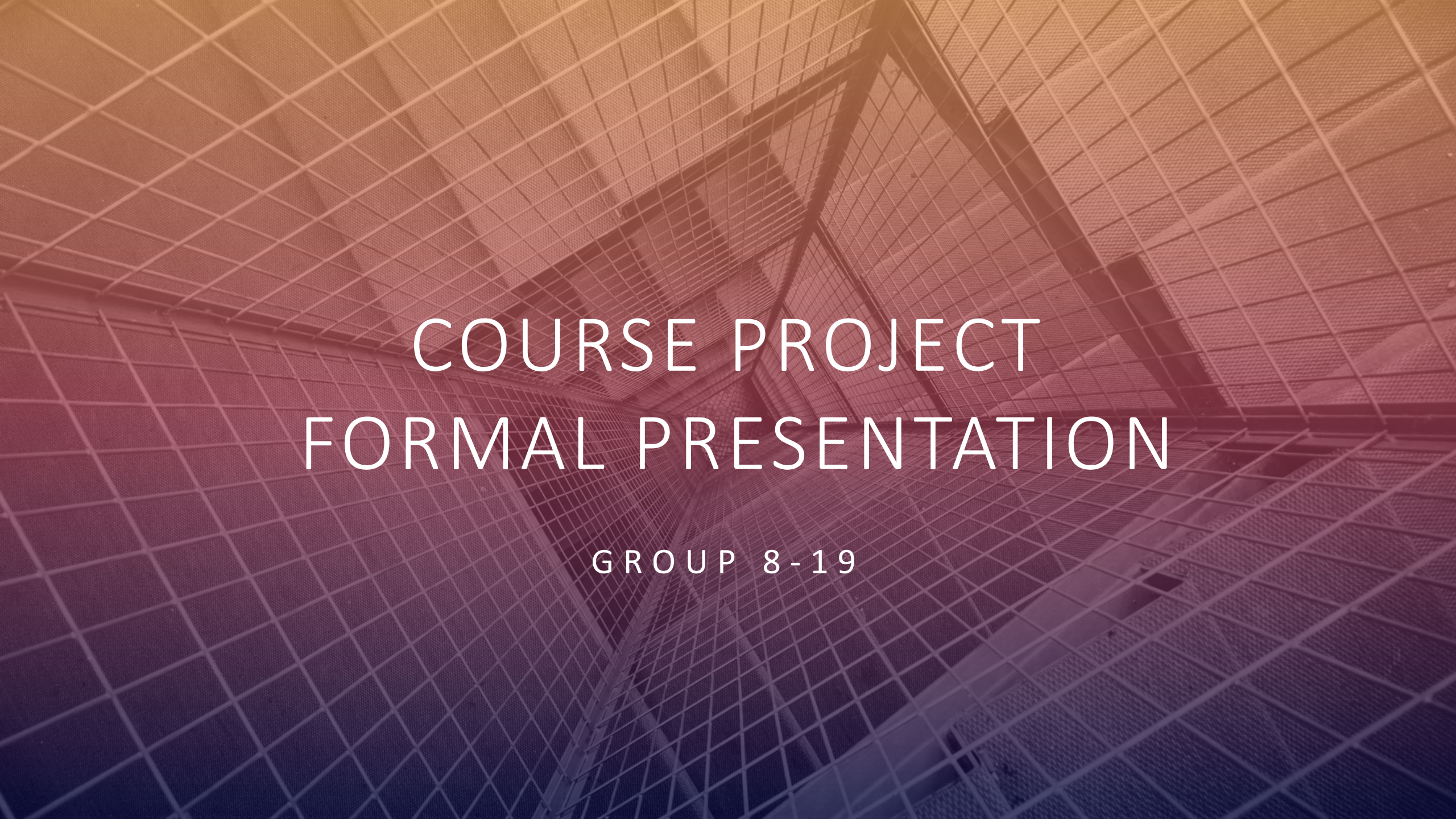
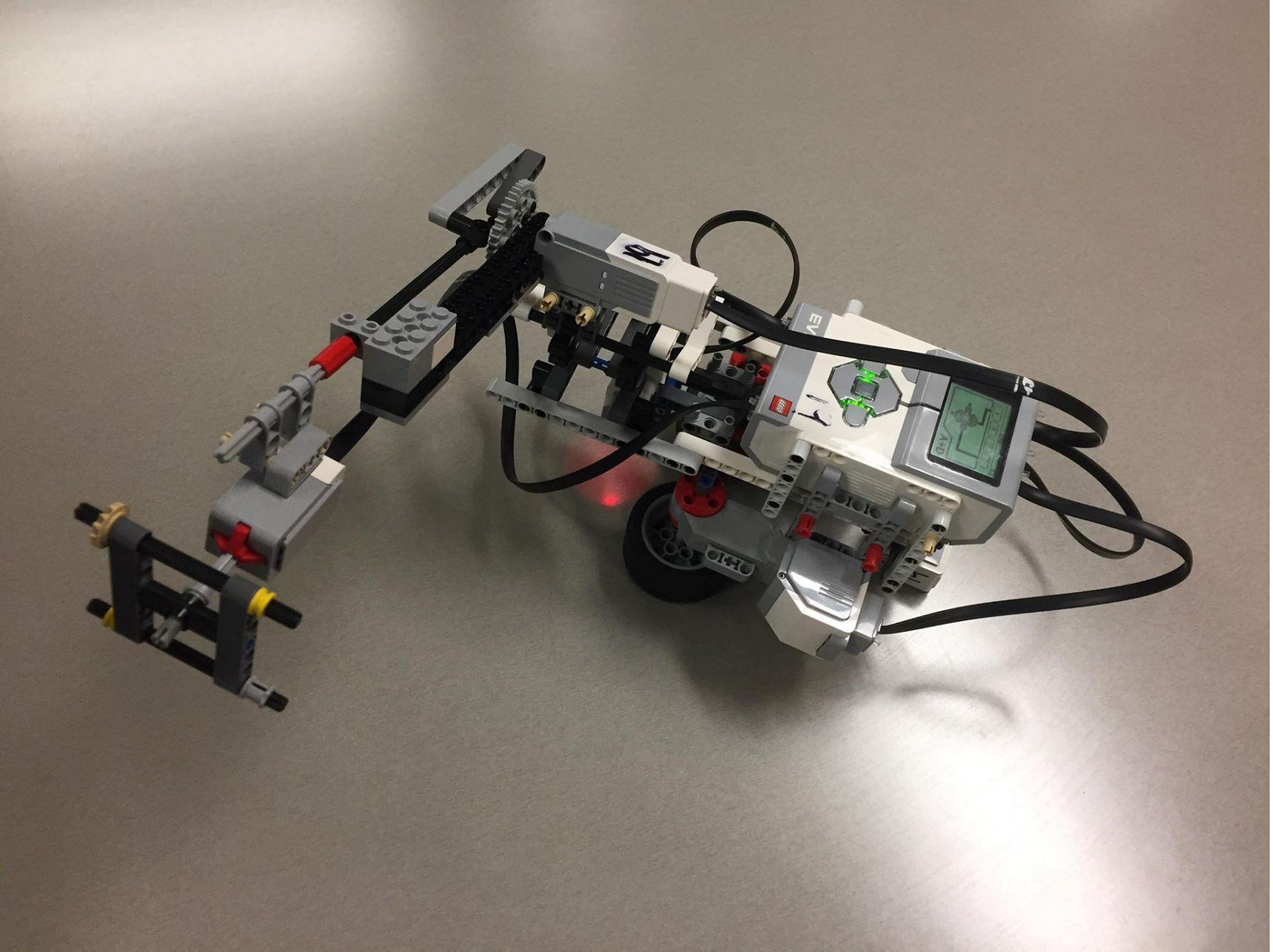


COURSE PROJECT FORMAL PRESENTATION

GROUP 8-19



Hello
my name is

JENNIE

GENE 121 - Fall 2019

1199 - Fall 2019

Ends January 6, 2020 at 12:00 AM

ITEMS

1. DESIGN PROBLEM
2. CHANGES
3. REQUIREMENTS
4. PHYSICAL SYSTEM
5. TESTING PROCEDURE
6. INQUIRIES/FEEDBACK (DISCUSSION)

DESIGN PROBLEM

- Automating the manufacturing process
- Boosting repetitive task efficiency
- Receiving user order
- Building customizable part with pre-determined components

CHANGE 1: NO LINE-FOLLOWING

ORIGINAL

- Circular track
- Colour sensor line-following

NEW

- Linear track
- Colour sensor only used for colour indicators
- Faster
- No risk of straying from track (physical grip on track)

CHANGE 2: ADD MOTOR TO ARM

ORIGINAL

- One motor to rotate arm up and down

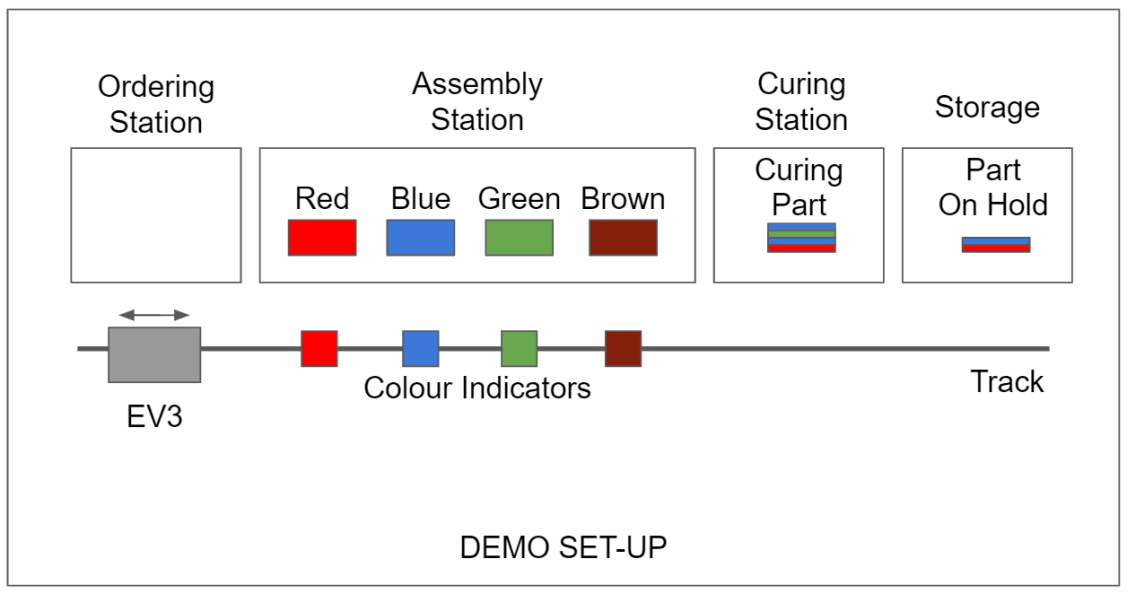
NEW

- One motor to rotate up and down
- Second motor to extend and retract end of arm to interact with hook and loop tape components
- Additional degree of freedom to account for partially empty containers

CHANGE 3: ADD COLOUR INDICATORS

ORIGINAL

- Four colour indicators
  - One for each component colour
- Indicator in from of corresponding container on track



NEW

- Six colour indicators
  - Four for component colours
  - Two for Curing Station and Storage
- Allows robot to accurately identify where the Curing Station and Storage are

CHANGE 4: ARM ENCODER & GYRO

ORIGINAL

- Arm with simple up and down rotation motion
  - Arm at discrete points of 0 and 3 o'clock

NEW

- Adding gyro sensor to track exact degrees of rotation of arm to achieve 90 degrees accurately
- Adding motor encoder to track how far the end of the arm has actuated
- Finer control of robot arm when interacting with components

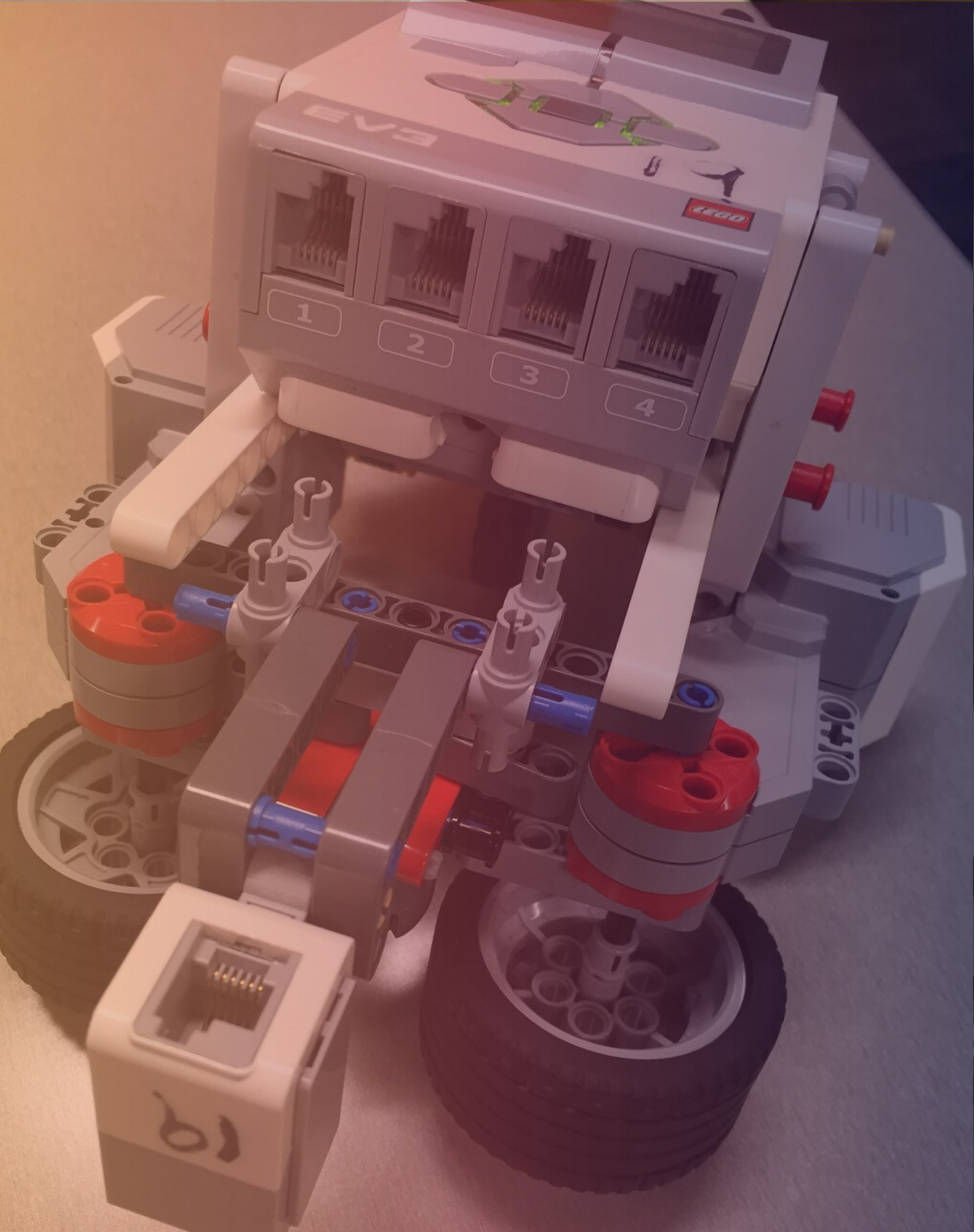
CHANGE 5: NO ULTRASONIC SENSOR

ORIGINAL

- Use ultrasonic sensor to sense obstructions in path
- Used to fulfill 4 input quota

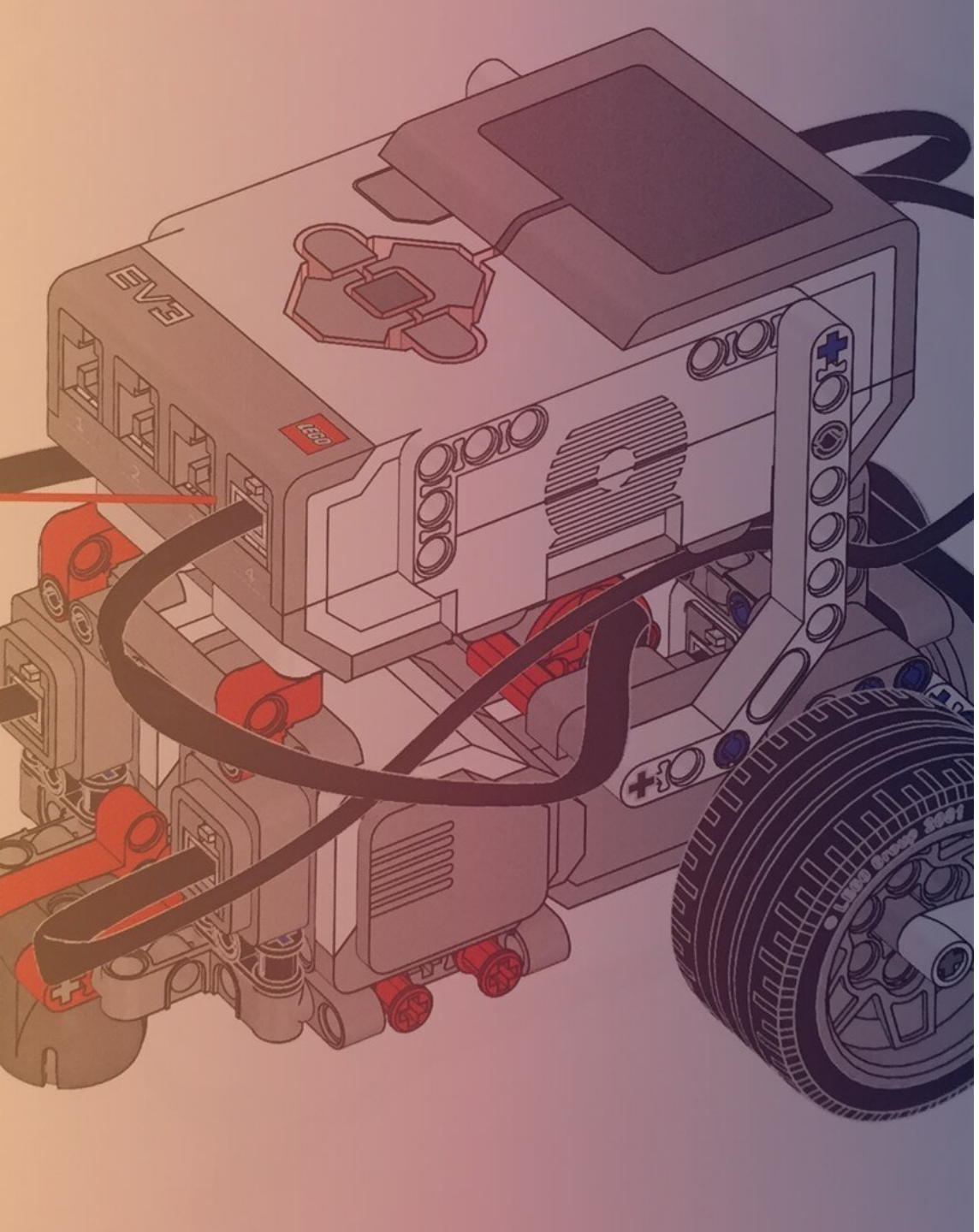
NEW

- Removing this obstacle-sensing functionality
- Less relevant to problem context
- Other more necessary inputs have been added
- Removes tall, shaky part



REQUIREMENTS

1. Robot needs to be able to do work on **two parts** at once
    - Adds a decision-making layer
2. Robot needs to be able to build a part made of up to **five components**
    - Adds customizability



CONSTRAINTS

1. Rotating motor of arm cannot move at above **75% power**
    - Placeholder value of 75% - will be tested when arm is fully built
        - Test for max speed such that hook and loop tape holds
        - Test for max speed such that momentum of arm does not jostle robot
    - Power limit is easy to change in the code
2. Hook and loop tape cannot support less than the **weight of up to five components**

PHYSICAL SYSTEM

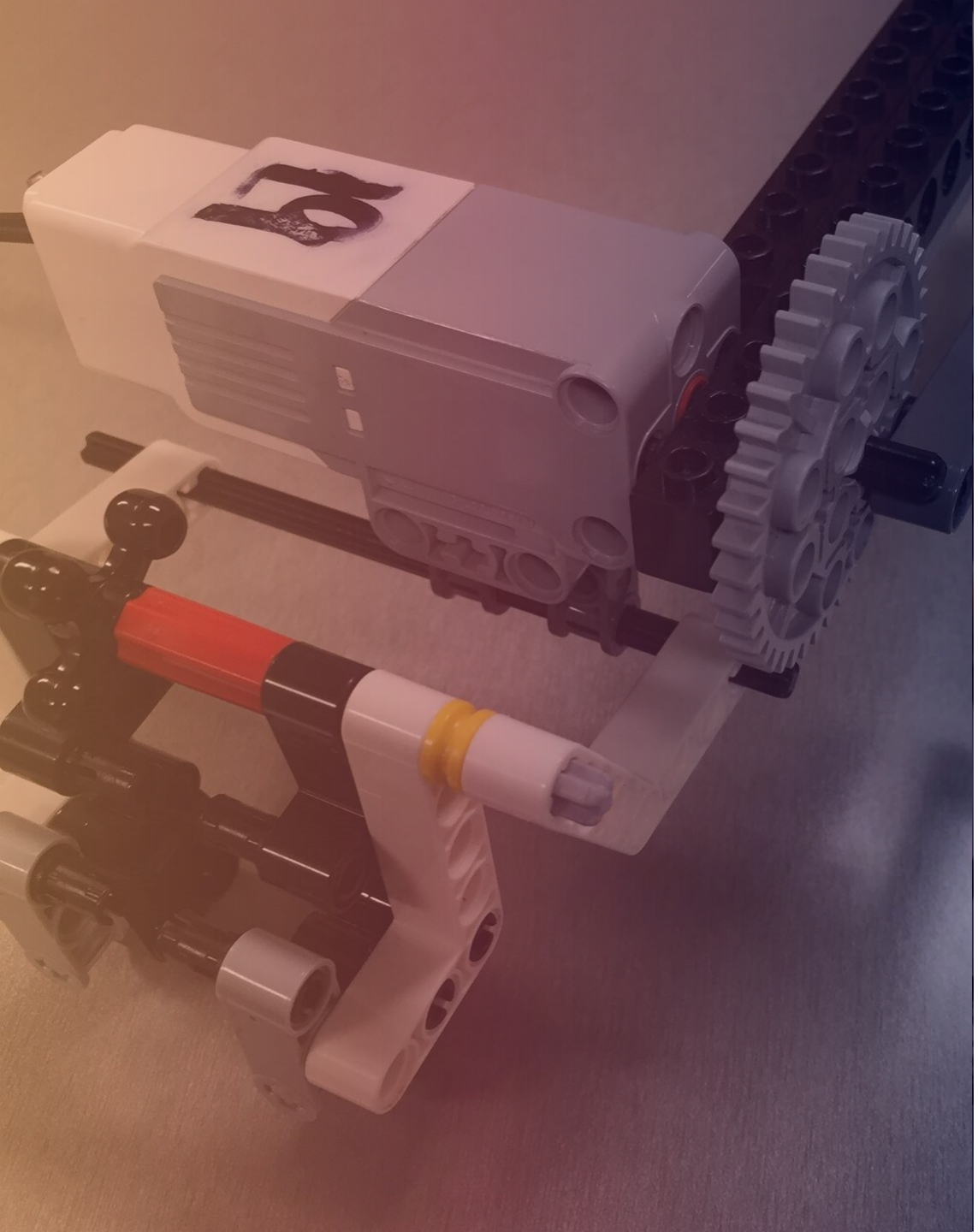
MOTORS AND INPUT

MOTOR	USE
Motor 1	Drive left wheel
Motor 2	Drive right wheel
Motor 3	Rotate arm
Motor 4	Actuate arm

INPUT	USE
Buttons	Get user order
Colour sensor	Read colour indicators
Touch sensor	Confirm target contact
Gyro sensor	Track arm rotation
Motor encoder	Track arm actuation

KEY COMPONENTS

1. Wheel and track system
    - Drive base designed to be different from standard configuration
    - Wheels turn in opposite directions to grip track
2. Arm
    - Rotation to reach into containers
    - Actuation to push into hook and loop tape of component to be picked up
    - Arm is well supported enough to satisfy requirements
        - Carry weight of 5 components
        - Move at a speed that ensures components do not detach from arm



FEATURES

1. STORAGE: Works on two parts concurrently
    - Boosts efficiency
    - Allows one part to be “on hold”
2. ARM: Can combine multiple components together and layer them with hook and loop tape
    - Combine components into one customized part
    - Pushes into each layer with the end of the arm
    - Extension with second motor

TESTING PROCEDURE

TEST LIST

	TEST	HOW TO TEST	PASS CRITERIA
1	Robot staying on track	Drive back and forth 10 times down the track	Robot does not fall off the track and arm does not hit anything in the upright position
2	Aligning with stations	Use colour indicators and colour sensor while driving the bot	Arm is in position to rotate into slot in the given container
3	Start up	Input orders with buttons	Check if button order translated in the correct order in the software array
4	Regular Operations	1. Run code for the assembly phase of the process; combinations of component orders (repeats, 1-5 components) 2. Not picking up finished part until beeping begins	1. Robot drives to required containers in the correct order 2. Robot beeps and then returns to regular operation (taking orders, assembling) when user picks up part and presses centre button
5	Shut down	1. Leaving robot idle for 1 min with no new orders 2. Not picking up finished part within 1 min	1. Program ends 2. Robot beeps, displays shut down message, program ends
6	Resolving conflict between two parts	Make an order for second part while first part is in Curing Station, first part finishes first	Robot leaves work on second part to pick up first part at the Curing Station and returning it

INQUIRIES

1. GYRO ON ARM
2. HUMAN INTERACTION
3. EXTRA MOTOR REQUEST


FEEDBACK
Thank you for listening!