Real-time Educational Analysis of Makerspaces

Edwin Chng, Callie Sung, Tyler Yoo, Stephanie Zhang

What is the **problem** you are trying to solve with this application?

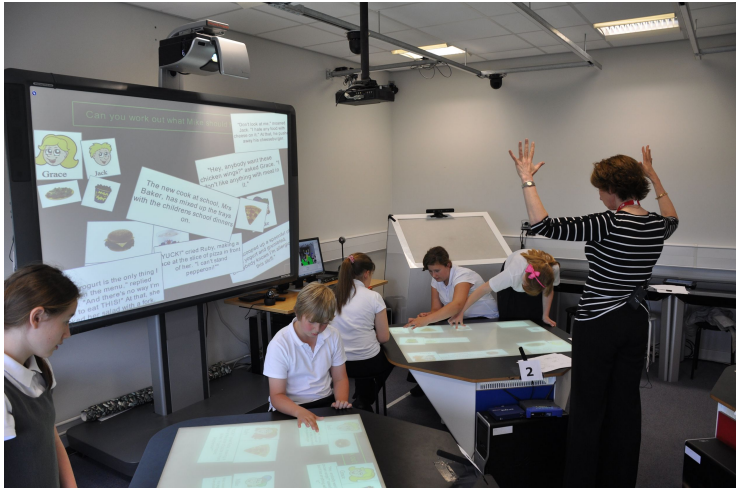
- Open-ended learning environments such as **makerspaces** present a unique challenge for instructors. Facilitators have to strike a difficult balance to allow learning through student-driven exploration while also providing support when students are confused or struggling.

- In this study, we explore **Kinect sensors** to monitor student behavior individually and with peers to detect opportunities for instructor intervention. We seek to use parallel processing and cloud computing to process and analyze the data in order to deliver this feedback to teachers in real-time.

What is the **need for big compute and/or big data processing** and what can be achieved thanks to large-scale parallel processing?

- Increasing interest in methods to generate real-time information during learning.
- Learning is a complex human behavior; as such, data that can capture interesting information on learning *processes* can be large volume, large variety, and high velocity *(e.g., Kinect, eyetracking, video or log data)*

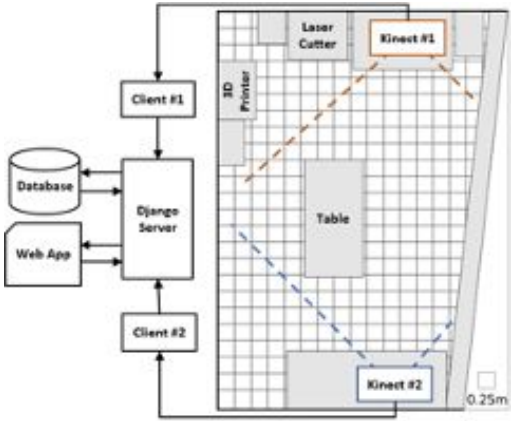
- Large-scale parallel processing can generate real-time information during learning to:
  - ➜ share with teachers to monitor learners, give feedback, or reflect on their own teaching
  - ➜ share with learners for self-regulation
  - ➜ use in stealth assessment
  - ➜ adaptive learning
  - ➜ etc.

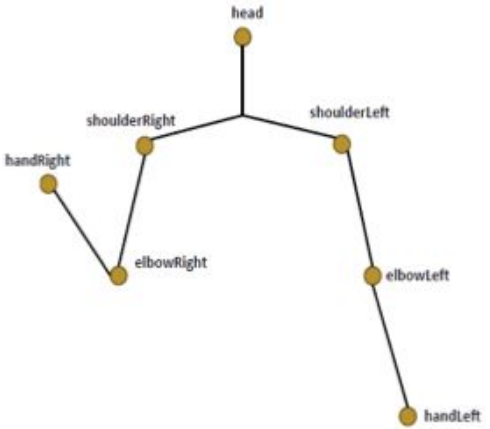


https://synergynet.github.io/synergynet/

Describe your **model and/or data** in detail: where does it come from, what does it mean, etc.

- Over the course of sixteen weeks, the research team collected Kinect sensor data and survey responses of 24 graduate students enrolled in a hands-on digital fabrication course.
- Using the Kinect data, features were extracted and used to link with constructs of interest. This would allow us to model students' learning experiences and social interactions within the Makerspace in a real-time manner.
- Ultimately, this information could be made available to instructors so that better instructional support could be given to students working in open-ended learning environments.





Which **tools and infrastructures** you are planning to use to build the application?

- In the stage of deciding which infrastructure best fits our purposes
- More insight from doing EDA and sketching out our serial implementation
- Spark for pre-processing the data (cleaning, analysis)
- Fine-tuning of hyperparameters using OpenACC