Online Labor Platforms and the Future of Engineering Design Work

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Problem Description
It is assumed that engineering design work cannot be easily outsourced and distributed. The expertise, coordination and communication associated with the design process makes it difficult to remove this work from the firm. The rapid advancement of digital infrastructure that enables firms to directly interact with a global workforce on an as-needed, task basis through online labor platforms now allows efficient outsourcing of individual, high-expertise tasks. It is unclear now whether this type of intellectual work will remain protected.

Method
**Experimental Study:** Developed and ran a series of 17 engineering design contests requiring varying levels of complexity/size and interdisciplinarity on an online digital platform, Freelancer.com
- Each contest was related to the design of an autonomous robotic manipulator to be used in space
- Considered 10 individual contests where the task was either to design a full robotic system or to design a key subsystem or component.

**Data:** In addition to Design Submissions for each contest, we collected information from active members of the online platform community:
- before exposure to contest details through a Registration Survey,
- during the contest through platform-hosted user forums and interest tracking data, and
- For every design solution submitted through an Exit Survey

**Previous Work, Research Questions**
Focus on Policy and Regulation of low-skill tasks
Online labor platforms have been dominated by industries utilizing low-skill labor. Majority of research has focused policy and legal issues, with an industry perspective. [1,2]

Research Questions:
- Can good quality engineering design work be accomplished through open online labor platforms?
- Who is doing this kind of intellectual work through online labor platforms?

Analyses:
- Quantitative analysis of participants’ demographic and work history data using Registration and Exit Survey data
- Qualitative coding of Design Submissions for quality of work product and design process.

**Preliminary Results**
(1) Capable workforce, with appropriate expertise for design work generated for all tasks
- However, capability and accessibility not uniform across tasks of differing complexity
- Higher yield of good design submissions for Component-level tasks
- System-level design submissions had higher variability in quality – uncertainty in access to workers capable full system design
- More effort needed to evaluate System-level design submissions for usability

(2) Good solutions and useful design work generated for all tasks
- More effort needed to evaluate System-level design submissions for usability

**Future Work**
- Quantitative analysis of Submissions across contests to better understand the design process with the goal of informing decomposition and distribution strategies to efficiently produce good integrated solutions
- Examine additional coordination costs for partitioning Design to make use of remote design workers, particularly additional design evaluation and design integration activities

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