USC Viterbi
School of Engineering

PoseToCode: Exploring Design Considerations toward a Usable Block-Based Programming and Embodied Learning System

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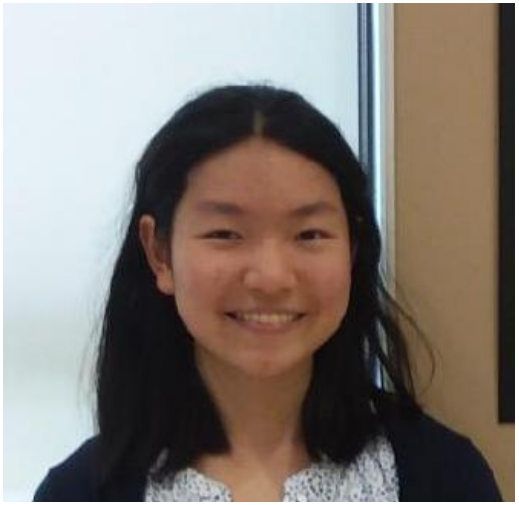
Presenters



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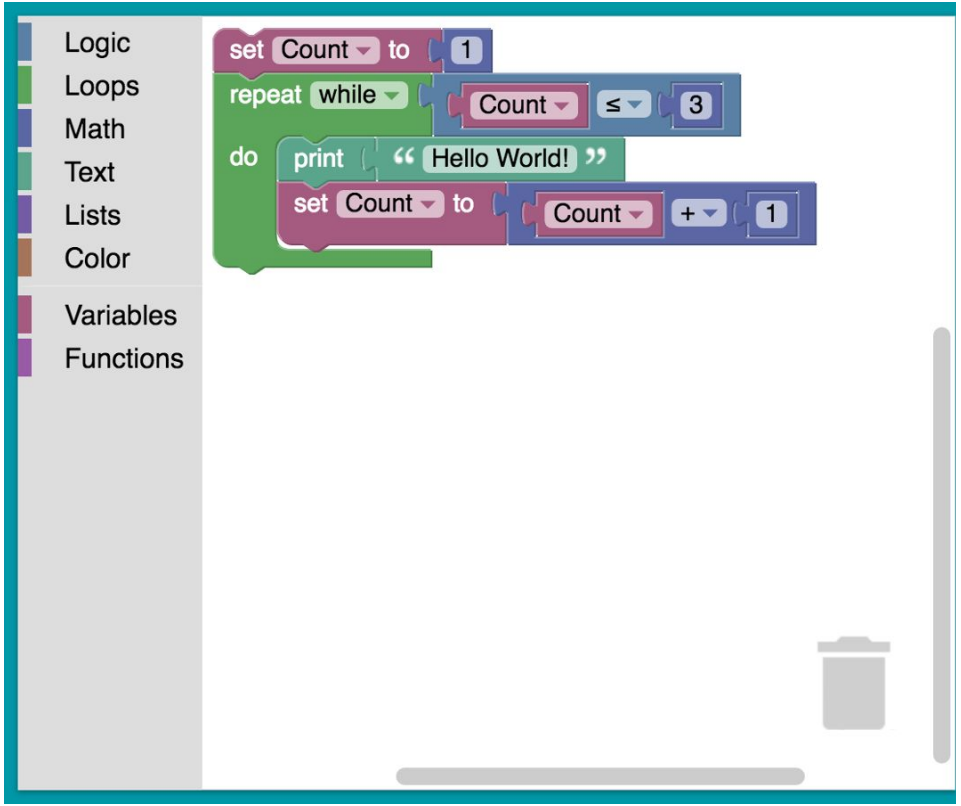
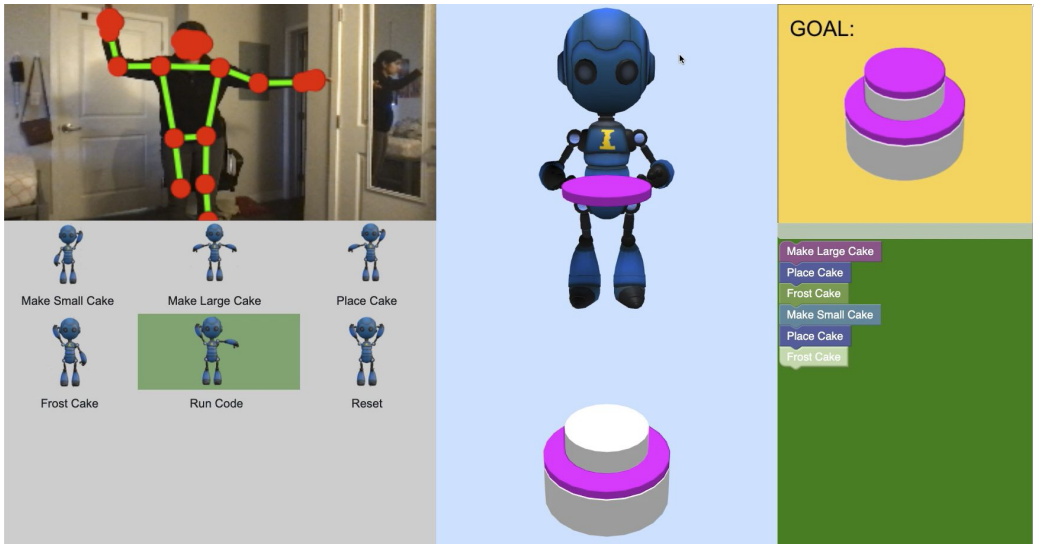
Introduction

- Block programming is commonly used to teach young students about coding
- They fail to incorporate body movement and kinesthetic learning



Contribution

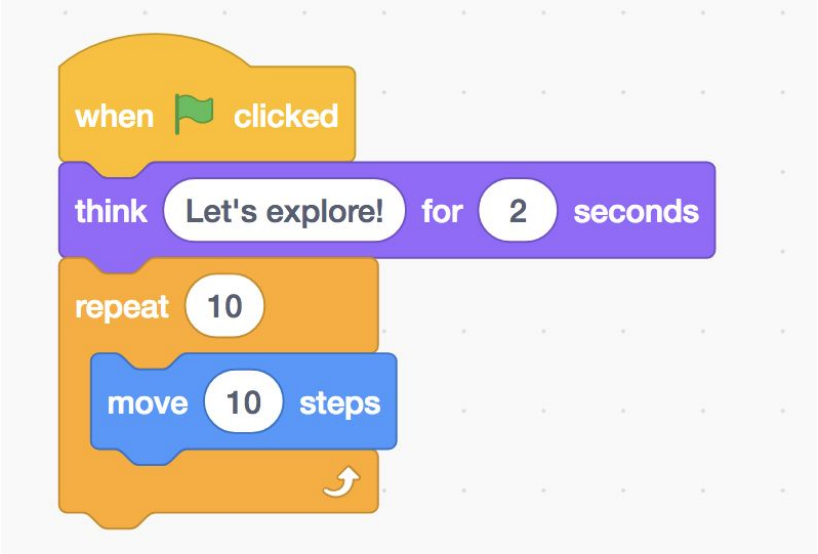
We have integrated kinesthetic learning into block programming exercises to increase students' curiosity and engagement in coding and we introduce design considerations around creating such an activity.



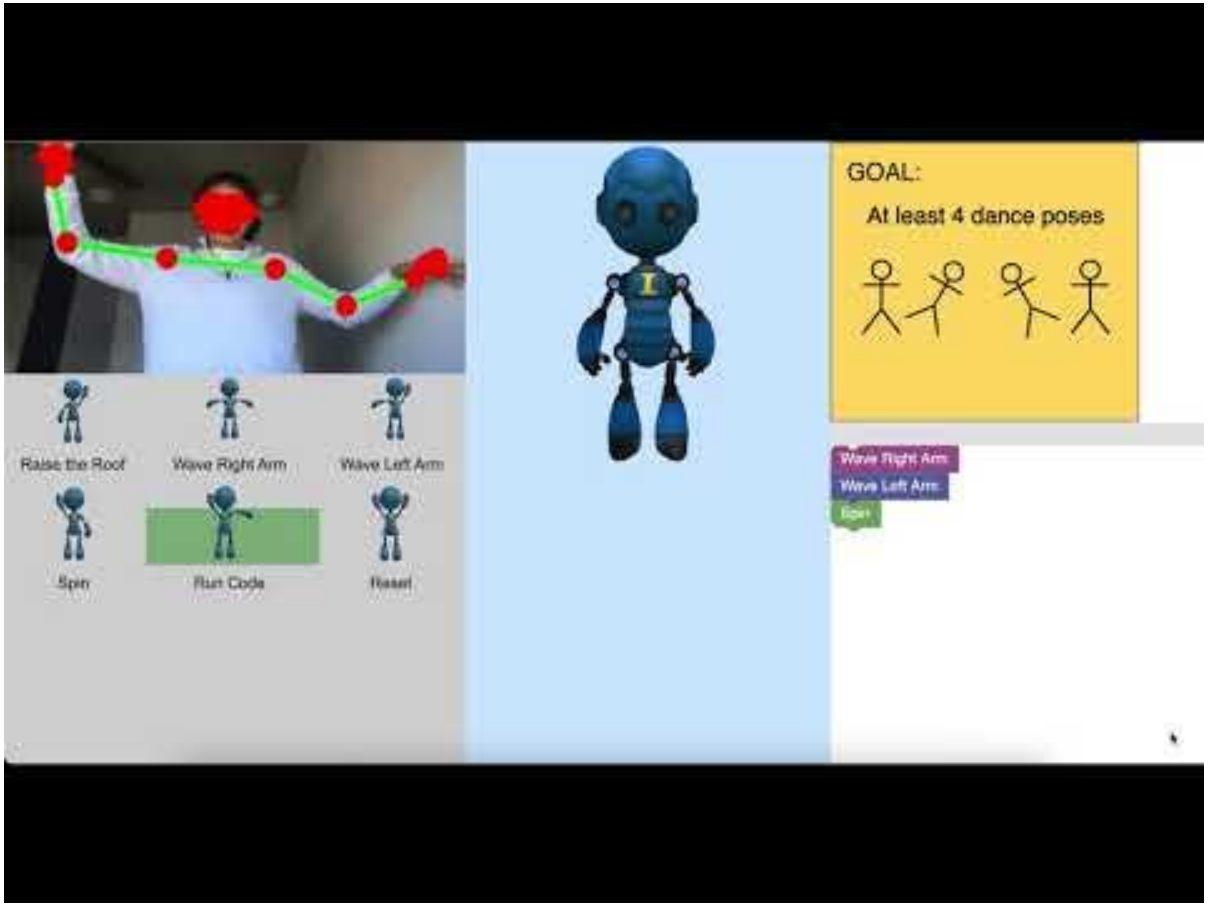
Background

1. Block-based programming
2. Kinesthetic Learning

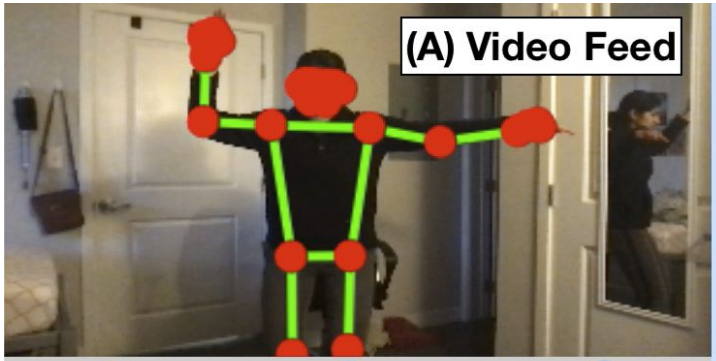
Research from the Cyprus Interaction Lab [4]

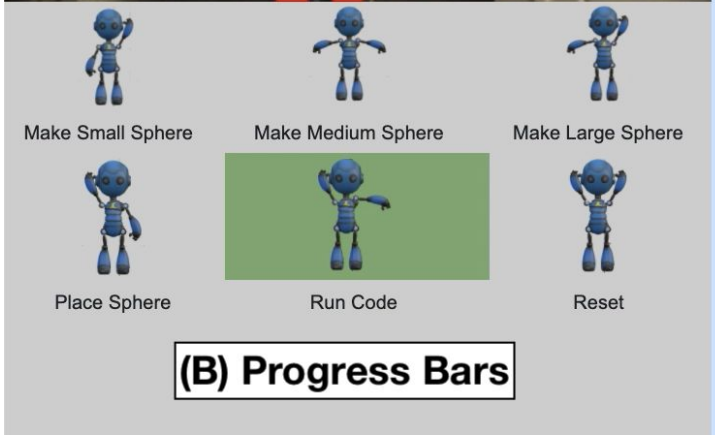


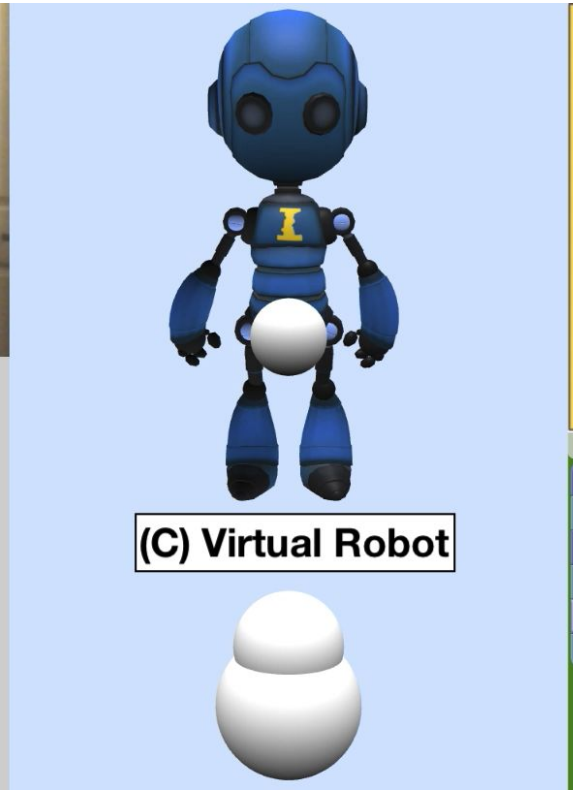
Demo


GOAL:
At least 4 dance poses
Raise the Roof
Wave Right Arm
Wave Left Arm
Spin
Run Code
Reset
Wave Right Arm
Wave Left Arm
Spin

Technical Design

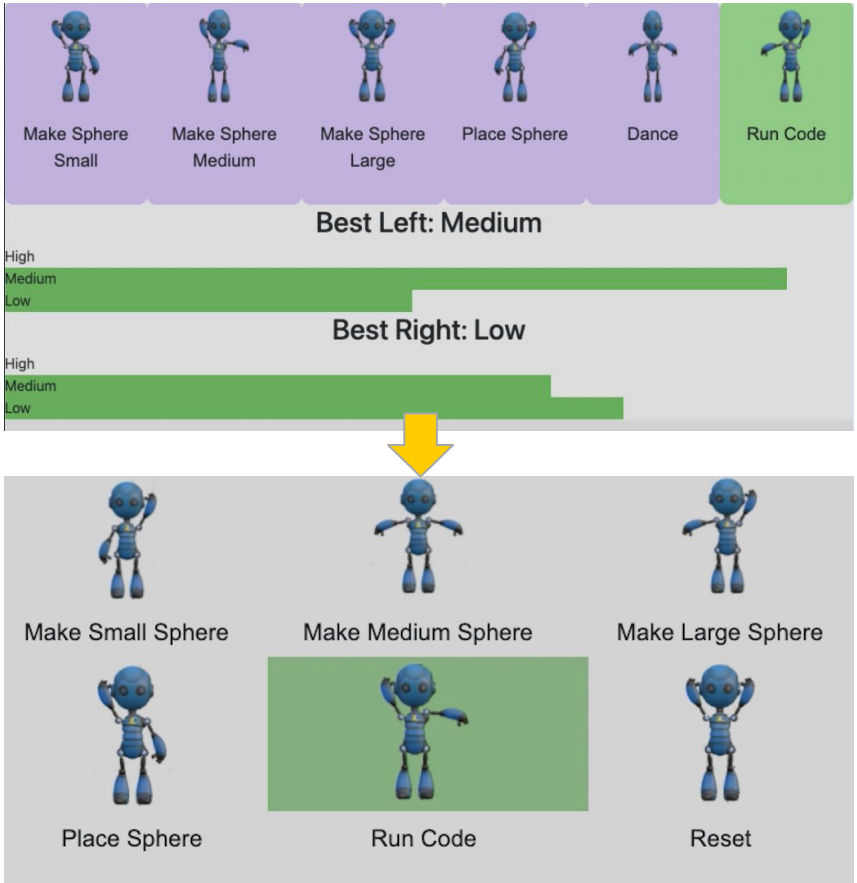






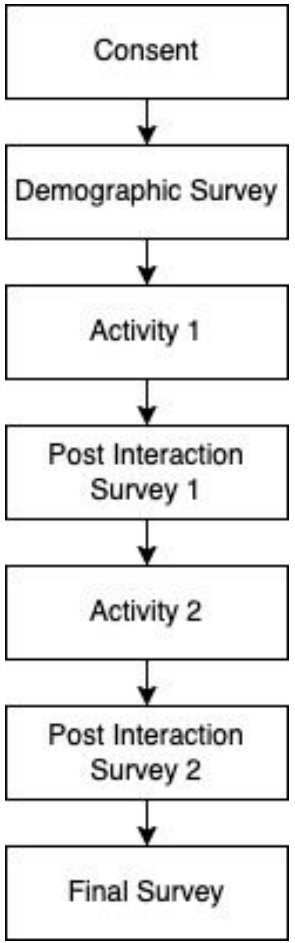
Pilot Study Insights About Design Considerations

- Accessibility across low-end computers
- Accessibility at a distance
  - Visibility
  - Webcam used as the only input source
- Real-time input and feedback
  - Direct pose key
  - Reactive and persistent pose bars
  - Both arms down not used as input



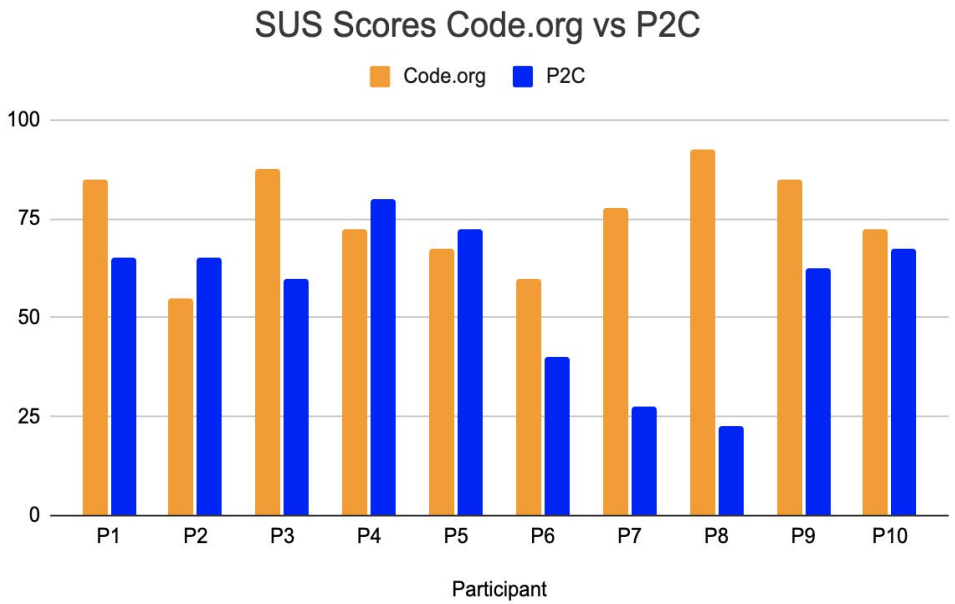
Methods

- Hypothesis
  - Users will evaluate PoseToCode to be a usable system
- Procedure
- Data Collection
  - Pre-study surveys
  - Post-activity surveys (SUS Scores)
  - Final post-study survey
  - Behavioral Data



Results

- Quantitative
  - SUS Scores
    - PoseToCode: 63.75
    - Code.org: 75
  - Mann-Whitney tests
    - PoseToCode more difficult than Code.org
- Qualitative
  - 5/10 participants prefer PoseToCode
  - Themes from participant quotes:
    - PoseToCode is more active than than Code.org
    - Code.org is easier to use



Limitations and Future Work

- Technical glitches
- Long surveys
- Individual interviews
- Arbitrary seated / standing interaction

Thank you to the research team and support

Tom Groechel

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Prof. Maja Matarić

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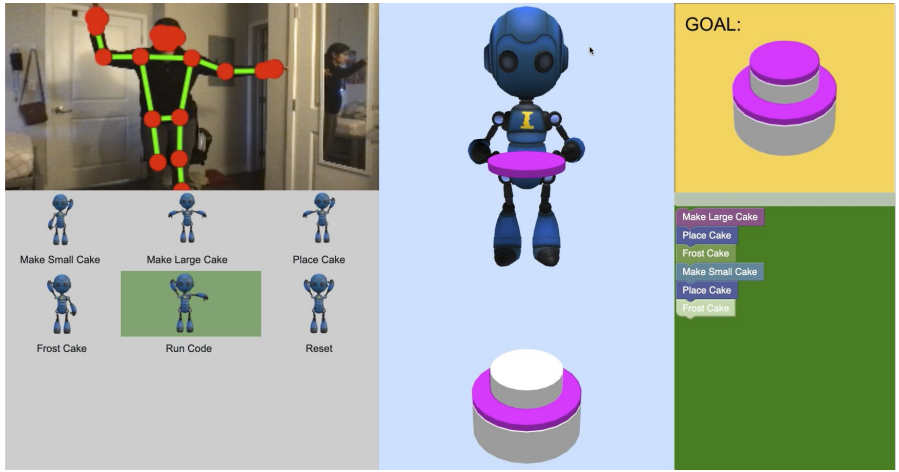
Key Takeaways

- Our work explored:
  - Introducing embodied learning capabilities into block-based programming toward encouraging student curiosity for coding
  - Designing a usable system

- Learned about key design considerations and necessary improvements for designing web-accessible embodied activities like PoseToCode



Repository: https://github.com/interaction-lab/PoseToCode

Demo: https://posetocode.web.app/tutorial.html

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