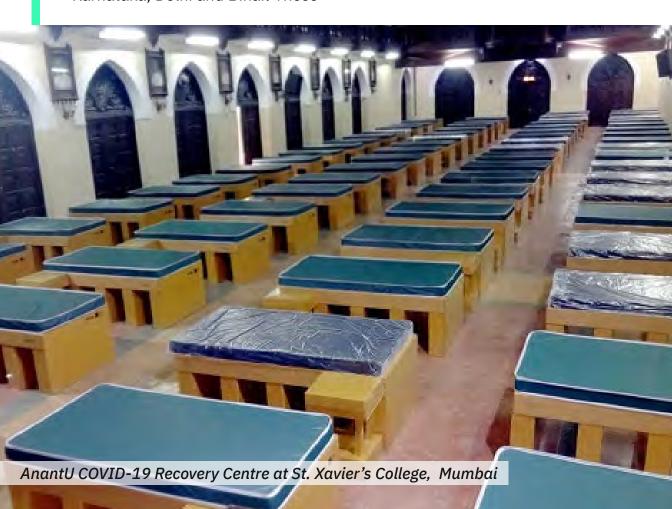


### **AnantU COVID-19 Recovery Centres**



The Anant Centre for Sustainability made recommendations to the Prime Minister's Office of using vacant infrastructure, such as empty community halls, affordable housing projects, etc. to create temporary COVID-19 Care Centres. This proposal was accepted and subsequently, the Anant Centre for Sustainability set up over 15 such CCCs across 6 states in India - Gujarat, Maharashtra, Kerala, Karnataka, Delhi and Bihar. These

places were first scoped out with the help of our on-ground partners and they were then furnished with basic hospital infrastructure that was developed and manufactured in house. These included beds, side tables and partitioning systems. The costs were kept very low using recyclable corrugated cardboard. Over 2000 beds were set up in record time and helped relieve the burden on an overstressed system.



## Affordable Products AnantU Corrugated Cardboard beds



When the pandemic hit for the first time, the availability of hospital beds was a major problem. Conventional supply could not keep up with the demand and prices skyrocketed, making it extremely difficult for hospitals and organisations to set up COVID-19 Care Centres and temporary hospitals.

The Anant Centre for Sustainability took a unique approach to develop ultra-low-cost beds that could be recycled after their need was over and would serve at the same parameters as conventional beds. There were other instances of

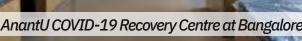
cardboard beds in the country but they failed as none of them could be sanitized and were very vulnerable to liquid spills. The beds developed by the Anant Centre for Sustainability with its partners were coated with a thin film of plastic that easily separates during recycling but protects the underlying corrugated board from moisture. This made it possible for them to be easily sanitized and reused multiple times. These beds were strengthened using a unique strut design and as conventional beds. There were could take weights upto 300 kgs.



## **Locations of COVID-19 recovery activities**





















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# Affordable Products AnantU Mobile COVID-19 Testing and Oxygen Auto-rickshaw

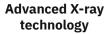
There were two great challenges faced by the government and healthcare providers during the COVID-19 pandemic.

- fast and reliable testing
- transporting patients safely to hospitals

Testing was a huge bottleneck but there is evidence that the presence of congestion in lungs indicates a very high probability of COVID-19. This can be easily ascertained by an x-ray but it is difficult to get people living in slums, rural areas and inner cities to x-ray centres. The Center,









Automatic disinfectant system



Oxygen supply for emergencies



Door to door access

with its partners, developed a low cost, mobile digital x-ray testing vehicle on a commercial autorickshaw chassis. These vehicles had automatic disinfection systems and provision to isolate the patient from the technician. There was also provision to conduct swab tests. The results were sent directly to the base hospital from where further steps were decided. The vehicles were deployed with the Brihanmumbai Municipal Corporation.

Ambulances were in very short

supply, and further, they could not reach inside slums, inner cities and areas with narrow roads. The Anant Centre for Sustainability team studied the requirements and developed a basic emergency response vehicle with bottled oxygen support on a commercial rickshaw chassis. These vehicles were economical, quick to deploy and easy to maintain. Most importantly they could go where conventional ambulances could not and were very agile. They have been deployed in Maharashtra and Gujarat







#### **Affordable Healthcare Scrubs**

Foundation year student Aditi Bhalekar's design won the best entry for a design contest organised by the Anant Centre for Sustainability. The competition required participants to design scrubs that COVID-19 frontline warriors such as doctors, nurses and volunteers could wear along with their PPE kits.

Aditi designed a comfortable and hassle-free jumpsuit that can be worn easily along with the PPE kit. The added details such as a zipper in the front made the scrub accessible, and the multiple pockets made it easy for the users

to keep track of their possessions. The scrub was made from good quality cotton-mix fabric which is more cost-effective than the usual scrubs and is also affordable. At the back of the suit, "COVID WARRIOR" was printed to instill a sense of pride among the frontline warriors wearing it.

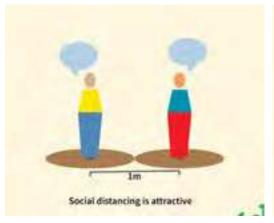
50 pieces of this winning design were worn by doctors and nurses at the Anant COVID-19 Recovery Facility at Najambaug, Mumbai. This facility was set up and funded in May 2020 by Anant National University.





#### **COVID-19 Awareness Posters**



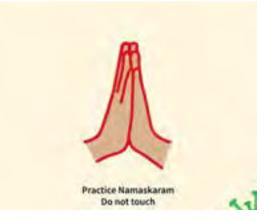
















## Housing for all



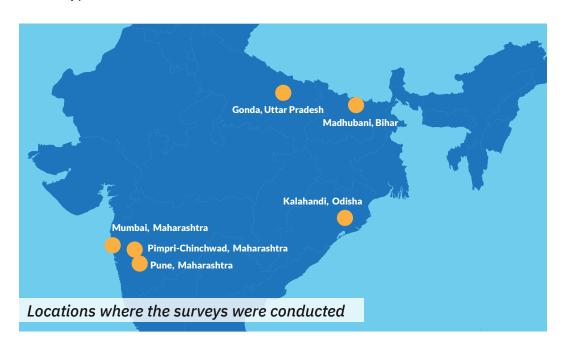
## Housing for All

The Anant Centre for Sustainability (ACfS) has partnered with the Terwilliger Centre for Innovation in Shelter (Atlanta) to identify whether lack of adequate housing played a role in the reverse migration of construction workers during the first COVID-19 lockdown.

The research design entailed primary research on migrant construction workers in one District each in three States of origin, namely Bihar (Madhubani District), Odisha (Kalahandi) and Uttar Pradesh (Gonda). In order to look at the types of accommodation

that migrant construction workers opt for in the cities, workers living in selected localities of Mumbai Metropolitan Region, Pune and Pimpri-Chinchwad have to be interviewed.

Part of the project looks at creating acceptable living conditions on construction sites. The Anant Centre for Sustainability has developed modular low cost housing solutions that can be deployed fast on site, and which offer better quality of life then what is currently provided.





## PMAY-Urban: Can "Housing for All" be achieved?



In 2012, the estimated housing shortage in India was 18.78 million. 56.18 percent of the shortage pertained to households with annual incomes of about INR 100,000, and 39.44 percent was for those with annual incomes of less than INR 200,000. By 2050, India will have added 416 million dwellers in the country's urban pockets, where the problem of inadequate housing is even more acute.

With a vision of "Housing for All by 2022", Government of India launched the "Pradhan Mantri Awas Yojana - Housing for All" (PMAY) scheme on 25 June 2015. The successful implementation of the PMAY-Urban would significantly reduce the estimated housing shortage of close to 20 million households. With less than a year to the target, this study aims to identify the challenges and opportunities for accelerating the

implementation of the PMAY-U, as well as make recommendations, if required, for changes in guidelines, management etc. of the PMAY for its extension beyond 2022.

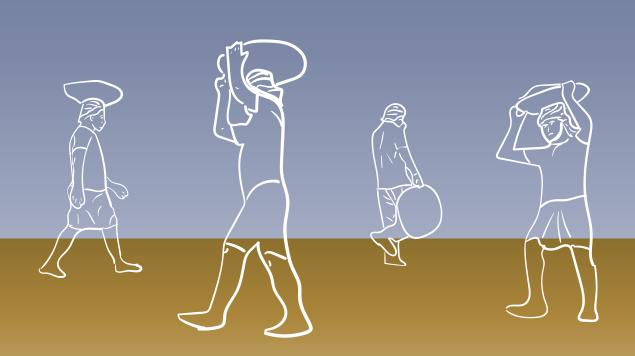
The research will cover secondary literature and data sources to document the measures taken by the Government over time to meet housing needs of the population, including the outcomes of previous schemes. It will document PMAY-U approaches and good practices that have enabled housing for the poor under its various options, as well as current status of implementation by State and by the largest cities. The aim is to identify reasons for good, medium and poor progress. The primary research will focus on Ahmedabad, the city in India that has the maximum number of houses sanctioned (228.910) and completed (130,527) under PMAY-U.



## **Housing for Migrant Construction Workers**

Safe and adequate housing remains one of the biggest challenges in India and in an irony of fate, the people building dream homes for us remain the most deprived. During the COVID-19 pandemic, we saw the largest human reverse migration in Indian history.

In collaboration with the Terwilliger Centre for Innovation in Shelter (TCIS), the Centre is looking to understand the whether the lack of adequate housing had a role in influencing the decision of migrants to return home on imposing of the lockdown after 24 March 2020. The report, based on past and current living conditions of migrant construction workers, will propose policy changes - if and where needed, and whether the Affordable Rental Housing Complexes policy has a role to play. The report will also look at alternate materials and technologies to propose possible design solutions.



### Report: Housing for All

The Anant Centre for Sustainability (ACfS) has partnered with the Terwilliger Centre for Innovation in Shelter (Atlanta) to identify whether lack of adequate housing played a role in the reverse migration of construction workers during the first COVID-19 lockdown.

With the aim of getting an overall understanding of the housing issues of migrant construction workers in India, the project focus is on Maharashtra – the State that attracts the highest number of migrants from within the country (4.79 crore - Census 2011).

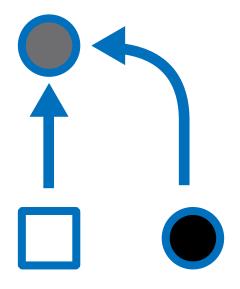
Part of the project looks at creating acceptable living conditions on construction sites. The Anant Centre for Sustainability has

developed modular low cost housing solutions that can be deployed fast on site, and which offer better quality of life then what is currently provided.

The report, based on primary research on housing needs and affordability options of migrant construction workers in selected localities of Municipal Corporations of Mumbai, Navi Mumbai, Vasai and Panvel in the Mumbai Metropolitan Region; in Pune and in Pimpri-Chinchwad, will propose needed policy changes and whether the Affordable Rental Housing Complexes policy has a role to play. The report will also look at alternate materials and technologies to propose possible design solutions.







# Indigenous Models of Circular Economy



## **Indigenous Models of Circular Economy in India**

The circular economy is a resource-efficient approach that concentrates on maximising the economic benefit from resources by keeping them in circulation or eliminating the concept of waste. All materials involved in this approach are either consumed, recycled or reused. There are several authentic Indian enterprise models that are intrinsically circular, primarily driven by resource scarcity. These models

are less documented and therefore lesser-known across the world. Our interdisciplinary research team studies the Indian practices of the circular economy and analyses the design of products, processes and infrastructure. We collaborate with academia, consulting firms and industry to discover traditional Indian practices in the field of circular economy that could be scaled as business models.





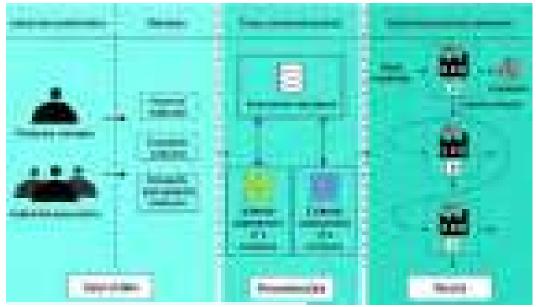
### Report:

## **Indigenous Models of Circular Economy in India**

Industrial symbiosis is a collaborative approach oriented towards resource efficiency among diverse manufacturing companies in an industrial establishment. The researchers studied the industrial metabolism of manufacturing

companies and informal economies of an Indian industrial estate to analyse the opportunities and challenges of implementing a resource exchange platform.

The findings from the research

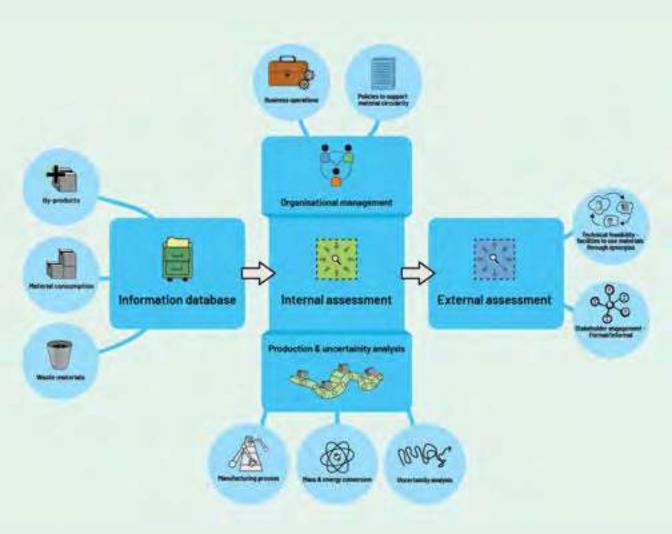


ICT Platform technological architecture

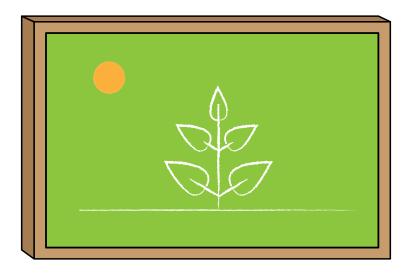
portrayed the numerous opportunities of restructuring industrial estates in India. The learnings from the Naroda Industrial Estate case study are listed in this report. The report incorporates several interesting insights leading to the proposal of

an effective framework backed by an Information and Communication Technology platform architecture. Additionally, the report illustrates a practical working model to guide companies to implement industrial symbiosis in industrial estates.





Framework for industrial symbiosis implementation within a boundary



## **Teaching**



## **Bachelor of Technology specialising in Climate Change**

The unique B.Tech. degree at AnantU is a specialised engineering programme specifically for innovating in climate technologies. It is the only undergraduate degree programme in India offering students to specialise in climate technologies and thus be part of the \$23 trillion climate economy globally.

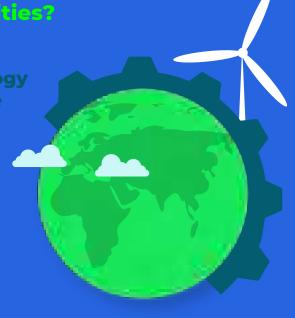
Students learn to use engineering tools and design thinking principles with practical application-oriented learning at AnantU's Climate Lab, within industry, government, research laboratories for creating technology solutions for climate change.

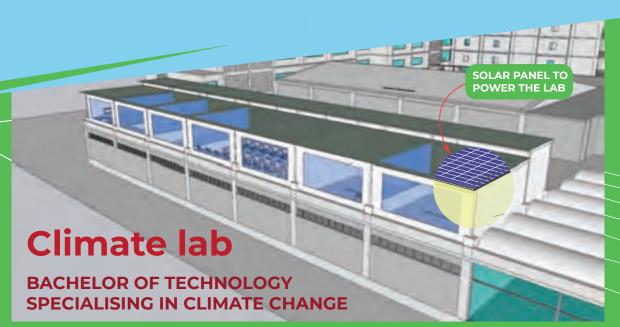
# Green jobs to grow to 43 million in the next 3 decades

Apply for Bachelor of Technology specialising in Climate Change at anuedu in

Are you prepared for the \$23 trillion

AnantU offers India's first undergraduate degree specialising in climate





Students learn to use engineering tools and design thinking principles with practical application-oriented learning at AnantU's Climate Lab, within industry, government, research laboratories for creating technology solutions for climate change.



The lab's cutting-edge infrastructure includes a wide range of equipment

- Automated weather stations
- · Cup anemometer and Vane anemometer
- · Piezometric sensor
- Thermo-hygrometer with radiant screen sensors
- Tipping bucket rain gauge
- Thermoelectric pyrheliometer
- · Solar Radiation Measuring instrument
- Barograph
- · Hybrid microgrid laboratory
- Atmospheric attenuation and electric field simulation



 Hybrid microgrid laboratory – A testing setup for a combined performance under variable load condition

**Equipped with softwares solutions like** 

- WAsP software for wind resource assessment
- •TerrSet integrated geographic information system and remote sensing software
- PVsyst a PC software package for studying and simulating PV systems
- HOMER Pro® microgrid software Global standard for optimizing microgrid design.
   HOMER (Hybrid Optimization Model for Multiple Energy Resources) nests three powerful tools in one software product
- SimaPRO Life Cycle Analysis software



# **Anant Fellowship for Climate Action**



The Anant Fellowship for Climate Action is a unique one-year immersive global programme for climate change solutionaries. Based on a mentor-mentee framework, it aims at creating a community of climate change trailblazers who collaborate and cross-pollinate each other's work with ideas and expertise from across sectors, regions and generations.



# Are you the next big climate solutionary that the world needs?

# Join the Anant Fellowship for Climate Action

# Mentored by the best in the industry



Amer Vohora
Partner/Chief Client Officer,
VALUEworks AG, Switzerland



Andy Parker
Project Director, SRM
Governance Initiative
(SRMGI)



Anoop Ratnaker Rao Founder, ReLife & Owner and Managing Partner, Engineering Enterprises



Arunabha Ghosh Founder & CEO, Council on Energy, Environment and Water, India



Bharath Visweswariah Ex-Director of Investments, Omidyar Network India



Chetan Maini Co-Founder & Chairman, SUN Mobility, India



Dhaval Monani CEO, First Home Realty, India



Diana Mangalagiu Professor, Environmental Change Institute, University of Oxford, UK and Neoma Business School, France



Indra Guha Partner, Think Through Consulting, India



Lise Bruynooghe Executive Coach, ProFound Consulting AG, Switzerland



Manish Kharbanda Advisor, Jindal Steel & Power, India



Maureen Nandini Mitra Editor, Earth Island Journal,



Mustapha Mokass CEO, Beya Capital, Morocco

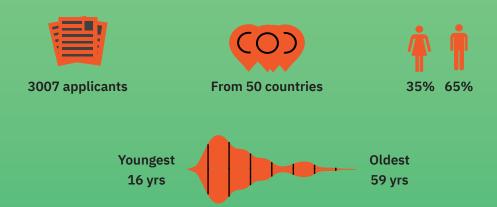


Vikram Chatterji Co-founder, Galileo, USA

Write to climateaction@anu.edu.in



# **Applicants information for 2021-22**





# **Anant Fellowship for Climate Action Cohort of 2021-22**



Anusha Sheth, Master's degree in Sustainable Energy Technology, Technische Universiteit Delft, The Netherlands



Arpita Bose Principal Investigator and Founder of Bose Lab, Washington University in St Louis, USA



Ashutosh Singh GPODS Fellow, Plaksha Tech Leaders Fellow, ClimateForce Antarctica Participant, Former BDM India, Zoeasy LLC, India, Founder Farminvesta, IIT Kharagpur Graduate India



Atik Sheikh Senior Consultant, Sustainability and Climate change Division, PwC India, India



Freeman Elohor Oluowo Centre Coordinator, Climate change and environment programmes and projects, African Centre for Climate Actions and Rural Development (ACCARD), Nigeria



Jeremiah Thoronka
BA (Hons) in Global Challenges,
African Leadership University,
Kigali, Rwanda; Certificate in
Conservation Leadership,
School of Wildlife Conservation,
Kigali, Rwanda; Intern, Solar
Cold Chain Logistics
Engineering.



Jos C Raphael Director, District Rainwater Harvesting Mission, Kerala government (Mazhapolima), India



Juan Antonio Arriaga Co-founder and Chief Financial Officer, GREENfluidics S.A.S. de CV., Mexico



**Kelo Uchendu** Founder and Lead Strategist, Gray2Green Movement, Nigeria



**Ketan Patel** Director of Africa and Asia, Enveritas, USA



Krystel Mae Penaflor Development Management Officer, Climate Change Commission, Office of the President, Philippines



Maria Elena De Matteo Global Communications & Engagement Strategist, Italy





Md. Humayain Kabir PhD candidate, Wegener Center for Climate and Global Change, University of Graz, Austria



Neeraja Kudrimoti State Program Officer – Transformation of Aspirational Districts Program, Chhattisgarh, India and Master's in Public Policy, University College London, United Kingdom



Nitij Singh Manager, Strategic Government Advisory, Yes Bank and Co-founder, Aslee, India



Nurul Islam Biplob Project coordinator - Alternative pathways for climate-induced migrants under Promoting Knowledge for Accountable Systems. British Council, Dhaka, Bangladesh



Pankaj Jiwrajka Manager, Partnerships, Transform Rural India



Paul M. Tuda Scientist, Leibniz Centre for Tropical Marine Research (ZMT), guest lecturer, ISATEC (Tropical Fisheries and Catching Methods), Bremen University, Germany



**Sai Parameswaran** Climate Change Desk, LAYA Resource Centre, India



Salem Afeworki Energy and Sustainability Services Manager, City of Costa Mesa, California & Founder of Value Sustainability, USAResource Centre, India



Shanmuga Sundara Bharathi Documentary filmmaker, former Programme Executive, Doordarshan, India;Nature Conservationist since 2019.



Sigrid Vasconez Sociologist and environmental biologist, Ex-Advisor to the Minister of Foreign Affairs and Human Mobility, Ecuador



Stacey Alvarez de la

Campa
Educational/legal consultant,
environmental expert and teacher,
University of Strathclyde, Centre for
Environmental Law and
Governance, Scotland; and Lex
Caribbean Attorneys-at-law,
Barbados; founder of Worldwide
Sustainability Warriors



Susan Jackson Affiliated Researcher, Stockholm University, Sweden



# **Courses at Under Graduate Level**

# Foundation Course on Sustainability

Students at Anant National University benefit from developing a robust foundation in sustainable design and practices by leveraging the resources offered by the Anant Centre for Sustainability. In the Introduction to Sustainability students trace the origins of 'sustainabile development' since the early 1800s across academia. politics, and business. They read key texts and publications that shaped the meaning of sustainability as we know it today, and learn about key topics such as waste to wealth, circular economy, industrial symbiosis, stakeholder mapping, sanitation and water in housing, as well as affordable housing and product design.





# **Affordable Housing - Minor**

AnantU has recently launched a minor in Affordable Housing as part of its Bachelor of Architecture program. The specialization is an attempt to train market ready professionals focused on a key real

estate area of growth. Apart from design, the students will undertake courses in finance, marketing and urbanization that will help them holistically address affordable housing problems.



#### Poster made by the students







LIVE PROJECT FOR SHELTER DESIGN

PROF. DHAVAL MONANI | PROF. SHARADBALA JOSHI | PROF. VIVEK AGARWAL



Posters made by the students



# **Executive Education**

The lack of formal education in sustainability studies, including climate sciences, affordable housing, design thinking for solving social problems, deepens the need for executive education in this field.

Working professionals, job seekers and students can sign up for the Executive Education courses offered by the Anant Centre for Sustainability round the year. Currently we offer two programs that are described below.

# **Designing Affordable Living**

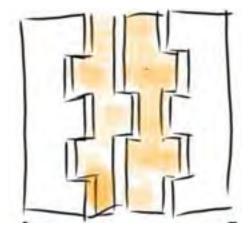
The programme aims to enable students understand the needs for affordable living in India, and then effectively design, produce, and market affordably priced items made with limited resources

in short durations of time. This is an aspect of design that is especially important for providing a life of dignity and comfort even to those who are economically disadvantaged.



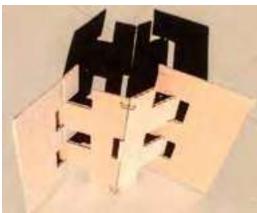


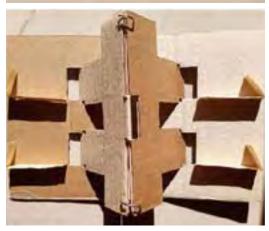














Conceptualisation and material exploration for a partition wall, Product from the first cohort of Designing affordable living course



## **Entrepreneurs in Residence**

The Entrepreneurs in Residence programme is envisioned to help three entrepreneurs with either a well-fleshed out business idea or an existing business in the field of affordable housing, building

construction, real estate, design or prop tech. The entrepreneurs could then leverage AnantU's physical infrastructure, expertise and partnerships to scale up. 47



Do you have an idea or existing business in the affordable housing, real estate, design and property technology domain?

# Become an Entrepreneur in Residence.

Scale up your idea sustainably by leveraging AnantU's infrastructure.

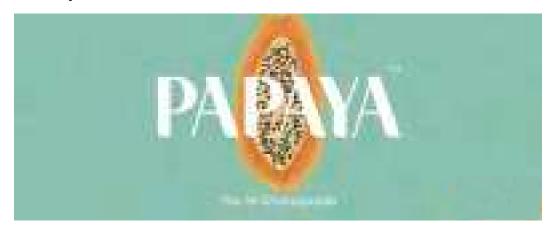
https://bit.ly/AnantUEIR







## **Entrepreneurs in Residence - 2022- 2023**



## Project: PAPAYA (<a href="https://www.papayain.com/">https://www.papayain.com/</a>)

#### Team

Victoire Ambeza (Co-Founder & COO, Papaya) Suhani Jalota (Founder & CEO, NGO Myna Mahila Foundation, India) Shagun Maheshwari (Co-Founder, Product, Papaya)

#### About the team

Victoire, Suhani and Shagun, a team of 3 women entrepreneurs from India and France, share a common passion for social innovation, gender equality and women's health, and have been working in the field of menstrual health for more than five years.

#### **Project description**

Papaya, a social enterprise, aims at finding concrete solutions to improve the menstrual experience of all women in India by developing quality, sustainable and empowering menstrual solutions.



#### **VICTOIRE AMBEZA**

Victoire is the Co-Founder and COO of the social enterprise Papaya which is based in Paris, France and Mumbai, India. She just completed a master's degree in international development at Sciences Po, Paris. She is passionate about resolving the issues related to gender inequality, women's health and environment in India through social innovation. Alongside Papaya, she is working at Inuk, a French startup leveraging technology to accelerate the low carbon transition. She has previously worked as a Junior Consultant at Archipel & Co, Paris, a consulting firm specialized in inclusive business and social innovation. She has also interned in various organizations working on women's health issues such as the NGO Partner for Urban Knowledge, Action and Research (PUKAR) and the social enterprise Myna Mahila, both in Mumbai. While she was living in India, she attended Navdanya's Earth University to learn about regenerative farming and ecofeminism. In 2016, she was the ONE Youth Ambassador in Paris and campaigned against extreme poverty. She is multilingual, speaking 5 different languages. Victoire aims to associate creative and entrepreneurial spirit with a positive social and environmental impact in her professional life.



#### **SUHANI JALOTA**

Suhani is the Founder and CEO of the Myna Mahila Foundation based in Mumbai, India which runs various campaigns and programs around menstrual hygiene education. She is also the Co-Founder of mNaukri, a social enterprise aimed at creating a freelancing platform for slum residents of Mumbai, India. She has previously worked as an Associate at IDinsight in New Delhi, India and Manila, Philippines. She is a Knight





Hennessy Scholar at Stanford University in California and is completing her PhD in Health Economics from Stanford University in California. She was the only Indian to be nominated for the Cisco Youth Leadership Award 2020 and emerged as one of the top 3 finalists. In 2020, she won the 'Reimagine Challenge launched by Eric Schmidt Futures, in 2019 she was chosen as the Asia 21 Young Leader by the Asia Society and in 2017 she won the Queen's Young Leader award. Suhani was featured in the Forbes 30 under 30 Asia list of social entrepreneurs and in India Today's Top 50 under 50 most powerful women in 2018. She has won various research grants such as the Weiss Fund of \$20,000 by the Department of Economics in Harvard University, COVID 19 Stanford Global Health Seed Grant of \$18,500, a \$30,000 grant by the Hennessy Foundation and has also received the Stanford King Center Graduate Student Research Funding thrice. She is also a Schultz Graduate fellow. Suhani is an activist and social entrepreneur who is working to improve the employment and health of Indian women. She has expressed herself at countless forums such as the Harvard Club of Mexico (2020), Youth Ki Awaaz (2020), Menstrual Hygiene Alliance India (2020), Clinton Global Initiative Alumni Conference in New York (2019), UNESCO World Youth Conference on Kindness in New Delhi (2019), Forbes 30U30 Summit in Hong Kong (2018) and the Rotary International in Mumbai.

#### SHAGUN MAHESHWARI

Shagun is the Co-Founder, Product of the social enterprise, Papaya. She is currently the Product Development Lead for the NGO Myna Mahila Foundation in India where she is Lead Engineer in the Biodegradable Sanitary Napkin project and is working on developing a low-cost biodegradable sanitary





napkin to cater to the urban slum environment. This project has been recognized as one of the top 10 Sustainable Development Projects by UNESCO on World Engineering Day 2020. She is also working as a Staff Mechanical Engineer with Mojo Vision in California, USA. Shagun is a Mechanical Engineer by profession and is passionate about improving lives through science and technology. Shagun has a Master of Science degree in Mechanical Engineering from Duke University in Durham, North Carolina. She has been conferred with the Applied Materials President's Quality Award in 2017 and the Engineering Technology Excellence Award in 2018. She has previously worked as a mechanical engineer in Santa Clara for 3 years. Shagun enjoys working with people and is a goaloriented team player.



# Project: ANGIRUS (<a href="https://www.angirusind.com/">https://www.angirusind.com/</a>)

#### Team

Kunjpreet Arora (Co-founder, Business, Angirus) Lokesh Puri Goswami (Co-founder, Product, Angirus)

#### About the team

Kunjpreet & Lokesh share the vision of recycled waste material bricks, 'Wricks', to provide a sustainable and clean technology to the brick industry and help India to solve the problem of waste management and air pollution.

#### **Project description**

Angirus provides eco-friendly and sustainable technology to make bricks and paver blocks that are damp-proof and lightweight. Angirus' products are 100% made from recycled plastic waste and industrial waste using Angirus' patented technology.

#### Innovation

- Wricks is an environmentally sustainable and high quality brick that is made 100% by recycling waste material, including 20% plastic waste.
- Wricks require one day of manufacturing and can be made available in any shape and size as per the demands & requirements of the construction industry.

#### **KUNJPREET ARORA**

Kunjpreet is the Co-Founder and Head of Business Development at Angirus India Pvt. Ltd. based in Udaipur, Rajasthan. This startup has been recognised by the Department for Promotion of Industry and Internal Trade (DPIIT), a central government





department under the Ministry of Commerce and Industry in India. In this venture, she is currently working on a project which seeks to develop light weight and low cost bricks using only waste materials. She is responsible for the business operations and design growth strategy in her startup. She has previously worked with Eptisa India Pvt Ltd as Civil Engineer trainee in the Smart city project in Udaipur, India. In 2020, she was selected for a 3 months Acceleration Programme by IIM Udaipur for developing business and entrepreneurship skills. In 2019, she attended the iB Hubs Startups school to learn the various aspects of entrepreneurship. She won the Carbon Zero Challenge organized by IIT Madras and was given a grant of INR 5,00,000. She also won the ECO grant by C4Y and Plan India in 2019. She was conferred the Green Engineer Award by LD college in Ahmedabad, India in 2018 for giving an insightful presentation on sustainable development and green environment. An engineer turned entrepreneur, Kunjpreet's mission is to disrupt the real estate industry by bringing sustainability to manage the problem of waste generation in India.

#### **LOKESH PURI GOSWAMI**

Lokesh is the Co-Founder and Head of Product Development at Angirus India Pvt. Ltd. This startup was founded with an aim to bridge the gap between the stagnated brick industry and innovation to reinvigorate the Indian real estate sector. He is a civil engineer with an experience in product designing and development. He has previously worked on site execution and construction management at ACE Project Management and Consultant in Mumbai, India. He has also received industrial training with Sunshine Housing & Infrastructure Pvt. Ltd. in Mumbai,





India. He won the first prize in International Civil Engineering Symposium(Students) at IIT Bombay in 2018 where he presented a paper on the topic "low cost construction material by waste plastic and marble slurry". He has also been awarded a silver medal by the National Design and Research Forum in Bengaluru, India. In 2018, the Smart India Hackathon was organized by the Ministry of Human Resource Development at NIT Trichy and he won the first prize of INR 75000 and grant of INR 10,00,000 by the All India Council of Technical Education. Lokesh's vision is to help the country solve the problem associated with solid waste management and achieve a lower carbon footprint.





# Project: FAVO ROBOTICS (https://www.favorobotics.com/)



#### **Team**

Shiva Bisne (CTO, Favo Robotics)
Siri Chandana Vodela (CEO & Founder, Favo Robotics)
Gaayatri Yarlagadda (COO, Favo Robotics)

#### About the team

Shiva and Gaayatri are tech enthusiasts who aim to contribute to the advancement of the construction industry. Siri is a design enthusiast and likes to build things that are inspired by nature and add value to our daily lives.



#### **Project description**

Favo Robotics aims to provide affordable collaborative robots that make construction automation accessible, increase productivity, improve the quality of work, and reduce the cost of construction.

#### **Innovation**

- SCARA is a large format heavy duty robot with subsystems to perform brick masonry work with minimal human intervention.
- It has the ability to produce 1440 bricks per day instead of 120 bricks per day

#### SIRI CHANDANA VODELA

Siri Chandana is the Co-Founder and CEO of Favo Robotics. She graduated with a Bachelor of Technology in Civil Engineering from Mahindra University in Hyderabad, India. She was the Team Lead - Smart Brush at Indian School of Business Aug'17-Dec'20 at Smart Brush, a technological entrepreneurship program conducted by Indian School of Business in Hyderabad, India. She designed a working prototype of a smart multipurpose brush for which she filed a patent in June, 2020. She was also one of the finalists in the "Smart Fifty Competition" conducted by IIM-C Innovation Park in association with the Department of Science and Technology in the government of India where she presented a smart solution idea for converting waste plastic into useful construction material. Siri is passionate about solving complex real world problems in the construction industry by providing affordable automation solutions. She has a knack for design, aesthetics, and attention to detail. She likes to build things that are inspired by nature and add value to our daily lives. She has worked on projects like interlocking plastic bricks from discarded





plastic waste for construction, a low-cost housing demo project, and cement from industrial waste: geopolymer cement. As part of Pehchan Yatra, she successfully completed a rigorous, (Organized by ISB & CII) cross-country tour to meet leading women entrepreneurs & community impact leaders in India across diverse industry fields. She loves to travel, read books and watch documentaries and science fiction movies.

#### SHIVA BHISNE

Shiva is the Co-Founder and CTO of Favo Robotics. Last year, he and his team demonstrated a functional prototype of Favo Robotics' product to the Prime Minister of India, Narendra Modi, government officials of MoHUA & BMTPC and stakeholders across India at Azadi@75 GHTC-IHTM Exhibition in Lucknow. India. He even led the team of Favo Robotics at Ministry of Housing and Urban Affairs (MoHUA) Global Housing Technology Challenge - Delhi in 2019 wherein it was selected for a grant of INR 5.2 Cr and technical handholding from IIT Kharagpur. Shiva has completed his Bachelor of Technology from Mahindra University in Hyderabad, India. He also pursued the NIDHI-EIR program from CIE-IIIT in Hyderabad in 2019 where he learned the skills of how to build a startup. Over a period of five years, he worked in collaboration with various academic professors and industry professionals in projects related to 3D printing, robotics, li-ion liquid cooling systems, and interlocking battery packs for electric vehicles. He has internship experience in marketing and sales. He is a tech enthusiast and has a knack for robots. Many of his





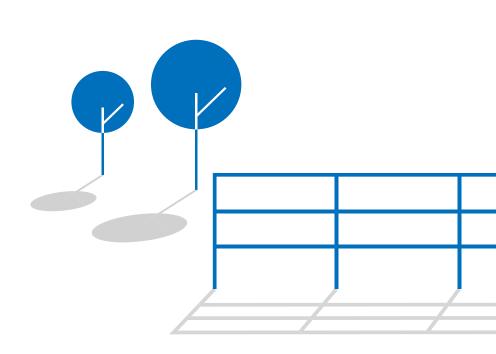
projects are inspired by sci-fiction movies and novels. In his free time, you can find him visiting historical monuments and scouting for authentic local food.

#### **GAAYATRI YARLAGADDA**

Gaayatri is the Co-Founder and COO of Favo Robotics. She has a Bachelor of Technology in Civil Engineering from the Mahindra University, Hyderabad. While pursuing engineering, she worked on manufacturing hexagonal interlocking bricks using different compositions of plastic waste. This project was selected as one of the top 400 innovations by SmartFifty. She is a technical person and always wanted to contribute to the advancement of the construction industry. She has worked on various projects like segmentation in the construction of high-rise buildings, interlocking plastic bricks from discarded plastic waste for construction, a low-cost housing demo project, and cement from industrial waste: geopolymer cement. She has international exposure, working on analytical modeling of flexible structures at Brandenburg Technological University, Cottbus, Germany. She enjoys trekking and street food.







# **Sustainable Campus**



# **Infrasturcture**

The Anant Centre for Sustainability works towards providing a sustainable campus for the AnantU community that contributes to building an eco-friendly environment through education, research and developments.

#### Baseline Sustainability Measurement

As an initial step towards a sustainable campus, the Centre has conducted an on-campus sustainability measurement across energy, waste, water, employee diversity, equal pay for equal work, faculty research interest, student

diversity, nutrition, marketing carbon footprint and governance for the academic year 2017-2018. The analysis led to several findings and targets were set for improvements. Further, the sustainability measurement is conducted each year to measure the developments against set targets.



#### **Nutrition**

The Centre assessed the food nutritional value served at the campus cafeteria. The nutritional committee formed by the students and faculty members of AnantU meets once a month to discuss the nutritional value of food served on campus. The committee also educates on nutritional choices for the students.



# **Capstone Projects**

A collaborative hands-on students project organised between the masters' students of Sciences Po Paris and AnantU to study and eliminate the single-use plastic materials within the AnantU campus. In this semester-long capstone project, students of diverse academic backgrounds

work together to identify the presence of plastic materials and the source of waste generation through single-use plastic products. As a result of the project, students devise a strategic and implementable roadmap to make campus single-use plastic free.



Students explored several waste management strategies, conducted field visits to waste recycling plants and learnt the issues related to unsegregated waste dumping sites. The implemented solutions include change management

strategies, invited field experts to conduct waste management workshops, sustainable alternative materials to plastics, reutilization of plastic waste and relevant policy implications. In the capstone project, students have engaged in



Graffiti wall painting to raise the awareness of eliminating single use plastics at AnantU. The artwork was directed by Mr Hanif Kureshi, an artist and designer working with street and typography. Mr Kureshi is the Artistic Director and Co-founder

of St+art India Foundation which aims to make art accessible to a larger audience in India through a series of street art festivals and making prominent public art on the streets.







AnantU and Science Po students in a workshop



Capstone project installation of single use cups generated per day on campus



# **Capacity Building for Waste Management**

The use of sustainable alternative products is encouraged among the AnantU community to eradicate plastic materials and reduce the on-campus waste generation. This is achieved through community sensitisation initiatives and utilization of alternative plastic-free products, which are recommended

after thorough examination by the researchers.

The use of on-campus eco-friendly materials includes sustainable menstrual products, Ecoboard, stationery products from recycled materials, copper bottles and cups, stainless steel toiletries etc.

#### **Period Power Initiative**

Sustainable menstrual products like cloth pads and menstrual cups are introduced on-campus to promote amongst the students and staff. It is to encourage the AnantU community's transition towards sustainable menstrual products,

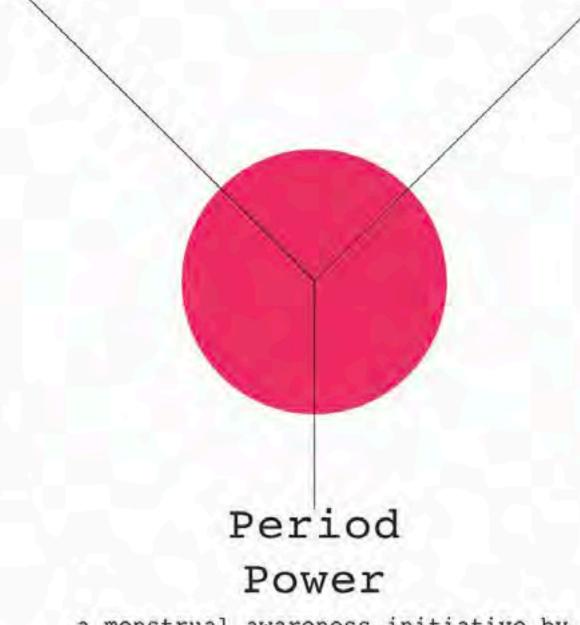
which is a part of the 'Period power' initiative. A volunteer group comprising students and staff are in regular contact through in-person and social media engagements to promote sustainable menstrual products on campus.

#### Sustainable materials

The furniture at the AnantU campus is made out of environmentally friendly materials which are derived from underused resources. The ecoboard are made from agricultural residues to make office furniture and waste collection bins such as e-waste and stationery

waste. The waste collection bins are located in strategic places on the campus. It encourages the students and staff in using sustainable alternative materials to plastic products and reduces the oncampus waste generation.





a menstrual awareness initiative by



We are a Sustainable and Equitable Campus

Menstrual cups and cloth pads available at the stationery store. To Join the volunteer group mail to wellbeing@anu.edu.in gokulram@anu.edu.in

Environment-friendly stationery products are introduced on campus which are made from recycled

tetra-packs. The products made from waste materials helps to promote waste to wealth practices.



#### **Recycling of Waste**

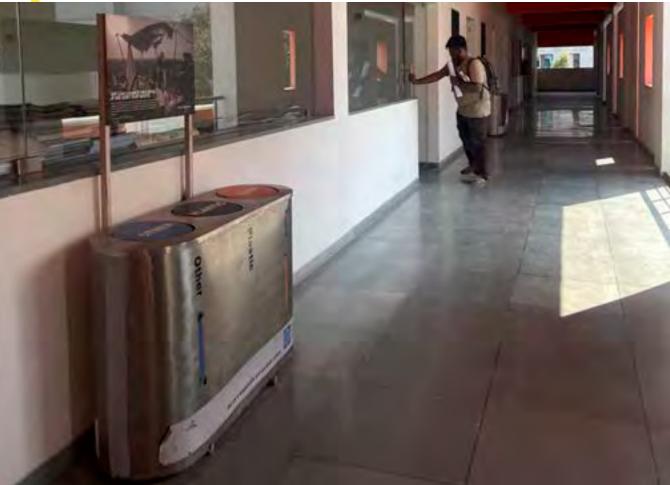
The waste materials are segregated through diverse segregation bins located at AnantU. The segregation of dry and wet waste within the campus are recycled through recycling firms. The food waste generated on-campus is composted in-house using a food compost bin.

The construction and demolition waste generated on campus is transported to the recycling facilities for safe disposal and conversion of waste to resource. The rubbles are transported to Amdavad Enviro Project Pvt. Ltd., which are converted into building materials.









# **Mindset**

# **DOT: Dynamism-Open Mindedness-Talent**

The Anant Centre for Sustainability conducted a university-wide survey to gather ideas and feedback from the faculty, students, their parents and staff members on various aspects of the university that directly impacted them. The results from the survey were assessed and were used as inputs to define a new cultural identity for the university.

Dynamism, Open-mindedness and Talent, abbreviated to DOT, are the 3 values that are embedded in all that we do at the university. In addition to promoting rigour, innovative thinking and competitiveness, the philosophy of DOT also emphasises the importance of great collaboration in achieving greater heights.

This new philosophy was strategically implemented over a period of two years across the length and breadth of the university through the use of change management



techniques. It touched upon administrative practices, academics, research, student relations and partnerships, among others. The essence of DOT was visualised by a team of two AnantU students who worked as collaborators with the design team at the Anant Centre for Sustainability. The creative exercise resulted in the development of a brand identity (logo) of DOT and a library of posters. These posters are published each week by the Centre via internal and external communication platforms in celebration of initiatives at the university that embody the philosophy DOT.























Chegnitina the Assessment



an Entrepreneur in Residence.

















# **Sustainability Talks**

The Centre has conducted multiple activities to introduce students to the idea of sustainable design. The Centre collaborated with design festival, Bengaluru ByDesign for two consecutive years - 2018 and 2019, which curated design thinking, innovation and sustainability through creative events. These events comprised workshops and

lectures by industry experts and academics of international repute along with an exhibition on the built environment.

Currently, the Centre periodically also organises interactive workshops on waste management to introduce staff and students to the magnitude of waste challenges.





Consultancy



## 509 Army base workshop, Agra Cantonment

The Anant Centre for Sustainability and officials from the army base workshop 509 at Agra Cantonment have vigorously worked towards recycling, managing and ensuring safe disposal of waste generated at the cantonment. The Centre has conducted intensive field

research at the cantonment and recommended a roadmap to categorize, segregate, and manage waste materials. The suggested guidelines also include impactful case studies on waste management.



## BW India's Most Sustainable Companies//ACfS x SLP

The Anant Centre for Sustainability and Sustain Labs Paris partnership seeks to address the gap of communicating the concept of sustainability by breaking it down into an impactful and easily understood format. This is through the Anant Centre for Sustainability's experience and skills in both sustainability and visual design.

The posters were designed with the aim to communicate and engage with companies about sustainability. AnantU student from B.des, Product design discipline, Anoushka Mohapatra worked along with Anant Centre for Sustainability team on creating



the posters. These were sent out to India's largest 200 companies which were ranked based on their sustainability performance by SLP and BW Businessworld India. The assessment scores, rankings and associated write ups are published in an annual special issue on sustainability by BW Businessworld in the month of December each year.

# Financial Health

and 30 defining factors to assess your company





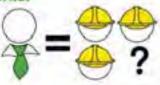


and 30 defining factors to assess your company



## CEO-Average Worker

and 30 defining factors to assess your company





and 30 defining factors to assess your company





Waste Productivity and 30 defining factors to assess your company



Number of Lives Positively Impacted as a Result of Business

and 36 defining factors to assess your company



and 30 defining factors to assess your company



Water Productivity

and 30 defining factors to assess your company



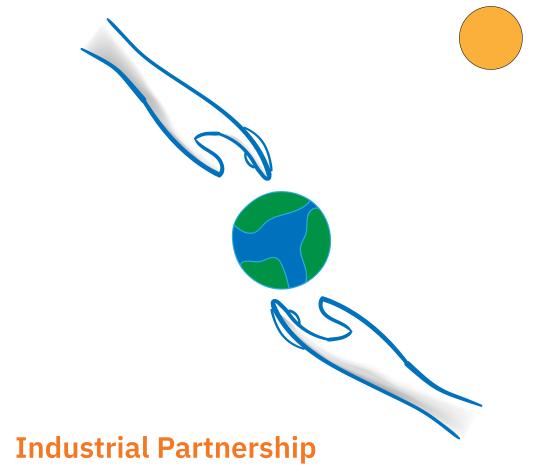


Innovation and 30 defining factors

to assess your company



CENTRE FOR SUSTAINABILITY



The Anant Centre for Sustainability works in partnership with select international and Indian organisations to further its mission of advanced research and project implementation in climate action, affordable housing, indigenous models of circular economy, and building sustainable education campuses. In implementing

projects, the Centre has received grants and sponsorships from both government organisations and private sector companies. We have also delivered to clients in locations across India, products and solutions related to affordable housing, corporate sustainability, and sustainable campuses.



## Terwilliger Centre for Innovation in Shelter, USA

Terwilliger Centre for Innovation in Shelter (TCIS) - USA, is an independent entity set up within Habitat for Humanity International to deal with a market-based approach and create an impact on 100 million lives. It functions independently of Habitat for Humanity with its budget and team. TCIS has set up and manages several funds for investing in housing ecosystem start-ups, including the much-lauded Micro Build Fund – which has led to the development of commercial paper by Credit Suisse for investments in the affordable housing space.

AnantU partners in research on areas of mutual interest with TCIS. The areas of cooperation may include, subject to mutual consent, any desirable and feasible activity that would further the goals of each institution.

Such interaction may include cooperation in a variety of joint

academic and education activities such as:

- The impact of accessibility to housing microfinance on low-income families
- Which materials or services have the most impact in creating a vibrant housing ecosystem
- How to integrate sustainable technologies in low-income housing construction

Further, both organizations are keen to develop and conduct modules for capacity building in the affordable housing space. The capacity-building platform would be open for students and faculty members to work with the portfolio companies of TCIS.



Terwilliger Center for Innovation in Shelter



## **Habitat for Humanity India**

Habitat for Humanity – India (HfHI) is one of the largest organizations working to provide decent shelter to families. HfHI sets the stage for families, volunteers, donors, and supporters to come together to build suitable homes that provide the foundation for a better life.

HfHI and AnantU anticipate that a number of initiatives will occur during the period of this MOU. The key objectives of this exercise would be to address the issue of 30 million incomplete homes and their possible solutions. The focus would be on the self-build space, which accounts for 60 per cent of all home construction in India.

To fulfil the above-mentioned objectives, the scope of the work is classified into key heads such as:

Volunteering Programme:
 Assistance to each other
 with Construction, Technology,
 Innovation & Design to affordable housing by sending their students/ staff on the field for volunteering programs.

- Knowledge Hub and Workshops: Facilitate and host key research workshops to enhance the efficiency of the housing projects.
- Research and Development:
   Undertake research,
   assessment, development
   of tools and resources that
   facilitate dialogue and synergy of
   best practices between different
   operating models and
   stakeholders.
- Research Aspect: To conduct joint action-based research such that it is implemented in field-level, policies and practices. These researches shall make an impact in creating awareness within the areas worked upon and the public, in general.
- Publishing: Case studies and innovation may be presented in national/international conferences and published in reputed Journals and Magazines.





#### MIT solve

The Anant Fellowship for Climate Action is a member of MIT Solve, an initiative of the Massachusetts Institute of Technology, USA, with a mission to solve world challenges. The Fellows will be involved in various initiatives by MIT Solve all through the year.



## Saltech Design Labs

Saltech Design Labs is a technology startup that re-cycles and up-cycles plastic waste into commercial products for use in the construction industry.

- AnantU provides design support to Saltech to develop new products using its technology.
- Both parties focus on design competitions and exercises to create new products that can be mass-produced and taken to market.



#### Terra.do

Terra.do is an online climate school and community developed with the objective of building a global professional community of climate change problem solvers. The course, 'Climate Change: Learning for Action' is a 12-week interactive climate Bootcamp that gives a deep and strategic overview of all things about climate.





## **Brigade REAP accelerator**

Brigade REAP the leading real estate focused accelerator in the country has entered into a partnership with the Center for Sustainability at AnantU to help its cohort companies gain access to subject matter expertise, sectorial research and mentoring from industry leaders. The partnership offers a unique opportunity for companies to gain access to a large and diverse pool of talent from the student body while giving the students a chance to gain experience with fast-developing companies have first-hand insights into entrepreneurship. The companies will regularly spend time on the state of the art AnantU campus to take advantage of the infrastructure and interact with faculty and students. Brigade REAP will also work with the EIR cohort as a mentor.

#### PI India

Parliamentarians with Innovators for India (PII) is an inclusive, non-partisan, pan-India action group for fighting COVID-19. PI India aims to enable meaningful collaboration between citizens, parliamentarians, and industry leaders who wish to make a difference to our communities and our country with immediate impactful interventions.

Anant Centre for Sustainability worked along with PII team to setup several COVID-19 recovery centres in the different parts of the country.



#### **Sustain Labs Paris**

Sustain Labs is an enterprise based in India, UAE, and New Zealand that partners with organisations to make them more environmentally and socially responsible as well as profitable. Working along with AnantU on the fellowship, and other partnerships they are

answering the large questions that have global impact.





## **Avantgarde Design Studio**

Avantgarde Design Studio is multi-disciplinary design firm that provides architectural, interior design and project management services. We are the leading solution provider in India for low cost and mass housing - showcased in multiple reports and case studies.



## **Grants received from**

- 1. Godrej Consumer Products Ltd
- 2. Population Foundation of India
- 3. Collective Good Foundation
- 4. Caring Friends
- 5. Bharti Airtel Limited
- 6. Gujarat Industrial Investment Corporation Limited
- 7. PZ Pictures Pvt. Ltd.
- 8. Project Mumbai
- 9. Fresh Foundation

## **Team**



Dr Miniya Chatterji
Director, Anant School for
Climate Action & Anant Centre
for Sustainability
CEO, Sustain Labs Paris



**Dhaval Monani**Associate Professor and
Director, Affordable Housing



**Dr Sharadbala Joshi** Senior researcher, Anant Centre for Sustainability



**Gokulram**Reseacher, Anant Centre for
Sustainability and Project
manager, Anant Fellowship
for Climate Action



**Joel Fernando R** Multimedia Associate, Anant Centre for Sustainability



**Dr. Asima Sahu**Reseacher,
Anant Centre for Sustainability



Anurita Bhatnagar Senior Researcher & Associate Professor, Anant Centre for Sustainability



**Niba T N**Research Associate,
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Aditi Sharma
Programme Coordinator,
Anant Fellowship for
Climate Action







anu.edu.in/centres/centre-for-sustainability/