



AVEI NEWSLETTER

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As 2020 quietly started, little did we expect that a few months later the COVID-19 pandemic would send all of India into one of the strictest lockdowns in the world. Despite projects being underway and a full schedule of training courses in progress, the Earth Institute was required to close its doors at the end of March and only began to resume its activities in late May. To date, many of the Earth Institute's activities have been affected, including training, external project consultancy, and technology transfer.

But the team continues to push forward with projects within the community, and has started three online courses – AVD Theory, CSEB Theory, and CSEB Design – so that it can continue to reach students unable to travel to Auroville for training. We are also happy to report the promising early stages of two international technology transfers.

Please feel free to share this newsletter with your friends and colleagues as we spread the knowledge of earth architecture to the world!

Earthily yours,
The AVEI Team



Partnering with the Aga Khan Agency for Habitat in Syria




A rendering of the model house to be built in the village of Barri

The Earth Institute was contacted in the first half of 2020 by the Aga Khan Agency for Habitat (AKAH) to collaborate on a project to promote the use of compressed stabilized earth blocks in Syria, a region which has a long history of adobe construction. In spite of the constraints on travel and the uncertainty of the pandemic, the project was able to go forward with those elements as could be completed remotely. As a critical first step to introducing CSEB in the region, the Earth Institute proposed a combination of online courses to introduce architects and engineers selected by AKAH to the concepts of CSEB construction and the use of arches, vaults and domes (AVD), followed by hands-on training courses once it would be possible for Satprem to travel.

So far, approximately 55 participants have been

familiarized with CSEB and AVD through the online courses with a smaller subgroup of 30 students working through AutoCAD exercises and soil identification tests to give them deeper expertise. The soil identification done by the students has been particularly important in giving the Earth Institute team an idea of the soil types available Syria and how suited they will be to CSEB.

Concurrently, Satprem and the rest of the architecture team worked on the design of a demonstration house and detached workshop to be built in the Syrian village of Barri, near Salamiyah. The house will be constructed primarily with CSEB, and feature various AVEI-developed technologies such as the composite lintel, column, and staircase, as well as arches, various vaults, and a cloister dome. Earth 



Institute associate Omar Rabie contributed crucial inputs on the bioclimatic design of the building for the particular climate of that area of Syria. The team is now developing the working drawings for these buildings.

Satprem plans to travel to Syria in February for a preliminary visit and will return for hands-on training on block-making once the Auram machinery arrives, most likely toward the end of March. Subsequent visits will be made over the course of the year to give practical training on construction with CSEB and with arches, vaults, and domes and to guide the construction of the demonstration house.

Through the combined effort of widespread training and building a house that demonstrates the adaptability and possibility of the CSEB technology, the Earth Institute hopes that this project can inspire Syrian building professionals to utilize the low-carbon and low-cost technologies of stabilized earth as they rebuild into the future after this tumultuous decade of war.



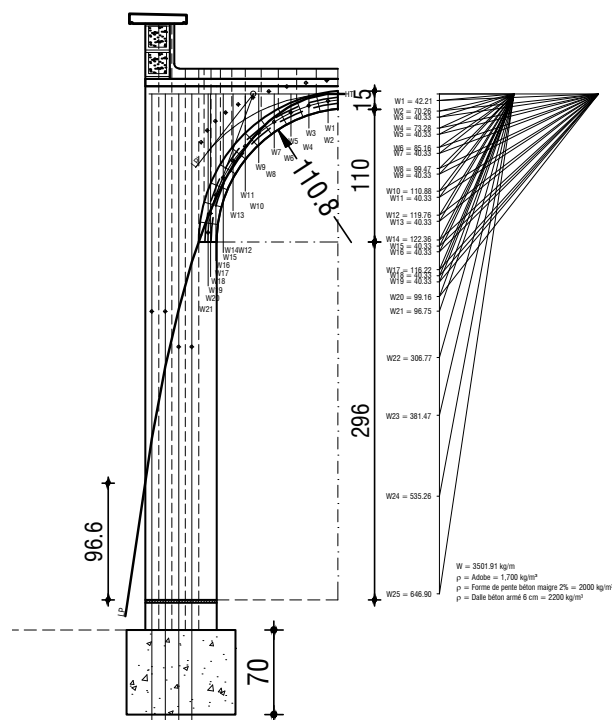
Further 3D renderings of the house and detached workshop

AVEI Projects & Consultancy Abroad

Structural study for a vault in Mauritania

In May, the Earth Institute was contacted by Mathieu Hardy, the director of Al-Mizan Sahel – an organization providing sustainable architecture solutions based out of Nouakchott, Mauritania – for a structural study for a classroom to be built using the traditional Nubian vault-building technique. The aim of bringing in the Earth Institute’s expertise was to optimize this model classroom design to reduce the use of reinforced concrete by eliminating the inverted T beams on which the vault would be built and to replace them with adobe arches. Satprem undertook a detailed stability study and provided his recommendations for the design and construction of the building.

Stability study done for the vault of the classroom





Developing CSEB capacity in Mauritania



Aerial view of Selibaby, one of the potential sites of intervention (© 2021 CNES / Airbus)

The Etablissement d'Exécution de Travaux Réalisés en Matériaux Locaux (ETR-ML, which can be translated as the Institution for the execution of works carried out with local materials) in Mauritania reached out the Auroville Earth Institute in October to ask for technical assistance in promoting the use of compressed stabilized blocks across the Northwest African country. While the project is still in its nascent phases, Satprem will be making a preliminary visit during January to Nouakchott and the other towns that the project targets to evaluate the suitability of CSEB for those areas.

As this project goes forward, the Earth Institute is expected to offer training – both online and in-person – on the use of CSEB and arches, vaults, and domes, but is also likely to guide the design of several demonstration buildings, which may

include a mosque, a social housing project, school facilities, and a health center.

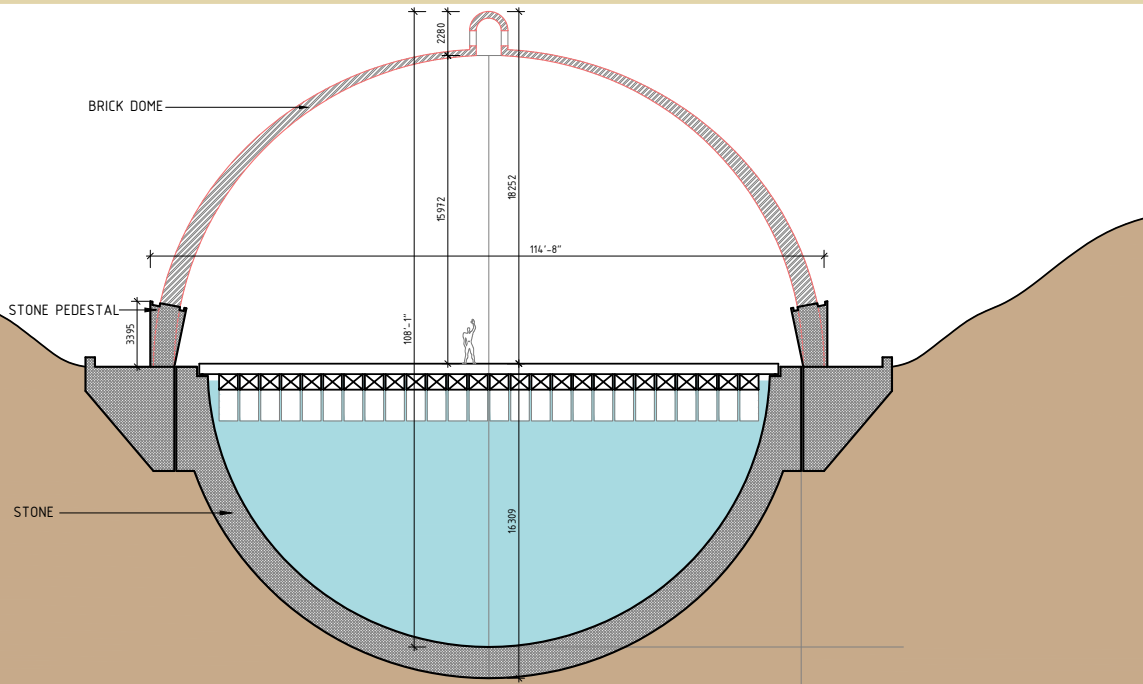
We look forward to seeing how this project develops after Satprem's visit to Mauritania. ■



Construction practices in Mauritania (© ETR-ML)



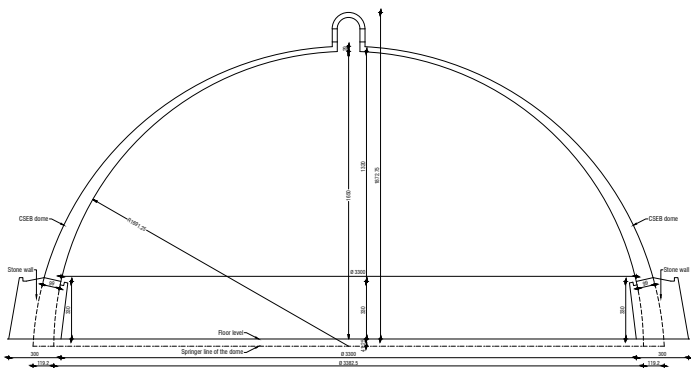
Structural study for a dome in Gujarat



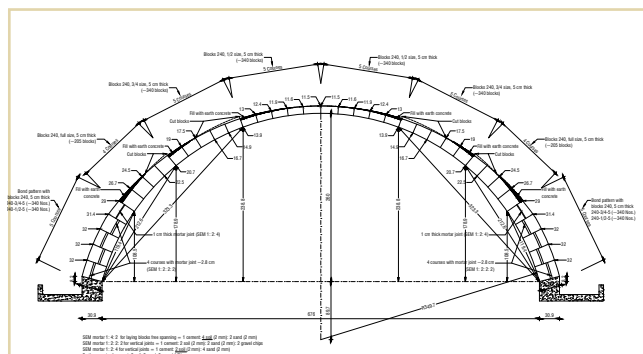
Concept of the 33 m dome for the Oshodhara Meditation Centre

The Earth Institute is offering technical assistance for the design, structural analysis, and construction of a dome for the Oshodhara Meditation Center, to be built in the Bhavnagar district of Gujarat for the Shree Osho Krishanganga Dharmodhyan. The concept design for this meditation center has been done by Dinesh Suthar and it will feature a 33 m dome that will cover a platform floating on a pool of water, thereby allowing the dome to form a complete circle.

Satprem has begun the study of the dome and will train a local contractor to produce CSEB for the construction. Once the building begins, a team of masons from the Earth Institute will travel to Gujarat. ■



Preliminary section of the Oshodhara dome done by AVEI



Dome study for a house: Satprem also consulted on the structural design of a dome for a private house designed by Auroville architect Suhasini Ayer. The house features an over 6 m dome and Satprem proposed a segmental dome form to keep the base slim while maintaining safety. ■



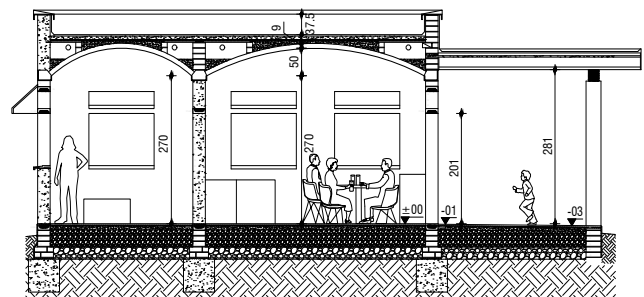
On-going projects around Auroville

Compound wall at Aureka: The Earth Institute's masons worked this year (interrupted partially by the lockdown) on a boundary wall around the campus of Aureka, a local steel workshop that has been collaborating with the Earth Institute since the 1990s on the development and manufacture of the Auram earth-building equipment, most notably the Auram presses for CSEB production. The wall has a length of almost 400 m with a thickness of 24 cm and a height ranging from 1.5 to 2.6 m. ■



AVEI masons working on the compound wall at Aureka

House extension in Petite Ferme: The Earth Institute has undertaken the design and construction of a house extension in the Auroville community of Petite Ferme for a small attached apartment so that the mother of the residents can live in proximity to them. It comprises almost 40 m² of new interior space, with a 15 m² covered terrace, all designed with poured earth concrete and CSEB, and vaults and ferrocement channels for roofing. ■



Construction on the Petite Ferme house extension



Washroom facilities for The Colours of Nature: The Colours of Nature, an Auroville-based commercial unit specializing in natural dyeing processes particularly using indigo, contacted the Earth Institute to build new washroom facilities for their campus. The detached building will feature PEC and CSEB construction. ■



Presentations at conferences and seminars around India

Presentation at Aayojan School of Architecture and Design: In January, Radhika traveled to Pune, Maharashtra to give a presentation at Aayojan School of Architecture and Design as a part of "Dialogues: a series of information conversations with young professionals". Radhika presented about her journey from Sir J.J. College of Architecture in Mumbai to Auroville and her experience working at the Earth Institute and promoting earthen architecture. ■

Seminar at IIT Roorkee: Satprem traveled to the Indian Institute of Technology (IIT) Roorkee on 3 February to take part as chief guest at a seminar on the subject of earthen materials and design-build procedures. This event took place as part of the "Towards an Indo-German Centre for Experimental Architecture and Material Culture (EAMC)" Project, which is a collaboration between IIT Roorkee and RWTH Aachen University in Germany. The project aims to look at sustainable design-build procedures, with a specific focus on earth and stone as building materials.

During this seminar, Satprem presented to a group of fifty students and professionals. The feedback was very promising from this interaction, with representatives from IIT Roorkee and CSIR-CBRI Roorkee expressing their admiration for the work of the Earth Institute. This positive momentum may well lead to future collaborations. ■

Conference at the Sigma College of Architecture: On 27 February, Satprem was invited to be the keynote speaker at the First International Conference on Architecture, Planning and Sustainable Engineering, held at Sigma College of Architecture near

Kanyakumari, in the south of Tamil Nadu. He gave a presentation on "30 years of research, development, promotion and education in earthen architecture" to an audience of approximately 100 students. ■





Online presentations and webinars

After lockdown and travel restrictions were implemented across India to slow the coronavirus pandemic, the AVEI team sought online opportunities for awareness building.

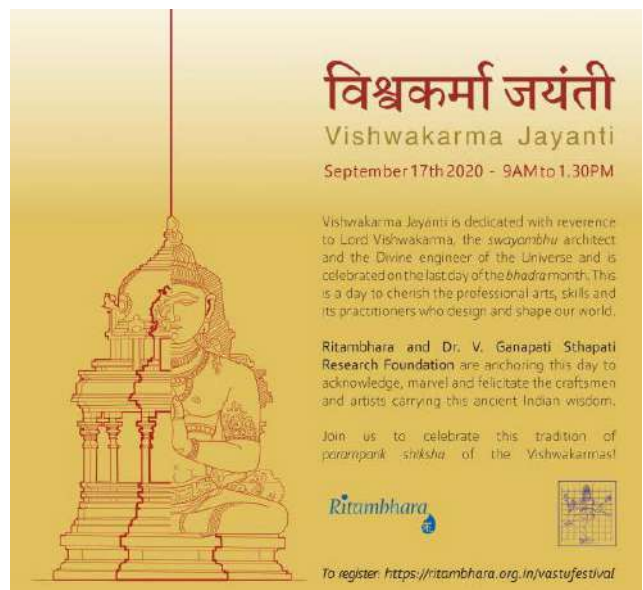
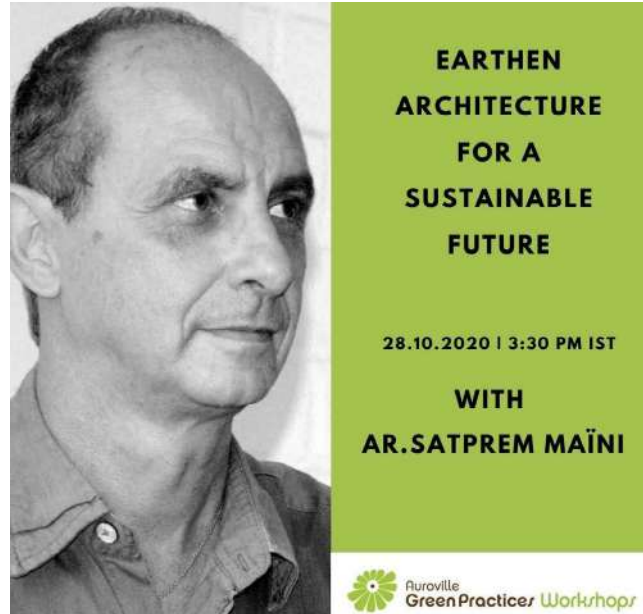
With Auroville-based **AGP Workshops**, Satprem gave a series of webinars during the period from September to December, including three one-hour webinars on the subject of “Earthen architecture for a sustainable future” and two two-hour webinars on “Building with arches, vaults, and domes for a sustainable future”. Each of these webinars were attended by 40 to 60 students and professionals.

Satprem also was invited by **The Institution of Engineers (India)** in September and October to offer two webinars on “Compressed Stabilised Earth Blocks for a sustainable future” and “Building with arches, vaults, and domes for a sustainable future” for groups of 432 and 376 professionals respectively.

In October, Satprem gave a webinar on “Compressed stabilized earth blocks for a sustainable future” to a group of 200 students and faculty members from **VESCOA School of Architecture**.

In December Satprem was invited to give a web-casted convocation speech for the graduating class of the **School of Architecture and Planning Bhopal**. He encouraged the graduates to develop their skills as fully as possible and to keep the question of who they would be building for firmly in mind.

In September, Radhika helped to organize an online program in honor of **Vishwakarma Jayanti**, a day that honors traditional craftsmen, sculptors, and architects. The event was hosted by **Ritambhara**, where Radhika has been studying the traditional Vastu building

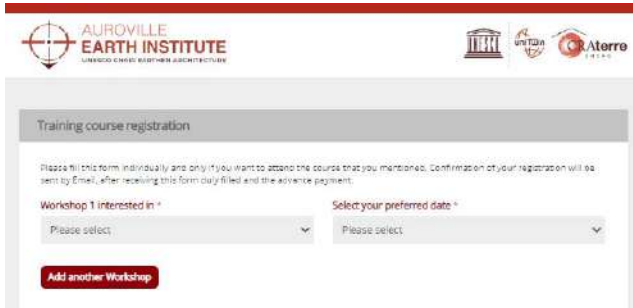


philosophy under Sashikala Ananth. The online event featured interviews with four traditional builders and sculptors from around South India.

In October, Hilary participated with Ravi in **MoodleMoot USA**, an online conference dedicated to the open-source learning management system Moodle, to share about the experience developing the Earth Institute’s online training courses (see p 10). ■



AVEI's presence around the Internet



New course registration website: The Earth Institute is pleased to have a new site for course registration, <https://registration.earth-auroville.com>. Developed by Sathish at the Auroville-based 150dpi, it provides potential trainees with a slick interface to register directly for training courses.

Participants in the online course sessions registered with this new website and now as the Earth Institute opens to on-campus courses, those interested can register for the full range of courses on the site.



New Aureka Press 3000 video clip: Aureka, the Auroville enterprise that produces the Auram machinery for earthen construction, has recently shot a beautiful promotional video for the Auram Press 3000. This video demonstrates the easy operation of the press and a sampling of the many molds that can be used to create different types of blocks. The video can be seen at: <https://youtu.be/CYycyiMGoBY>

AVEI Communications & Dessimination

Mention in *The Structural Engineer*: The recipient of the 2018 Pai Lin Li Award, Kavinda Isuru Nanayakkara, has recently published an article entitled "Shell structures: lessons in structural efficiency for sustainable construction" in *The Structural Engineer* journal. The article draws upon the research he did during his year as a Pai Lin Li laureate and this includes several references to the work of the Earth Institute.

As one of the first steps in his journey, Isuru came to the Earth Institute in September 2018 and took part in two weeks of training courses on Arches, Vaults, and Domes. Both his preliminary report and the final article mention this instruction and show illustrations from the Earth Institute's publication *Building with Arches, Vaults and Domes: Training Manual for Architects and Engineers*. See *The Structural Engineer* article at: [https://www.istructe.org/journal/volumes/volume-98-\(2020\)/issue-4/shell-structures-lessons-in-structural-efficiency/](https://www.istructe.org/journal/volumes/volume-98-(2020)/issue-4/shell-structures-lessons-in-structural-efficiency/)

Feature 3 The Pai Lin Li Travel Award 2018

Shell structures: lessons in structural efficiency for sustainable construction

SYNOPSIS
Shells are a highly efficient, lightweight structural form that have been used in construction for thousands of years. Shell structures can be formed from a wide range of materials – from compressed earth to concrete – allowing local materials to be used in their construction. However, social and economic factors mean that local materials are often perceived as inferior to steel or concrete in developing countries. In this article, stemming from his Pai Lin Li Travel Award in 2018, Isuru Nanayakkara looks at traditional technologies and modern approaches to lightweight shell construction to seek a better perspective on how shell technology can be appropriated to different local contexts.

Introduction
As one of the first steps in his journey, Isuru came to the Earth Institute in September 2018 and took part in two weeks of training courses on Arches, Vaults, and Domes. Both his preliminary report and the final article mention this instruction and show illustrations from the Earth Institute's publication *Building with Arches, Vaults and Domes: Training Manual for Architects and Engineers*. See *The Structural Engineer* article at: [https://www.istructe.org/journal/volumes/volume-98-\(2020\)/issue-4/shell-structures-lessons-in-structural-efficiency/](https://www.istructe.org/journal/volumes/volume-98-(2020)/issue-4/shell-structures-lessons-in-structural-efficiency/)

of the Rajarajacholapuram, Hindu temple, Chidambaram, Tamil Nadu, India. The temple is a masterpiece of traditional architecture and is a UNESCO World Heritage Site.

April 2020 | The Structural Engineer



Starting online courses at AVEI



Ayyappan and Satprem preparing the soil identification video for the CSEB Theory course (© Aurovenkatesh)

In response to the lockdown around India that took place from March to May 2020 and the halting of the majority of travel around the world, the Earth Institute has begun offering since July a select number of training courses online: AVD Theory and CSEB Design, where the curriculum of the on-campus courses have been directly developed into online materials, and CSEB Theory, an all-new abbreviated course which introduces students to the basic principles of earthen construction and the steps needed to produce and use CSEB.

The courses were developed using Moodle, a major open-source learning management system (LMS), with a dedicated site set up at <https://auro.one> by Ravi Murugesan. Working from the presentations given during the on-campus courses, instructors Satprem, Radhika,

and Ayyappan recorded lectures and two demonstration videos for the catenary method and soil identification using sensitive analysis. The demonstration videos were filmed by Serena Aurora and Aurovenkatesh of Auroville Outreach Media, who brought together multiple camera angles, closeups, and voice-over audio into two very clear and cohesive videos. Then Hilary developed course modules around the pre-recorded video lectures and demonstrations, with reading materials, activities, and quizzes, as well as discussion forums and practical exercises. In all these courses, students have the opportunity to receive one-on-one feedback from the instructors.

This shift to offering courses online has been more than a stopgap for the duration of the travel restrictions, but represents an important ➤



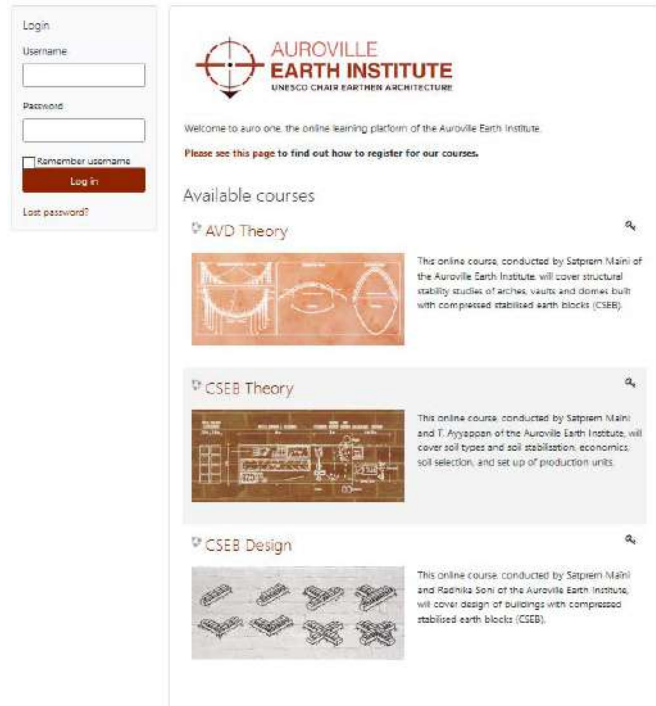
way for the Earth Institute to expand the reach of its educational initiatives. Much of what is taught at the Earth Institute is unmatched in its depth of coverage and authoritativeness, and some of this material is conducive to the online learning medium. For instance, the techniques for analyzing the stability of a vaulted structure that are taught in the Earth Institute's course AVD Theory are taught nowhere else in this complete and technical way, and yet they are crucial to the usage of complex vaulted roofing systems. By offering this and other courses online, the Earth Institute hopes to be able to offer its training courses to a wider array of students and professionals of earthen architecture around the world.

The 2021 schedule for online courses is available here: http://www.earth-auroville.com/online_courses_en.php ■

Revisions to the AVD manual

Satprem has been working to update the Earth Institute's manual on arches, vaults, and domes (AVD), *Building with Arches, Vaults and Domes: Training Manual for Architects and Engineers*, to incorporate the new advancements that the Earth Institute has made into analyzing the structural stability of vaulted structures. New sections have been added about arches with varying thicknesses, the optimization method for equilateral arches, the funicular method with beams, and other critical areas of study. A total of 94 pages and 199 figures have been added, resulting in a manual that now has 209 pages and 385 illustrations. These revisions will also result in new components in the Earth Institute's AVD Theory training course, to better introduce students to these methods of structural analysis.

The manual can be purchased from the Earth Institute and is given to AVD Theory students. ■



The auro.one login interface with course listings

Online course statistics for 2020: So far, the Earth Institute has held three sessions of online courses: July-September 2020, October 2020 - January 2021, and January-March 2021 (the last of which has just begun). The interest in these courses has been encouraging, and so far, the Earth Institute has issued certificates for one or more of the courses to 33 architects, engineers, and students, including 18 participants from Syria sponsored by the Aga Khan Agency for Habitat (see the larger description of this project on **p 2**) and one participant from Mauritania. An additional 31 building professionals sponsored by the Aga Khan Agency for Habitat have received certificates for completing the lecture component of the courses and thereby receiving an introduction to the concepts of building with CSEB and arches, vaults, and domes. ■



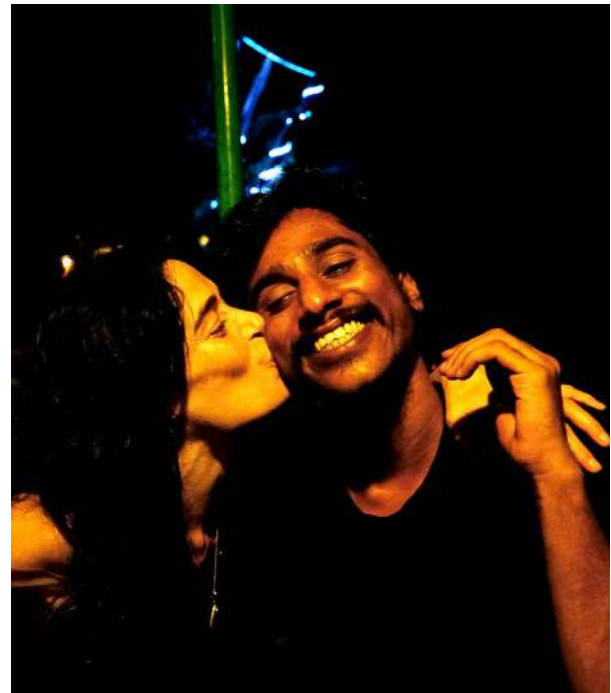
New AVEI team member

The Earth Institute has welcomed a new staff member this year!

Sucheta: With a passion for art and architecture, I pursued my Bachelors in Architecture from KIIT University. My inclination towards sustainable architecture started when I had come for a workshop at the Earth Institute during my college days. I have interests ranging from vernacular architecture and low cost housing to disaster resilient structures and landscaping, and am grateful that the Earth Institute gives me a platform to nurture all of them. In my free time, I have begun training in the ceramic arts as well. ■



A potluck in honor of Pongal at the office



Akash with his partner

Passing of Akash Nandkumar: The entire Earth Institute team is deeply saddened by the loss of colleague and research collaborator Akash, who passed away in October 2020. Akash had first began working with the Earth Institute in 2018 as he pursued the development of hemp-based building technologies, in particular “hempcrete”. He had great hopes for the viability of this technology, which makes use of the woody inner core of the hemp stalk mixed with a binder to produce a low-carbon building material, and had reached out to building professionals and government agencies to create awareness and to gain support. Akash’s family received notification that in fact his project had posthumously received Incubation Support under the Pre-Prototype Category of ASHA-India from the Ministry of Housing and Urban Affairs. We salute the vision and passion that Akash had for hemp as a building material and hope that his push for hemp-based building materials in India will be taken up by others in the field. ■



AVEI on-campus training course schedule for 2021

March

8th to 13th: AVD Theory
15th to 20th: AVD Masonry

April

19th to 24th: Wind Generator
26th to 1st May: CSEB Intensive

May

3rd to 8th: AVD Intensive
10th to 24th: Bioclimatic Earth

June

31/5 to 5th: Ferrocement
7th to 12th: AVD Theory
14th to 19th: AVD Masonry

July

5th to 10th: CSEB Design
12th to 17th: CSEB Production
19th to 24th: CSEB Masonry

August

9th to 21st: Bioclimatic Earth

September

30/8 to 4th: CSEB Production
6th to 11th: CSEB Masonry
13th to 18th: AVD Theory
20th to 25th: AVD Masonry

November

8th to 22th: Bioclimatic Earth

December

29/11 to 4th: CSEB Intensive
6th to 11th: AVD Intensive

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Colophon

AVEI online training course schedule for 2021

First Session

4th - 30th January: AVD Theory
1st - 27th February: CSEB Design
1st - 13th March: CSEB Theory

Second Session

28th Jun - 24th Jul: AVD Theory
26th Jul - 21st Aug: CSEB Design
23rd Aug - 4th Sep: CSEB Theory

Register at:
registration.earth-auroville.com