TeachBot

An Education System for Workforce Development

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INTRO

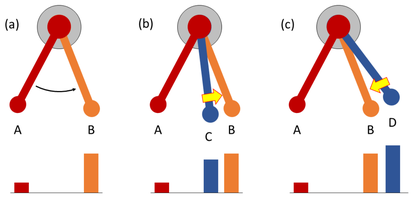
- Shortage of skilled workers will leave **two million unfilled manufacturing jobs** in the United States alone.
- **Lack of apprenticeship programs** leads companies to outsource system integration, which is costly.
- Traditional classroom learning fails to engage broad population.

OBJECTIVE

Develop robotic education system that:

- Requires no human instructor
- Runs on the cloud
- **Teaches learners more effectively than traditional lectures**

CONCEPT

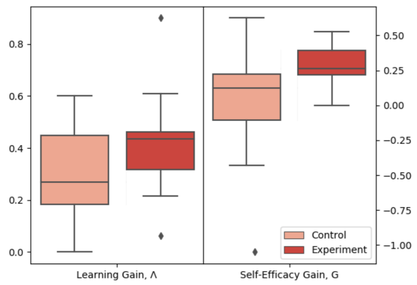


- Concepts like “feedback control” are crucial in robotics, but difficult to learn intuitively.
- TeachBot asks the learner to **manually produce** the effects of feedback to correct for undershoot (b) and overshoot (c).

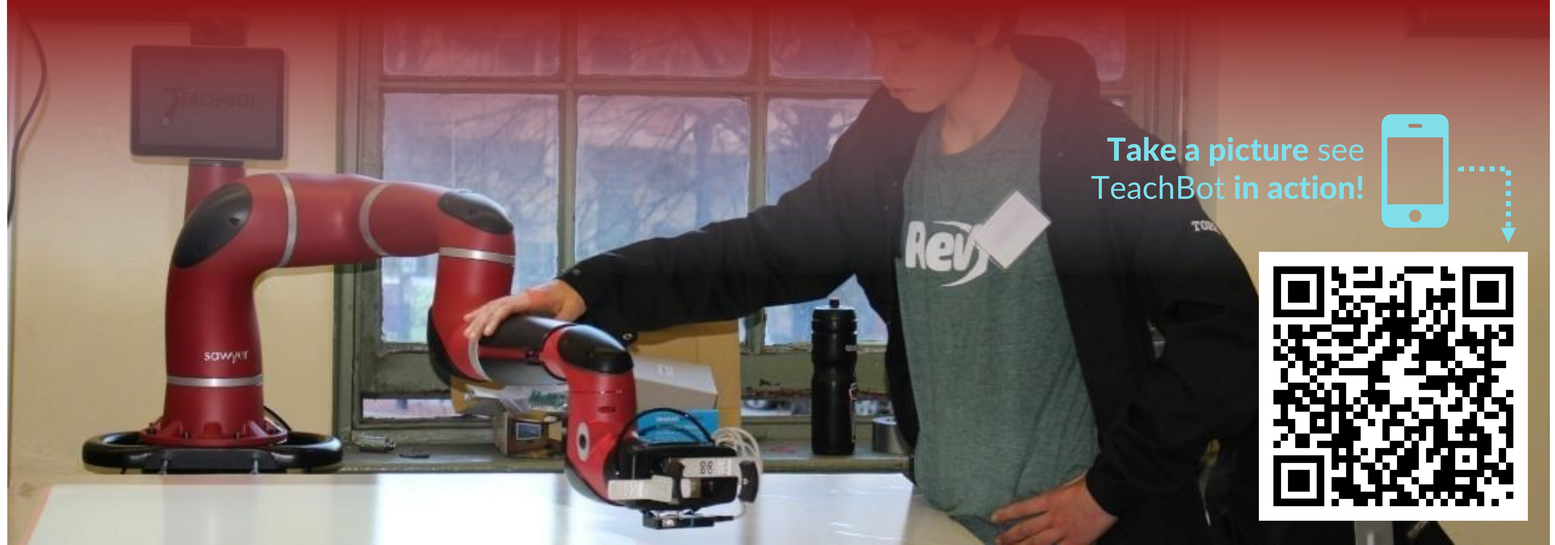
EXPERIMENTAL DESIGN

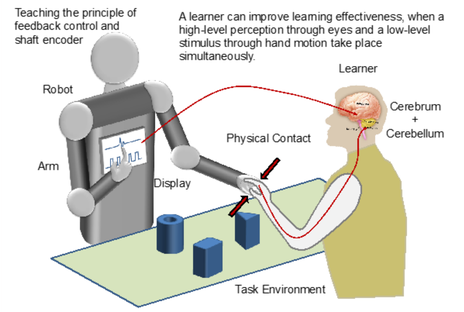
- **Experimental group directly interacted with the TeachBot system** to complete learning module.
- **Control group watched multiple perspective videos** of a model learner completing the same module.
- Both groups complete pre- and post-tests to evaluate learning and self-efficacy.

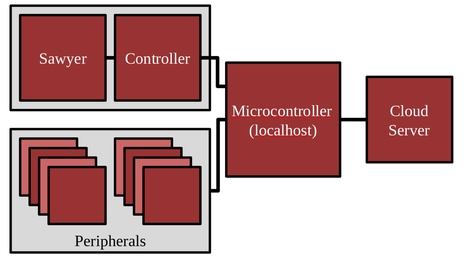
RESULTS

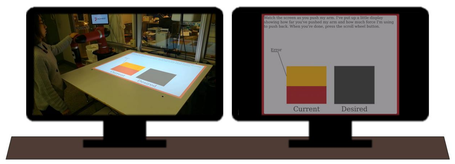


TeachBot is a fully autonomous, robotic instructor that **teaches workers** on a manufacturing line **how to use robots** effectively.







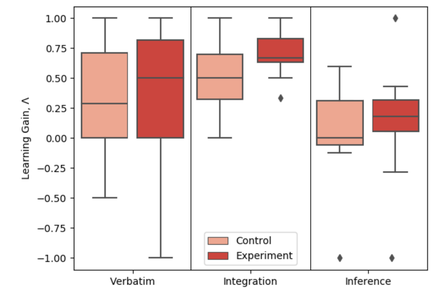


$$X_{i,j} = \begin{cases} 1, \text{if correct} \\ 0, \text{otherwise} \end{cases} \quad \Delta_i = X_{i,\text{post}} - X_{i,\text{pre}}$$

question i on test j

$$G = \frac{\sum_i \Delta_i}{N - \sum_i X_{i,\text{pre}}},$$ where N is the max possible score

Metric	Mean Difference	*p-value*
Self-Efficacy Gain, G	0.264	0.046
Learning Gain, Λ	0.106	0.120



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