ECE Promotional Display Technology
Sand Art Novelty Dispenser
Douglas Katz (djk289), Fred Kummer (fck22)
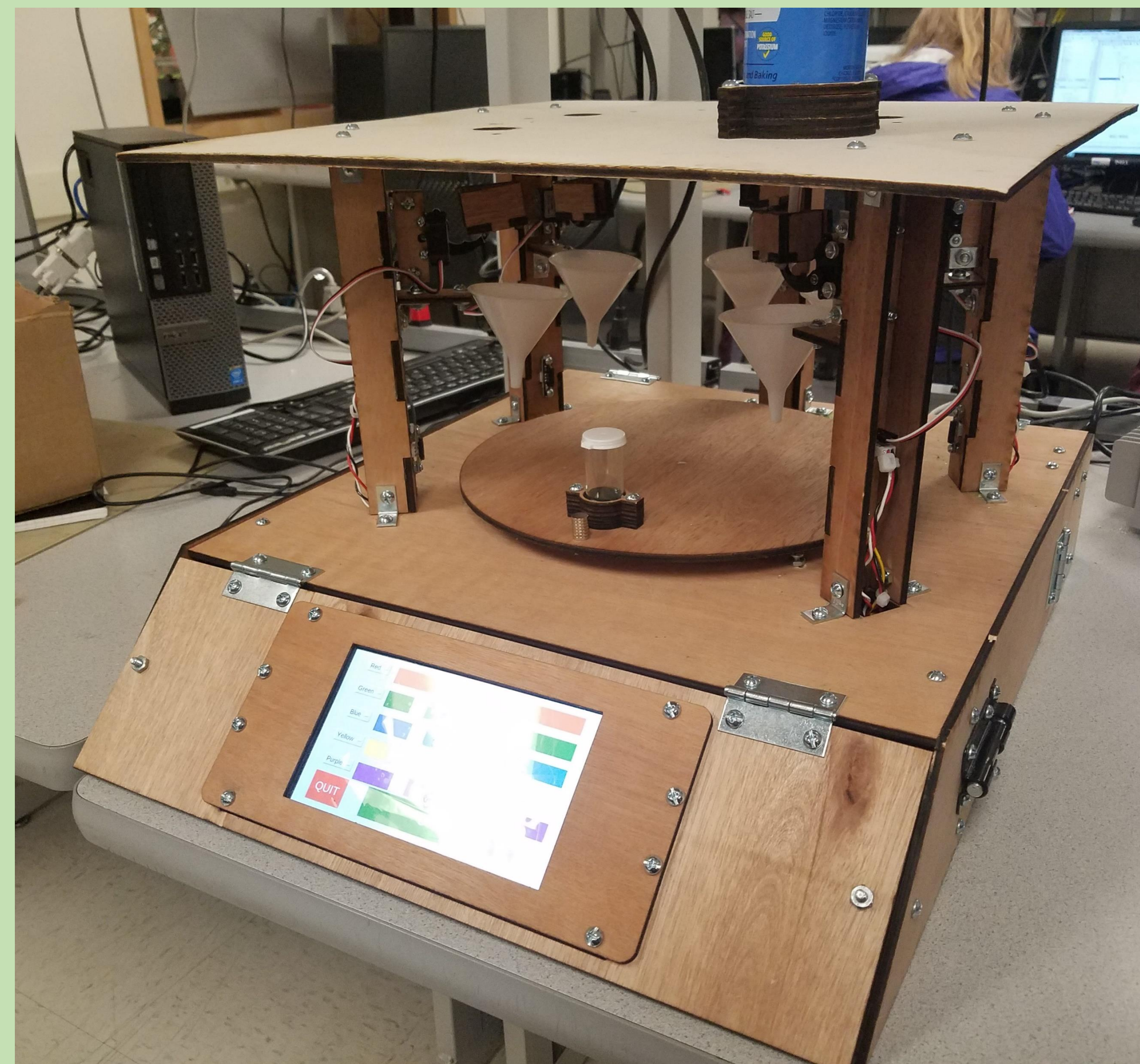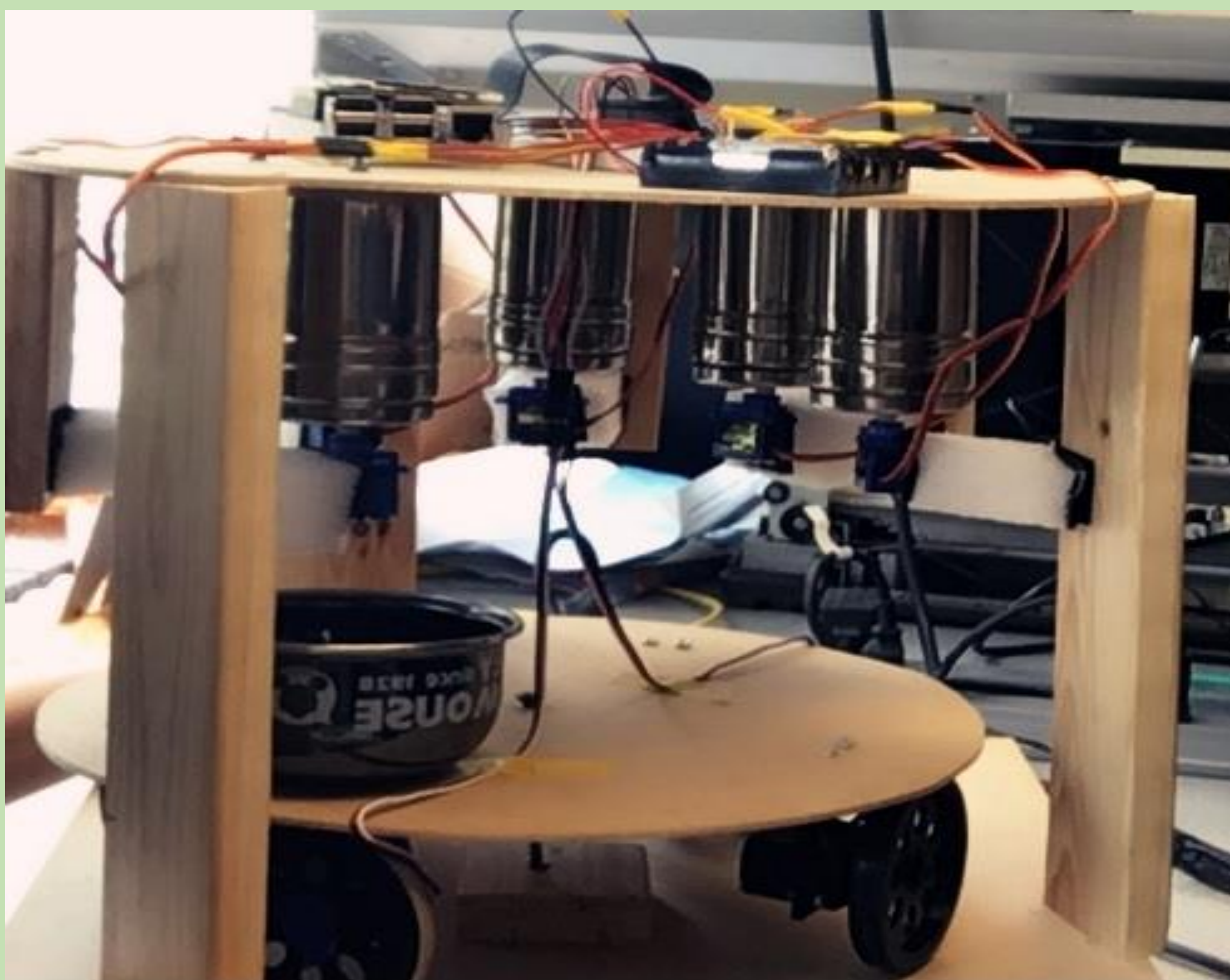### Advisors: Bruce Land, Joe Skovira

Publicizing ECE is Important

- Cornell ECE faculty need to engage prospective students and the general public

- ECE encompasses a broad range of disciplines that can be difficult to understand without specialized knowledge

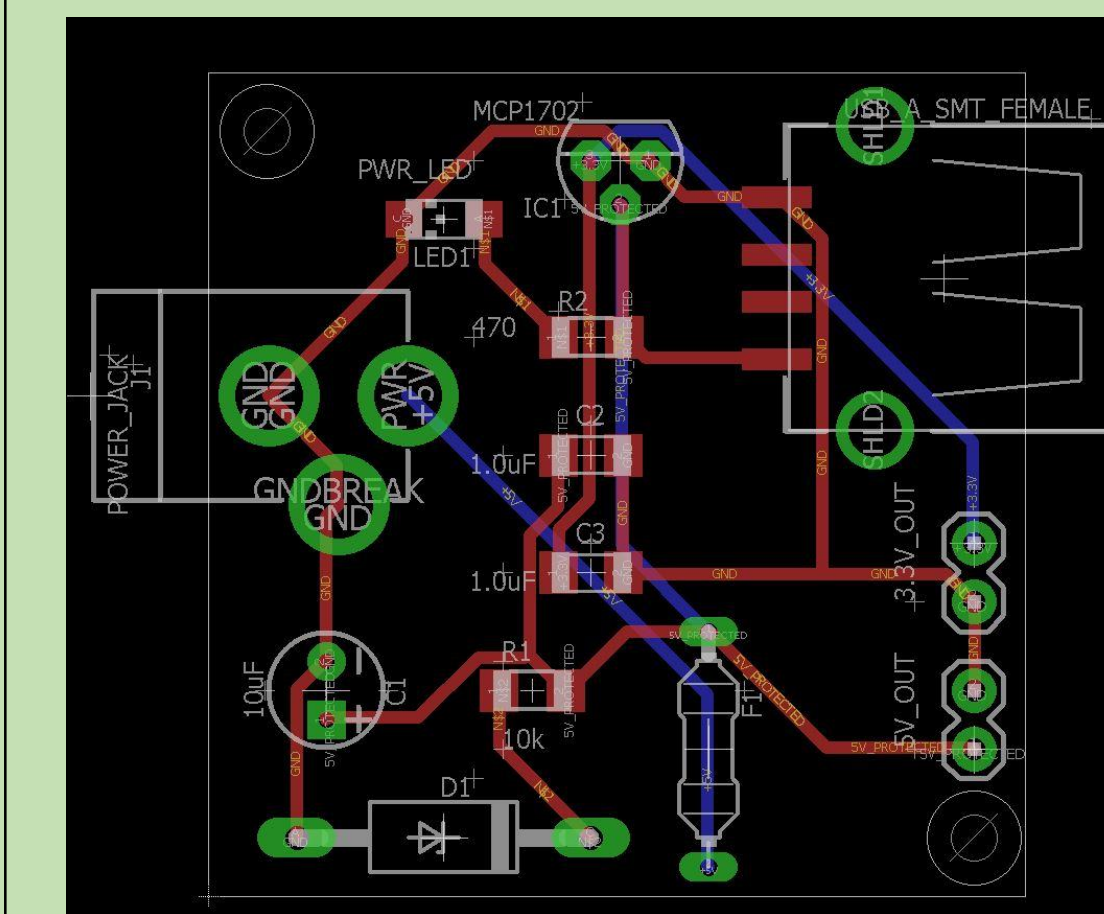- Student projects are an effective way to demonstrate the extent of the field

Demonstrating ECE Projects

- While student projects are effective faculty have had difficulty presenting them

- Student projects are often built under tight time constraints which leads to them suffering issues such as

  - Fragility

  - Challenging to maintain

  - Lack of visual appeal

  - Unintuitive user interaction

  - Difficult to transport and prepare

- Our goal was to address this problem by updating an existing popular student project with a focus on fixing these issues

- We updated a cooking robot created by Zhengning Han and Yannan Wu

- Previous design used turntable to dispense spices into a bowl

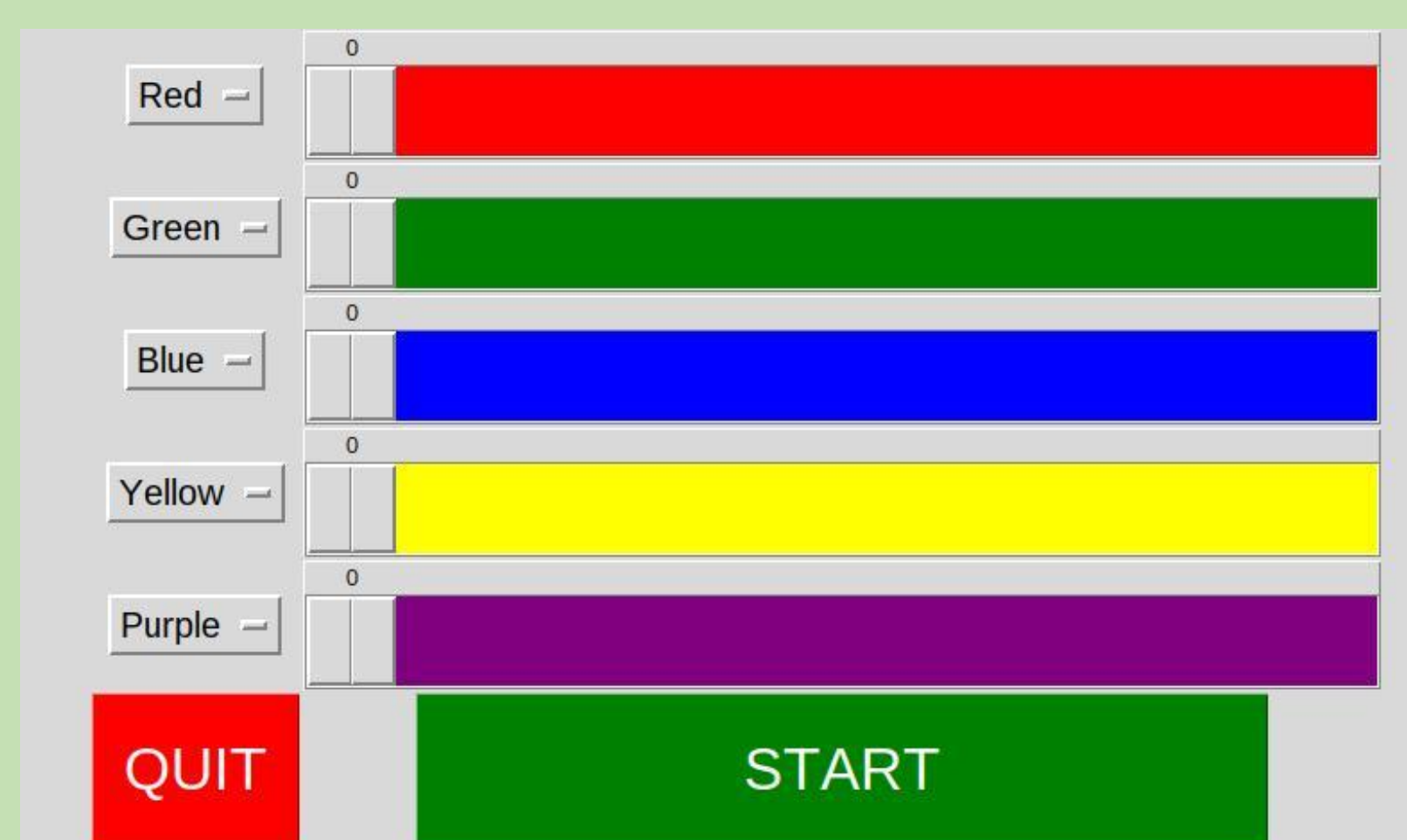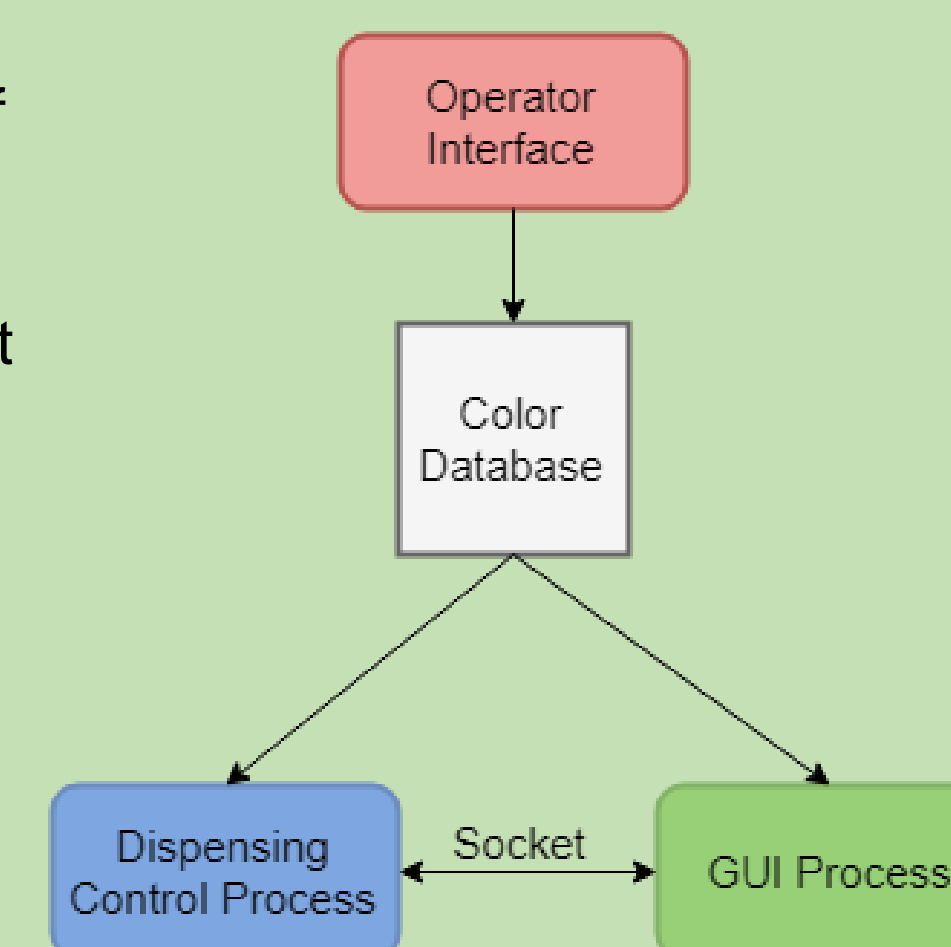- We modified the design to dispense sand art instead of spices

ECE is Hardware

- Raspberry Pi used to control all hardware

- Created custom PCBs for all electronics to improve robustness
  - Raspberry Pi expansion board
  - Power distribution board
  - Reed switch board
  - Servo adapter board

- Connected boards using connectorized wire harnesses for ease of setup

- Used existing 7" touchscreen display from Raspberry Pi Foundation

ECE is Software

- User interacts using a touchscreen interface made using Tkinter

- Users can choose color order and amount of each color

- Software intelligently routes vial to fill in most efficient path

- Operator can update color database to match the color of the sand in the shakers

- Dispensing control process handles moving vial to correct shaker and dispensing specified amount of sand

- GUI process handles user interface

ECE is Mechanical Synthesis

- System uses turntable to move a vial to a dispensing location

- Scoops lower to allow sand to flow out of dispenser and funnels direct sand into container

- This dispensing method was chosen in order to prevent jamming and allow for easy replacement of dispensing mechanism

- Used 3D CAD model to create design and laser cut all part to make fabrication of replacement parts simple