

## SE 101 - Lab Project Proposal

### **Project Description**

A machine that automatically recognizes and distinguishes LEGO bricks from a general pile based on whether they fall within a given set provided by the user. If possible, the process will then be automated so the machine feeds itself LEGO bricks from the general pile and then sorts them into the separate piles of blocks within the desired set and blocks outside the desired set.

### **Major Software Components**

- Brick Detection
  - Detect if a brick is within the given area and is useable for the rest of classification
- Brick Classification
  - Use machine learning to detect the type of brick (dimensions, types, etc)
  - Determining the color
- Brick-set management
  - Determining if the brick is within the given set, and whether the set has already been filled
- Conveyor belt management
- Push-arm timing and coordination

### **Prototype Plan**

- Primarily evolutionary for the software components
  - Interfaces should be evolutionary, but the components can be experimental prototypes
- The hardware components will be either evolutionary or experimental depending on which components are used in the final product (i.e. there may not be a useable conveyer belt or push arm yet)

### **Hardware**

- Raspberry Pi 3
- Camera for Raspberry Pi
- Possible Conveyer belt
- Possible pushing arm

### **Anticipated Challenges**

- The mechanics of the possible conveyer belt
- Learning machine learning
  - Physically inputting many photos for the machine learning
  - Possible misalignment resulting in errors of the push arm sorting bricks while hardware is under development
  - Skew testing of software if the bricks are incorrectly sorted due to the push arm being misaligned