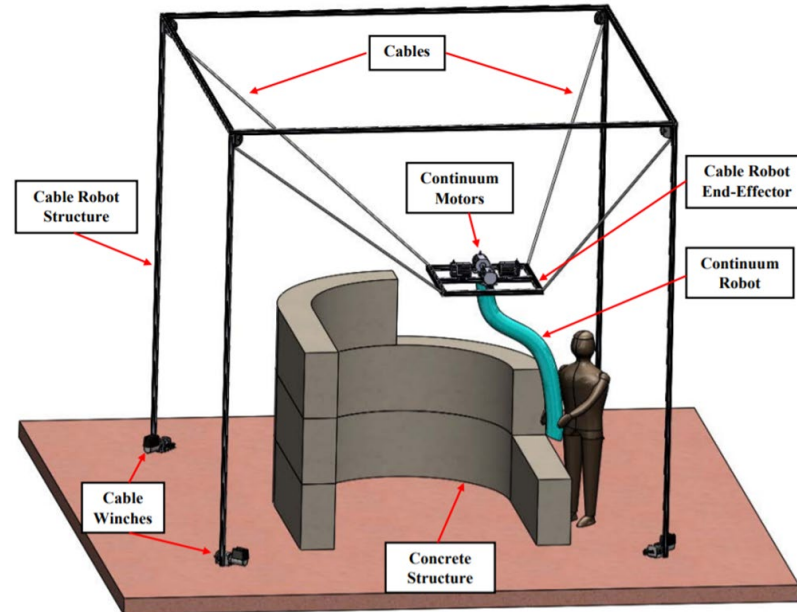


NRI:FND: 3D Concrete Printing with Macro-Micro Robots

Award #1924721 Award Date 8/1/2019 Clemson University
Ian D. Walker, Venkat N. Krovi, Prasad Rangaraju, and Matthias J. Schmid
Poster #145

Challenge

- Interactively assist construction workers to dexterously deploy concrete-delivery hoses in congested spaces for 3D printing of concrete



Solution

- Intelligent co-robot: novel cable-driven macro/micro design:
 - Cable-robot acts as macro-base
 - Continuum robot (integrated with concrete delivery hose) as micro-unit
 - Field Intelligence: Situational awareness and physical-assist
 - Field-deployable with large workspace/load carrying capability

Scientific Impact

- Fundamental research in rheology of 3D-printable concrete
- New generalizable modeling of coupled cable-driven macro-micro robot systems
- Intelligent assist for concrete delivery in construction industry



Broader Impact

- 4 Ph.D. students (2 female) and 1 REU student hired
- Outreach summer seminars to high-schools and industry
- Industry and conference presentations