GACHABOT VENDING

EGN 4060C - FALL 2024

INTRODUCTION TO ROBOTICS

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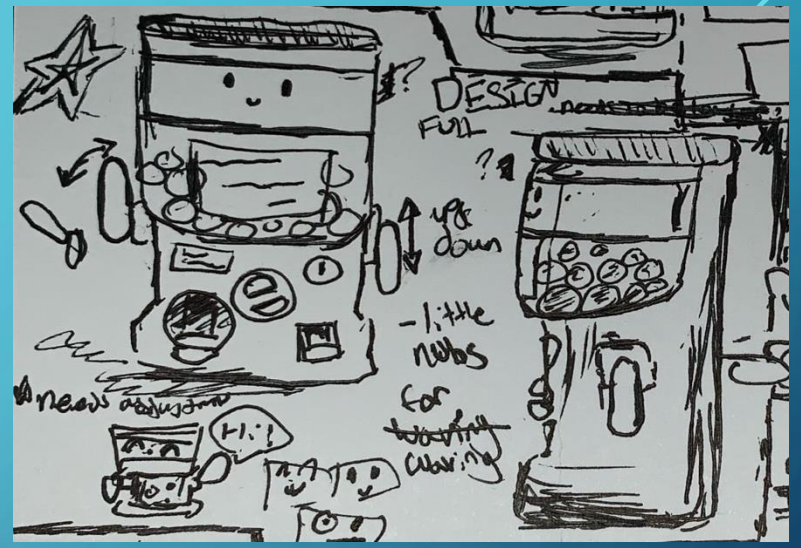
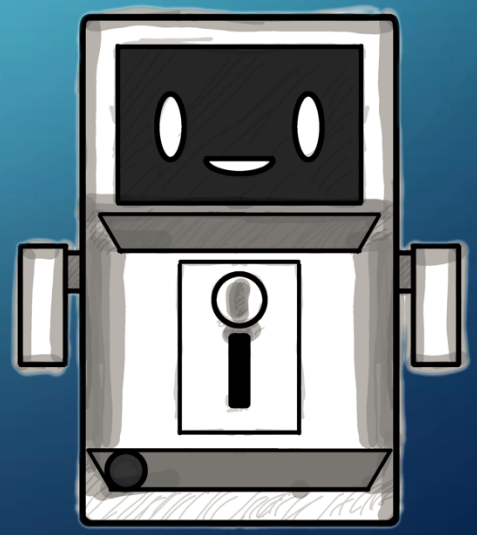
BACKGROUND AND INSPIRATION

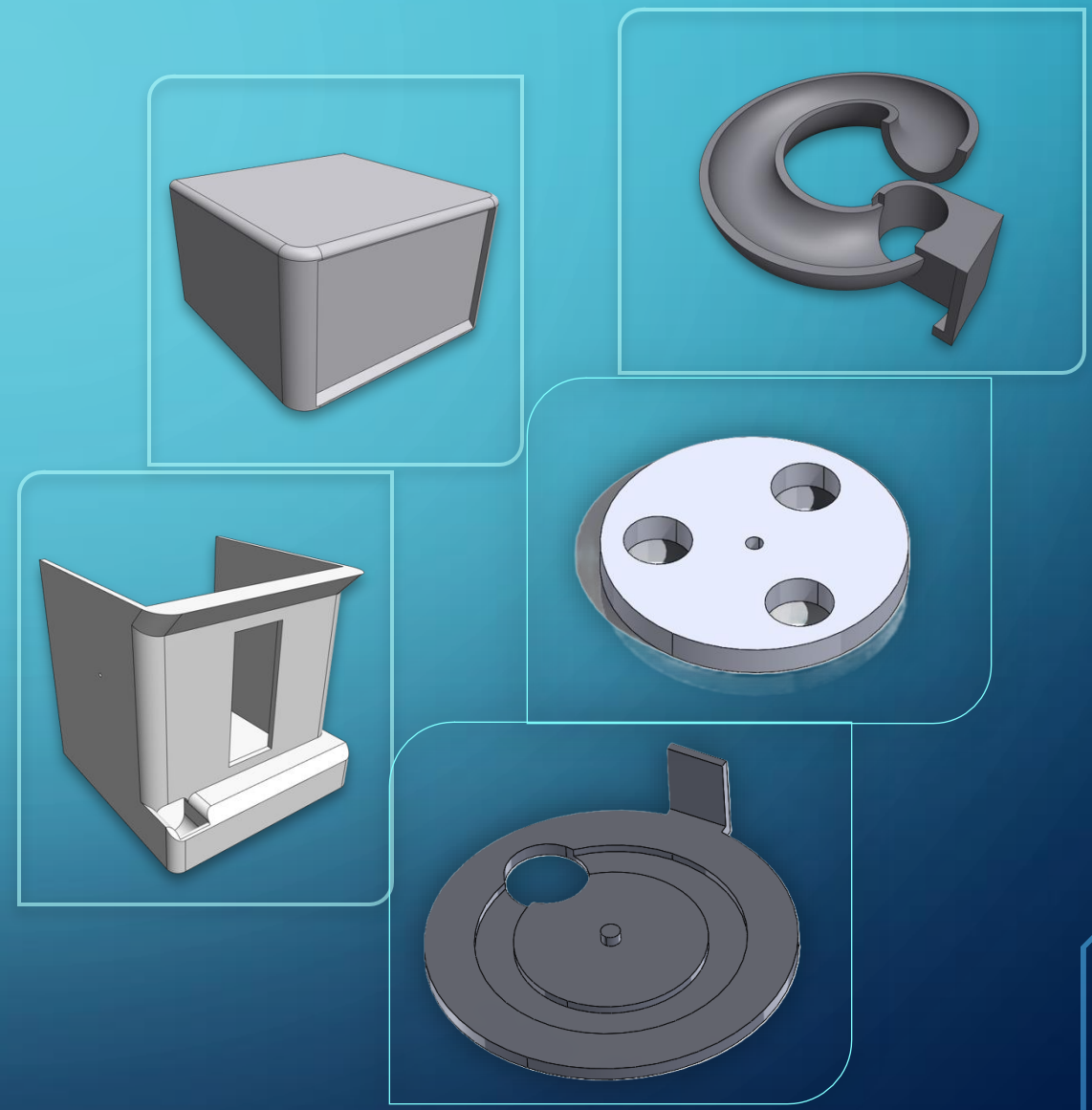
- Inspired by the Gachapon
- Focused on minimalistic and sleek design
  - Removed the crank
  - Simplified to geometric shapes
  - Rounded edges
- Additional elements for personality
  - Digital face and physical arms





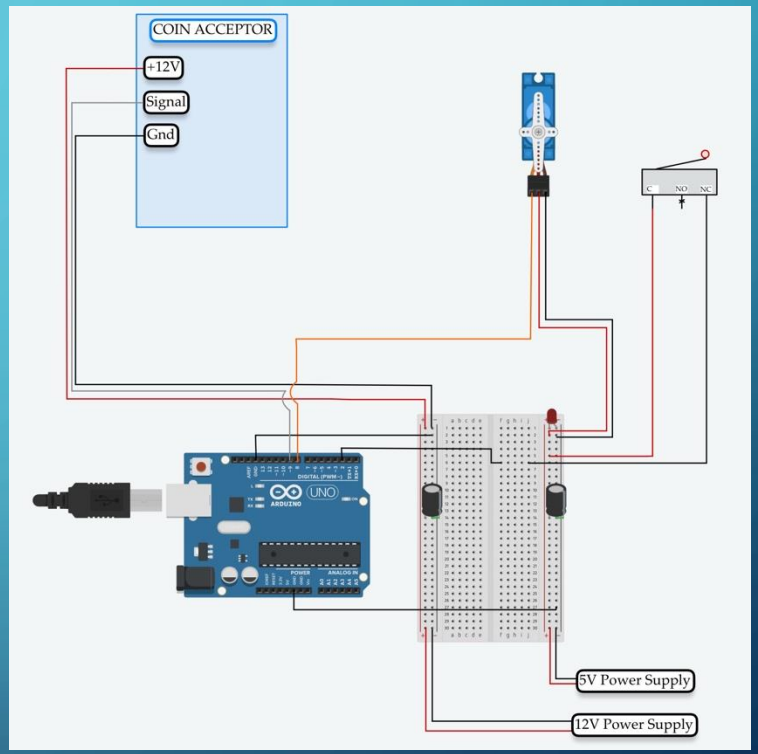
CAD DESIGN

- Base
- Head
- Capsule Storage
- Capsule Dispensing



ELECTRICAL DESIGN

- Main Processing on external PC
  - Drives Arduino Uno and Display
- Arduino Drives Sub-Components
  - Coin Acceptor
  - Dispensing Mechanism

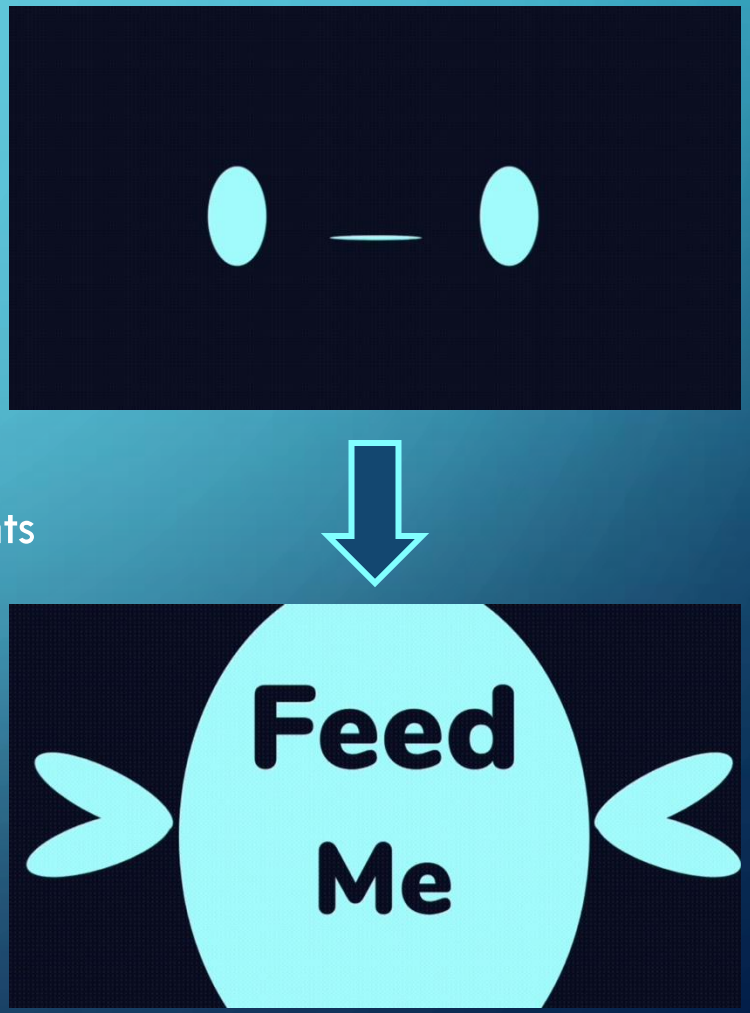


CODE AND ALGORITHMS

- **Arduino code**
  - **Coin pin**
    - Detects coin insertions, used to increment coin count
  - **Sensor pin**
    - Push sensor used to avoid false capsule detections
  - **Servo motor pin**
    - Rotates the release mechanism to collect and dispense capsule
  - **Loop()**
    - Prints the total amount of coins through Serial communication for the display code to read the coin
    - Once four coins is reached, the release function is activated
  - **ReleaseCapsule()**
    - Makes the servo motor iterate back and forth until a capsule triggers the push sensor
    - Once the push sensor is triggered the servo motor continues forward and drops the capsule through the hole down the release slide
    - Once dispensed the servo motor returns to initial position
- **Laptop/Display code**
  - **Main()**
    - Connects to the display screen
    - Calls functions
  - **RecordInteractions()**
    - Gets current time using RTC
    - If coin is inserted then interactions for that hour are incremented
  - **CallOutPeakTimes()**
    - Loops through interactions array to find the two hours with the most interactions
    - Sets the new hours as the next days predefined call out times
    - If current hour is a predefined time then the call out audio is played and the call out face is displayed
  - **UpdateDisplay()**
    - Uses coin count from Serial communications to display the proper face onto the screen

ANIMATIONS AND INTERACTIONS

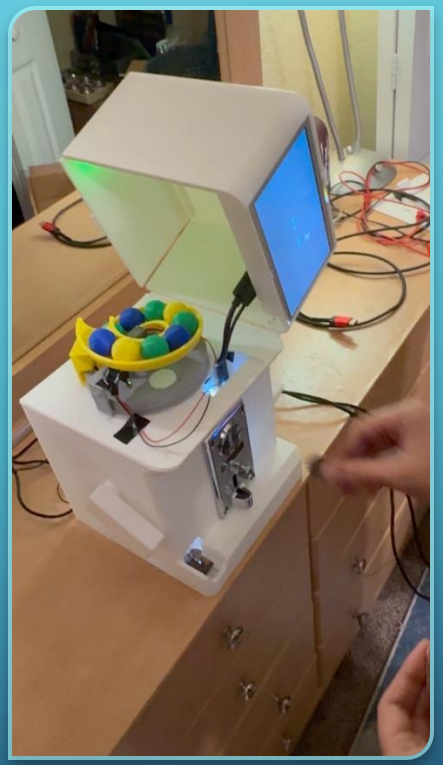
- Interactions tied to coin input and specified code
- Animations created to match coded states
  - Designed using both Alight Motion and CapCut
  - Later converted into still images due to technical constraints



DEMONSTRATIONS

Dispensing as intended

Dispensing while vending exposed



Components

DEMONSTRATION DISCUSSION

- Calls out for user attention
- Reacts with each coin inserted
  - Visual and audio reactions for engagement
- Preloaded prize is dispensed
  - Rotating over a hole in the mechanism
  - Being funneled to the pickup point
- Reloads prize before next interaction
  - Will provide an error reaction if a prize cannot be loaded
- Interaction is logged
  - Data will be used to adjust call out times
    to maximize the chance of user interaction

AREAS TO IMPROVE

- Redesign size to allow for arm articulation
- Remove external PC requirement
- Increase Capsule Capacity
- Replace images with GIFs/animations
- Quantitatively evaluate success of the algorithm

THANK YOU!!