IIT MADRAS
Indian Institute of Technology Madras

Technology Transfer Office
TTO – IPM Cell

Industrial Consultancy & Sponsored Research (IC&SR)

A climbing robotic system for automated construction of structural frames of buildings and method thereof

IITM Technology Available for Licensing

Problem Statement

- In traditional construction methods, workers have to climb & assemble structural frames of buildings, **leading to time consumption, unsafe, and costly due to the heavy reliance on manual labor.**
- Current automated construction equipment are **bulky**, often **larger** than the structures they are constructing, making them **impractical** for smaller residential building construction and leading to **inefficiencies in construction projects.**
- **Transporting heavy construction materials and elements**, like prefabricated components and concrete, is a challenging aspect of automated construction. Existing methods, like cranes, are **bulky, costly and difficult to deploy in congested construction sites.**
- The construction sector demands a solution for all the above mentioned issues. Hence, there is a need for the **development of more efficient methods for handling materials to streamline the construction process** & address the shortcomings of manual construction method & existing automated construction systems.

Technology Category/ Market

Civil Infrastructures & Structural Engineering

Industry: Construction and Building

Applications: Structural Frames Building, Multi-Story Building Construction, High-Rise Construction where safety, speed, and precision are critical.

Market: The global construction market value is expected to grow from **$14,393.63 B in 2022 to $18,819 B in 2027 at 5.5% CAGR.** Further, at **6.6% CAGR** to reach **$25,928 B by 2032.**

Intellectual Property

IITM IDF Ref. 2065;
Application No. 202041057308

TRL (Technology Readiness Level)

TRL- 4, Technology Validated in Lab

Research Lab

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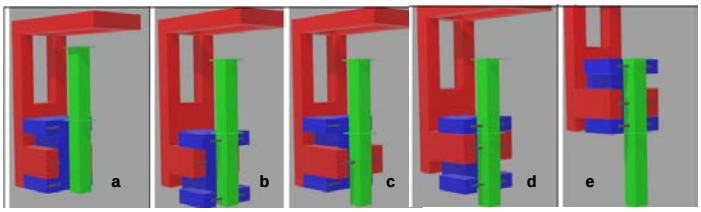
Technology

The present patent technology discloses a **climbing robotic system** for **automated construction** of structural frames of buildings using **interlocking column modules**.

The system includes **a climbing mechanism, column modules, a beam module connection system**, and a **method for construction**. **FIG 1A to 1E** illustrates an animated frames of robot movement:

a. frames of the movement of the robot by two connected column modules
b. back-piece climbing up by one step
c. front-piece climbing up by one step
d. back-piece that has climbed up by two
e. robot that has climbed to top of 2nd column module



Key Features / Value Proposition

❖ ***User Perspective:***

- Gives **improved safety** through **reduced manual labor** and **efficient, automated construction**.
- The **interlocking modules simplify construction**, making it accessible to a wider range of users.
- Give **environmental friendly construction** with self-compacting concrete-reduced material wastage.

❖ ***Technical Perspective:***

- **Innovative Robotics:** The system employs cutting-edge robotics for efficient construction.
- **Interlocking modules ensure strong, stable buildings meeting technical standards.**
- **Optimized mechanical processes reduce energy use and technical complexity.**

❖ ***Industrial Perspective:***

- **Enhanced Productivity:** Continuous, tireless operation rises construction output & project speed.
- **Competitive Edge:** Adoption of this technology attracts clients seeking modern, cost-effective, and sustainable building solutions, strengthening market position and growth potential.

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