



## Congratulations, Batch of 2023

### Greetings from TLC2 @ IIT Madras

The Center of Excellence (CoE) on Technologies for low carbon and lean construction (TLC2) has been established at IIT Madras to lead to the true adoption of the concepts of circular economy in construction and minimal impact on global climate change.

The TLC project aims to develop innovative low-carbon, lean construction technologies for minimizing waste throughout the construction value-chain, and lead solution implementation across organizational and policy levels.

Find us:

<https://civil.iitm.ac.in/tlc/>

### IN THIS ISSUE

#### Event

IIT-Madras in association with IAARC and TLC2 hosted 40th International Symposium on Automation and Robotics in Construction (ISARC 2023) from July 3<sup>rd</sup> to 7<sup>th</sup>, 2023

#### Key themes of ISARC:

Sustainability and circular economy in construction through automation

Autonomous construction, augmented reality and virtual reality-based visualisations

5G application in construction automation

Artificial Intelligence and machine Learning

#### Recent papers of interest

“Concentrated solar energy for recycling waste concrete”- research article by Prajapati et al., Materials and Structures (2022)

“Sustainable materials for 3D printing”- research article by Bhattacharjee et al., Cement and Concrete Composites (2021)

# 40<sup>th</sup> International Symposium on Automation in Construction

*“We will be constructing a university at an altitude of 4,000 metre, where we are looking at zero carbon emission and adopting lean construction. This place can be accessed only three to four months in a year. We are looking for automation to guide us through the construction at a quick pace, enhance safety for the labourers and provide stability for the building. As a computer science professor, I see three important trends are coming up-digital twins in which one can create a digital version of the building to be constructed, a lot more of deep learning, and the very big intervention of Internet of Things (IoT) in energy.”*

**Excerpts from opening remarks by Prof V Kamakoti, Director, IITM**

“Automation and robotics play a vital role in improving the efficiency of the construction industry, especially for developing nations like India. ISARC 2023 focuses on the theme of sustainability through automation, emphasizing the greening of the construction industry through technology option. During the 3-day ISARC conference, 130 research papers were presented from over 30 countries covering a wide range of themes.”-message from the conference chair, Dr. Benny Raphael



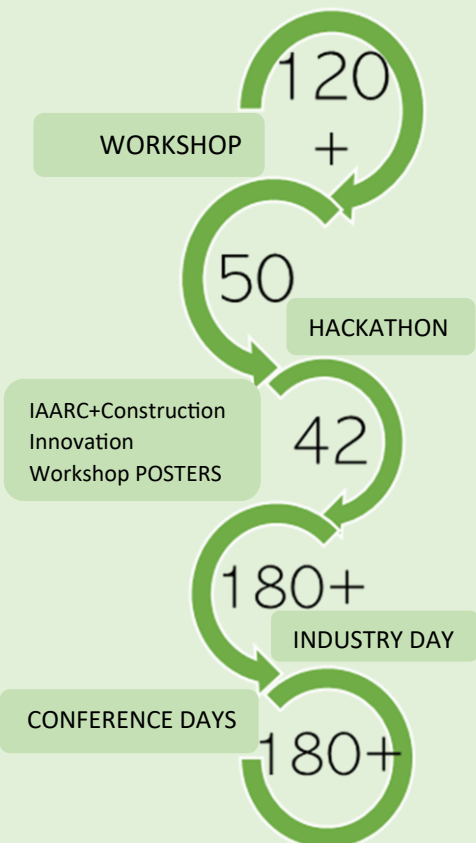
## PRE-CONFERENCE EVENTS

**WORKSHOP** on point cloud acquisition, processing and mobile robot

**HACKATHON** on prediction of compressive strength of concrete made with recycled aggregate by Machine Learning

**INDUSTRY DAY**  
Experts and practitioners from Industry attended  
Key themes of the day-Start-up & Innovation, Frontiers in Digital Construction

## DEMOGRAPHICS OF ATTENDEES



For more details, visit <https://isarc2023.com/>

## Recent papers of interest

### Sustainable materials for 3D concrete printing

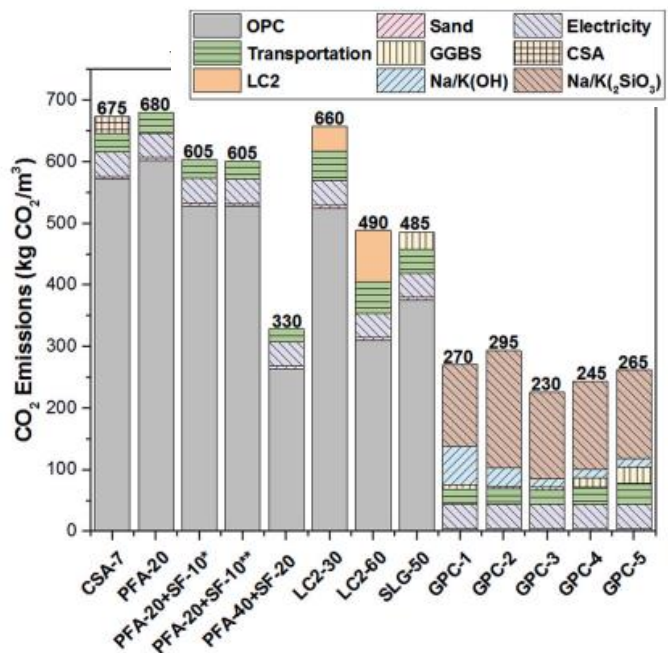
Shantanu Bhattacharjee, Anusha S. Basavaraj , A.V. Rahul, Manu Santhanam, Ravindra Gettu, Biranchi Panda, Erik Schlangen, Yu Chen, Oguzhan Copuroglu, Guowei Ma, Li Wang, Mirza Abdul Basit Beigh, Viktor Mechtcherine

Cement and Concrete Composites (2021)

Different binder systems based on portland cement and supplementary cementing materials (SCMs), such as fly ash, silica-fume and slag, were used.

Alternative binders such as geopolymers, calcium sulfo-aluminate cement (CSA), limestone calcined clay cement (LC3) and reactive magnesium oxide systems are explored.

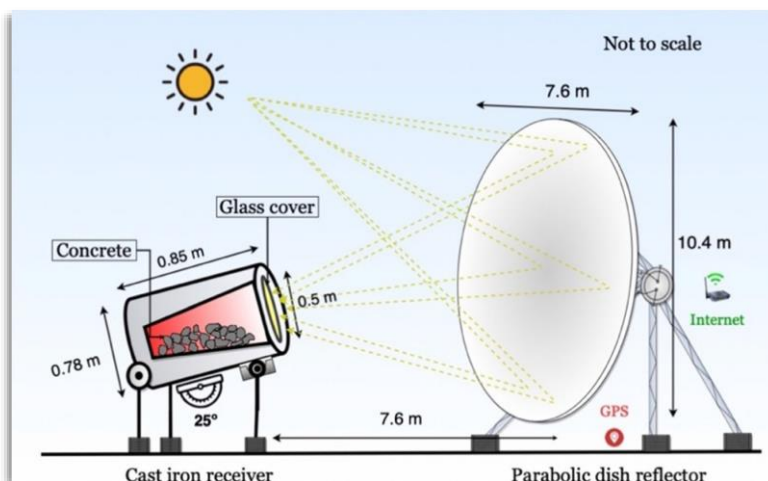
This paper underlines the effect of using SCMs and alternative binder systems for improving the sustainability of 3D printed structures. [READ MORE](#)



### A novel beneficiation process for producing high-quality recycled concrete aggregates using concentrated solar energy

Rohit Prajapati, Ravindra Gettu, Surender Singh

Construction and Building Materials (2021)



This study presents strong evidence for the use of concentrated solar energy for recycling waste concrete through thermomechanical beneficiation with promise for large-scale waste concrete recycling.

This would reduce the energy footprint of Construction and Demolition waste processing significantly, and lead to savings in raw material and electricity.

[READ MORE](#)

## UPCOMING EVENTS

### Young Researchers' Symposium on Technologies for Low-carbon & Lean Construction on Jan. 28, 2024 @ ICSR Auditorium, IIT Madras

#### ABOUT THE SYMPOSIUM:

The Young Researchers' Symposium on TLC2, co-sponsored by RILEM, is exclusively for senior PhD students and recent graduates; the symposium will provide a premium forum to present advances and research results in the construction materials and management sector, especially related to Low-Carbon and Lean Construction technologies.

#### ELIGIBILITY:

Participants should be senior Ph.D. students who have completed their qualifying exam, submitted research proposal, or recent PhD graduates who have defended their thesis in 2023. The **shortlisted candidates (but not finalists)** of YRS 2023 are also encouraged to apply for the YRS 2024.

#### DETAILS OF THE EVENT

- Submit an abstract and a 5-minute video on the PhD thesis work by September 15, 2023.
- Best 10 symposium speakers will be selected based on the short videos and abstracts.
- Each speaker will be given 15 minutes for the talk, followed by 15 minutes of discussion.
- A jury of international experts will evaluate the presentations and the best speaker will receive the **Prof. Surendra P. Shah Award on Technologies for Low-Carbon and Lean Construction - 2024**. The awardee will be given a slot at the 3<sup>rd</sup> International Workshop on TLC2 workshop to be held at IIT Madras, Chennai, during January 28 – 31, 2024.
- Travel grant of up to EUR 2000 could be available to selected speakers (partial support towards the actual travel expenses).

#### THEMES INCLUDE (but not restricted to...)

- Supplementary/alternative cementitious materials - hydration, fresh, durability, hardened properties
- Identification, processing, and valorization of waste for use in concrete construction
- Service life and life cycle assessment, sustainability and carbon footprint of construction industry
- An integrated test-bed for large-scale processes and visualization
- Organizational and policy research for large-scale and accelerated construction technology
- Implementing lean techniques in construction projects - research on organizational and stakeholder-linked implementation challenges

For registration and more details, please check [here](#).



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