Somerset Berkley Regional High School

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Robotics Engineering with LabView

Objective: To support the development of metacognitive skills and habits of reflection for effective problem solving

Planning ; What should step one be? What do I know about the problem?

<u>Goal setting</u> Set realistic goals. How much time do I have?

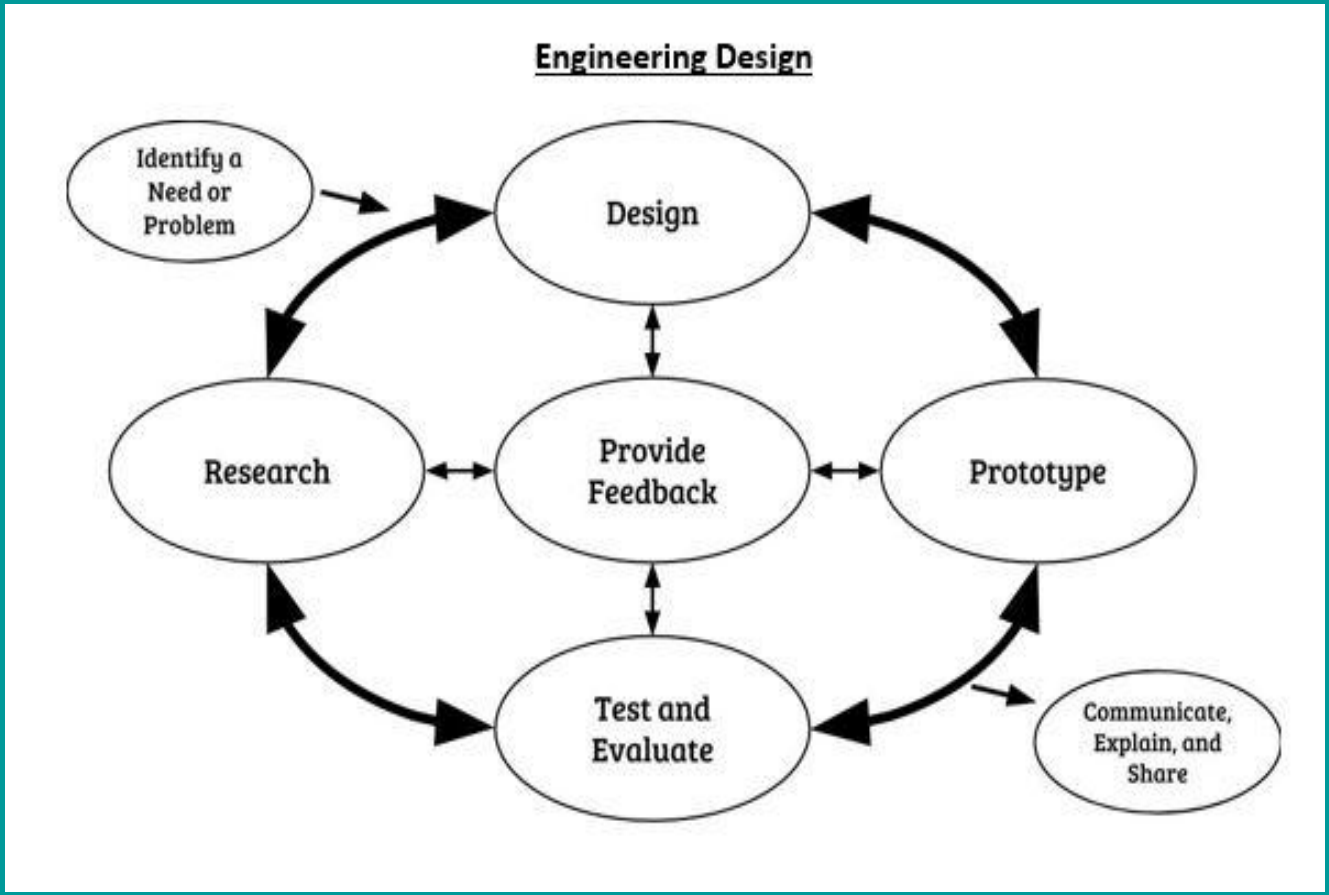
<u>Monitoring progress</u> Am I on the right track?

<u>Adjusting</u> What did I learn. Did I get the results I was expecting? If I could do this over again I would…….

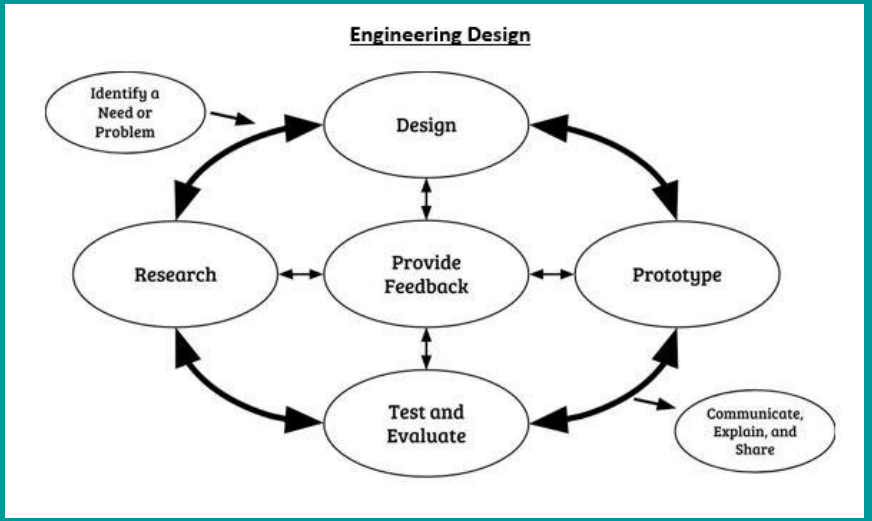
Standard 1.1

Engineering Design Process

2016 Revised Massachusetts State Framework



Identify the need or problem



Identify a need or a problem. **To begin engineering design, a need or problem must be identified that an attempt can be made to solve, improve and/or fix. . This typically includes articulation of criteria and constraints that will define a successful solution.**

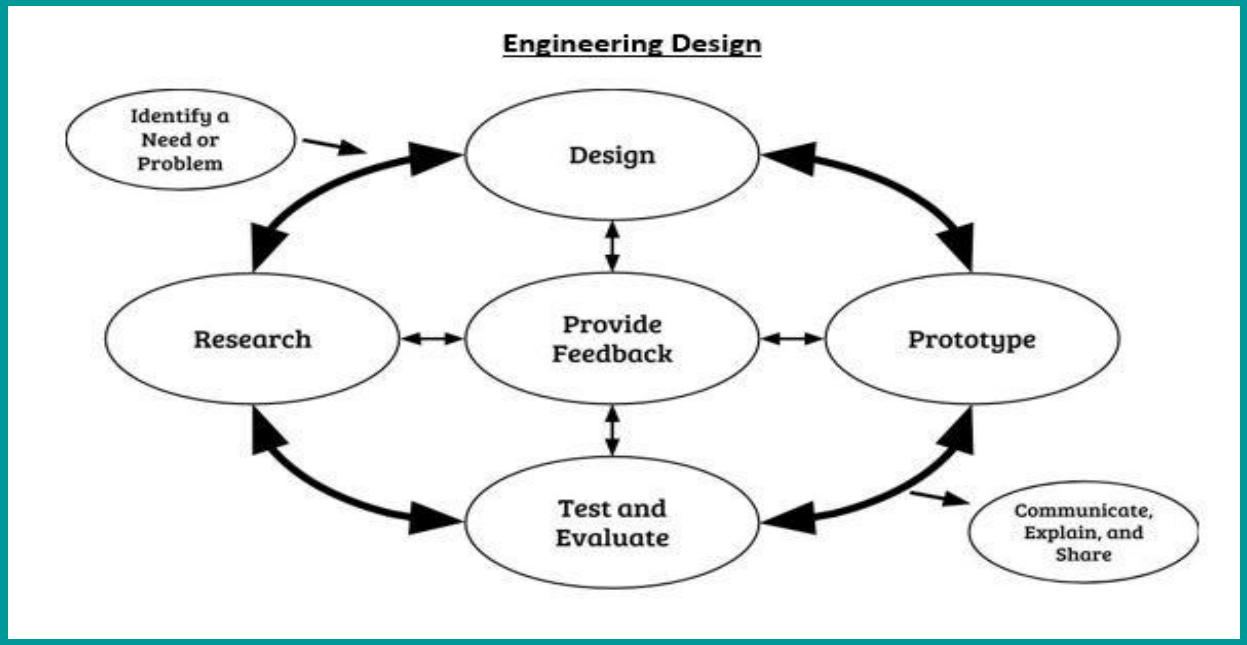
Evidence **: Add slide and describe what you already know about the problem. This helps to build an understanding of the problem**

Describe the knowledge you will need to solve this problem.

8 feet in 32 seconds to 8 feet in 21 seconds
(to feet per second)
0.25fps and 0.38 fps
(feet per second to miles per hour)
0.17 MPH to 0.26 MPH

The first problem is to get the robot to follow a line using the light sensor, and the second problem is to double the speed. The third is to get it to follow the line up a ramp and hit a button that alarms a sound notifying it was done right. The last is to do a race against another group to see who can follow a curved line the fastest. What we need to know for these problems, is how to get the robot to follow the line.

Research the problem



Research. Research is done to learn more about the identified need or problem and potential solution strategies.

Decide what information is needed.

What should step one be?

Use appropriate tools and strategies to access the information

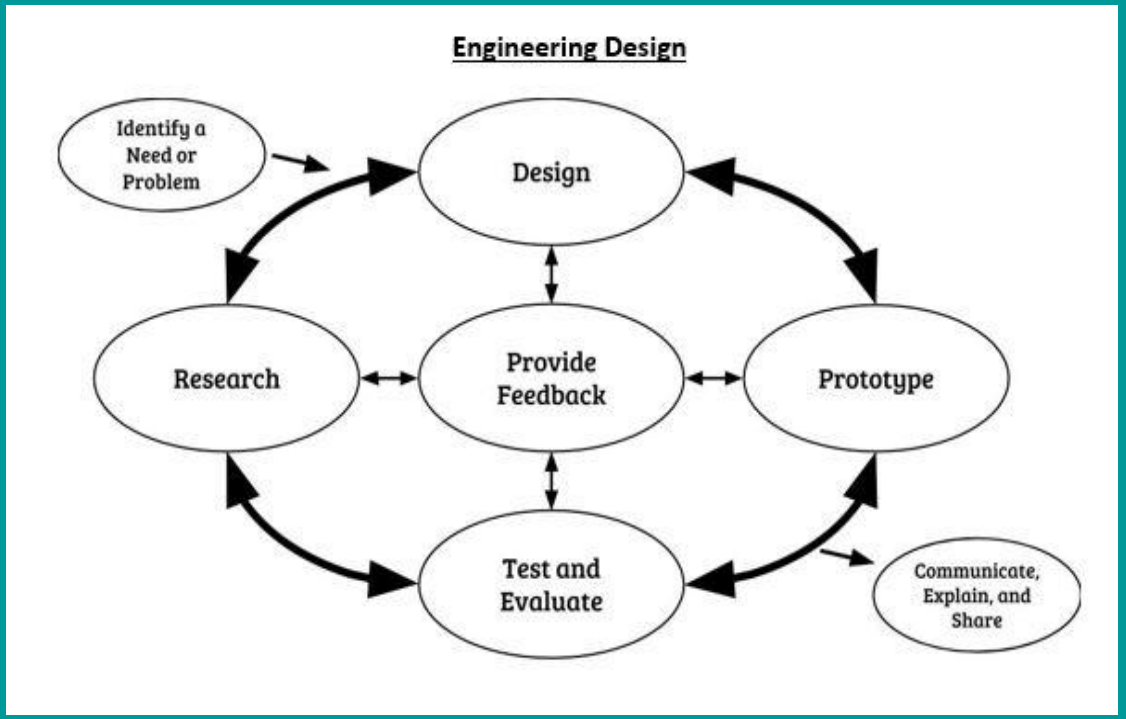
Analyze the information gathered and its sources.

If there is more than one good answer to the problem, list the positives and negatives of each of the findings.

On your PowerPoint file show add a slide to show what you did for research. ***Evidence**

The information needed is to understand how the robot follows the line, how to double the speed, and get it to go up the ramp. Step one should be figuring out how to program the robot to follow the line. We found that to make it follow the line you must find the average of the color of the tape and the board and make the program do different things once it's greater than the average with different motors going at different times making it slowly curve its way down. To make it double the speed, you must double the motor power. To make it go up the ramp you must modify the robot structure so it’s long enough to withstand the angle of the ramp and stay stable enough to go up it.

Design

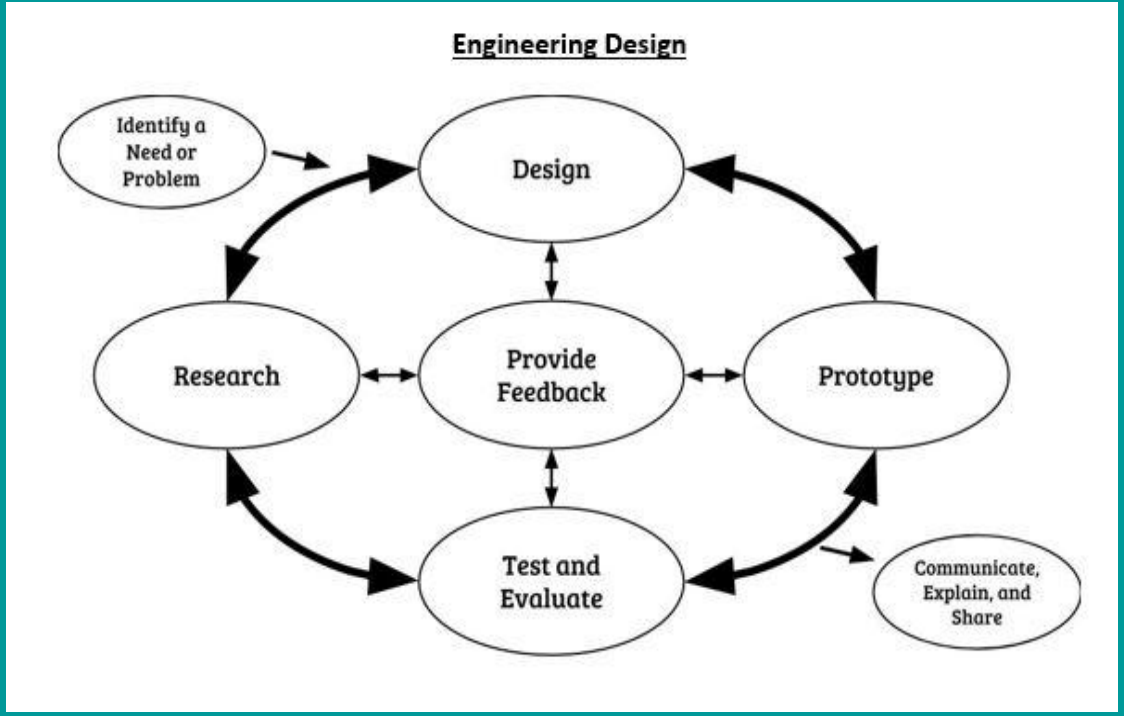


Design. All gathered information is used to inform the creations of designs. Design includes modeling possible solutions, refining models, and choosing the model(s) that best meets the original need or problem.

Evidence :Clarify the roles of each team member, taking advantage of individual strengths.
List the role of each member on the team

Programmer: Andrew Morin
Builder: Jacob Carpenter

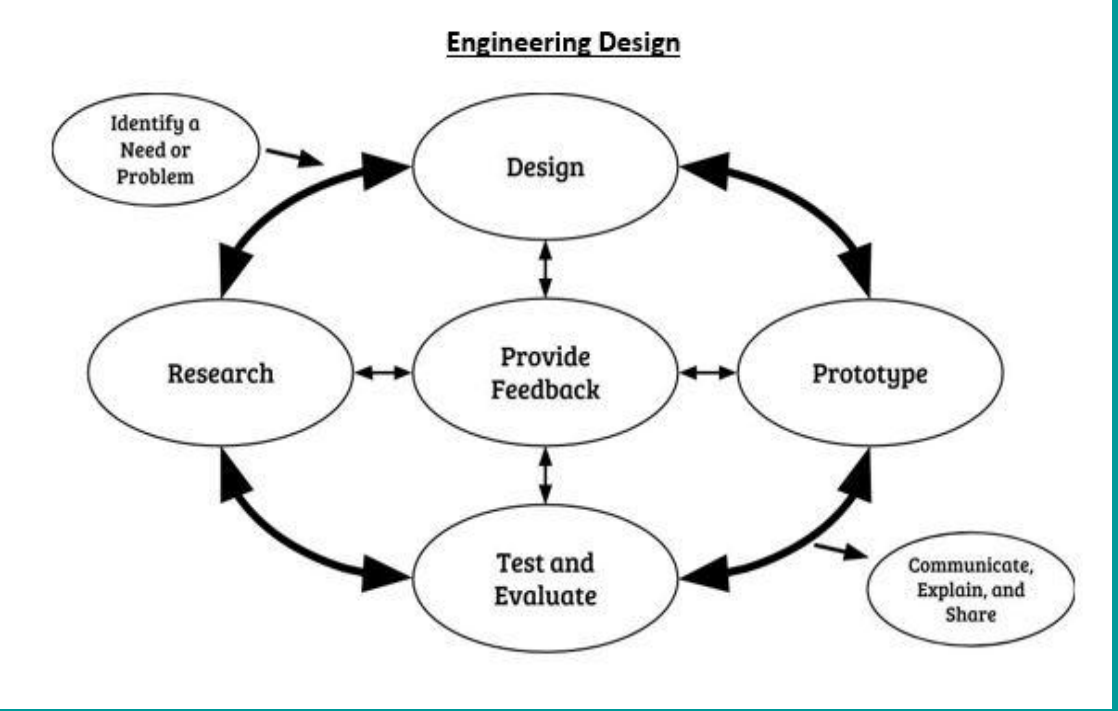
Prototype



A prototype is constructed based on the design model(s) and used to test the proposed solution. A prototype can be a physical, computer, mathematical, or conceptual instantiation of the model that can be manipulated and tested.

Evidence *:* Execute the plan, (build your robot) modifying as needed.

Test and evaluate



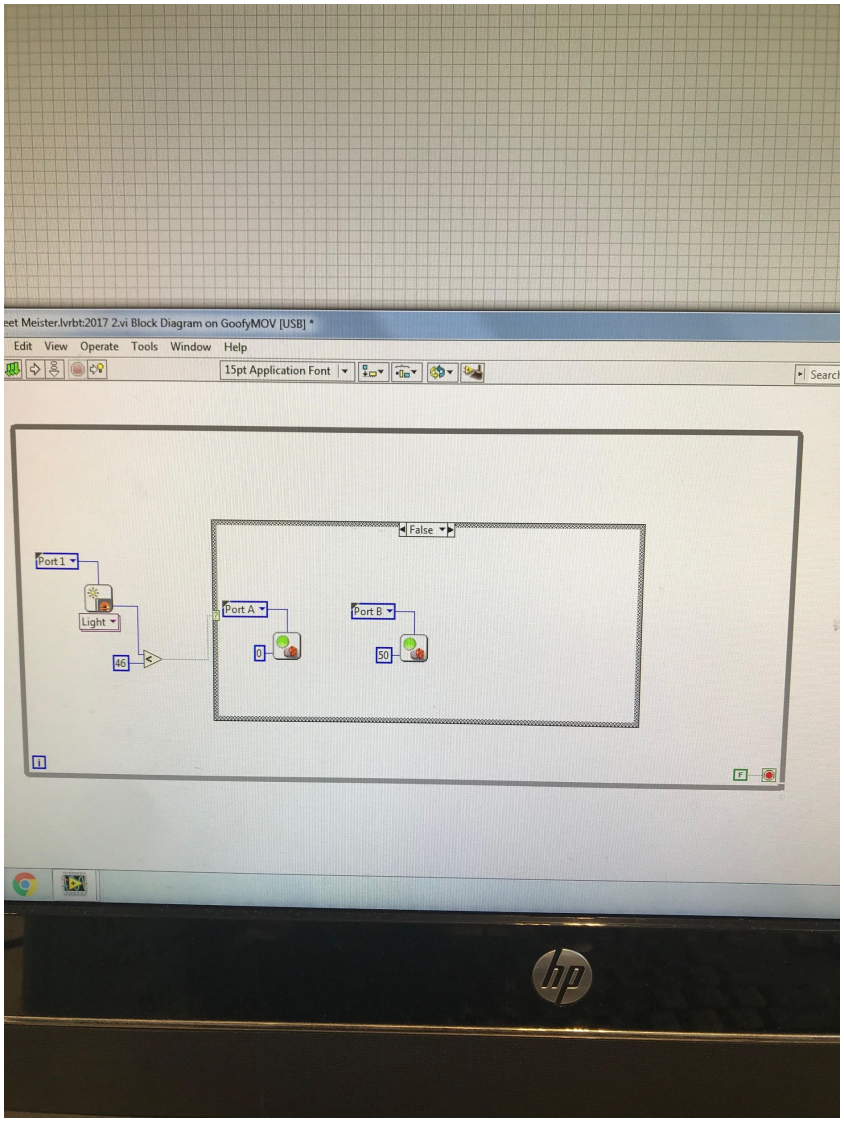
The feasibility and efficiency of the prototype must be tested and evaluated relative to the problem criteria and constraints.

Collaboratively decide whether the solution needs more work and repeat previous phases as needed.

1. Does your robot work?
2. Did it perform as expected?
3. What changes are necessary for the robot and the program?
4. Does it meet the original design constraints?
5. Is it safe?
6. Students discuss what they liked best about the collaborative process and what could be done differently next time.
7. Students present their solution to the other teams and celebrate the work of the problem solvers

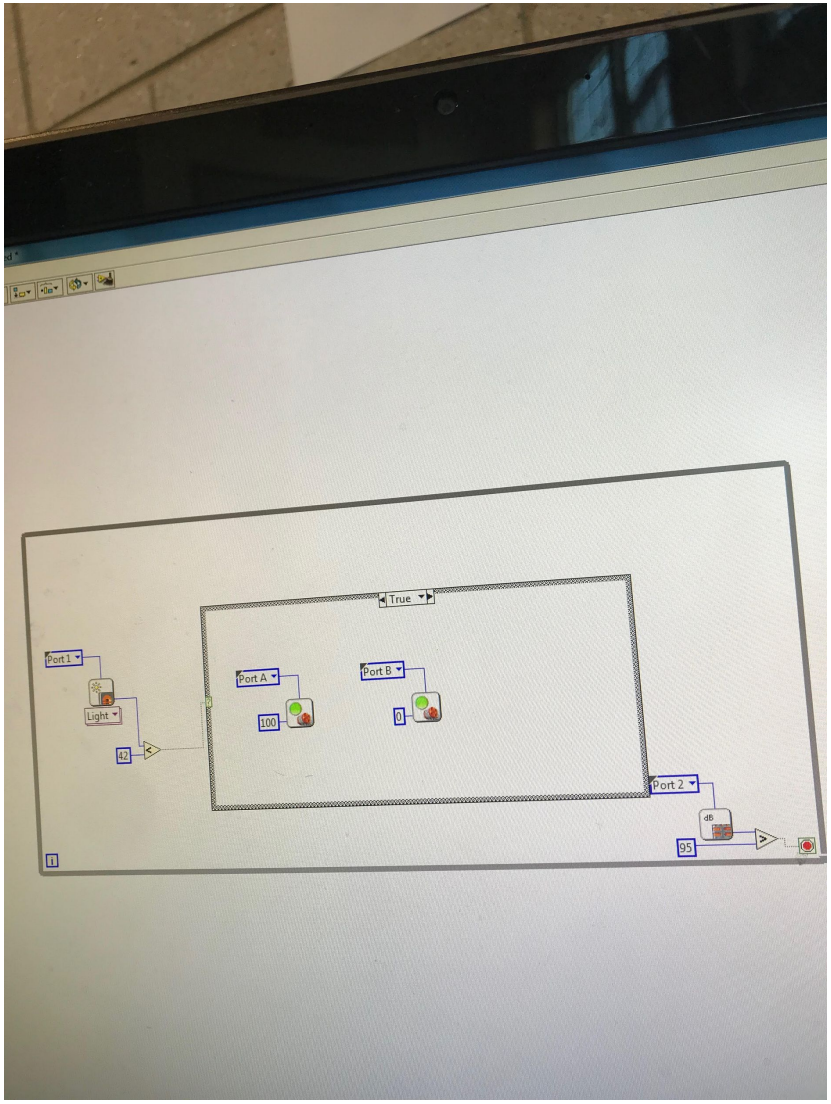
Evidence

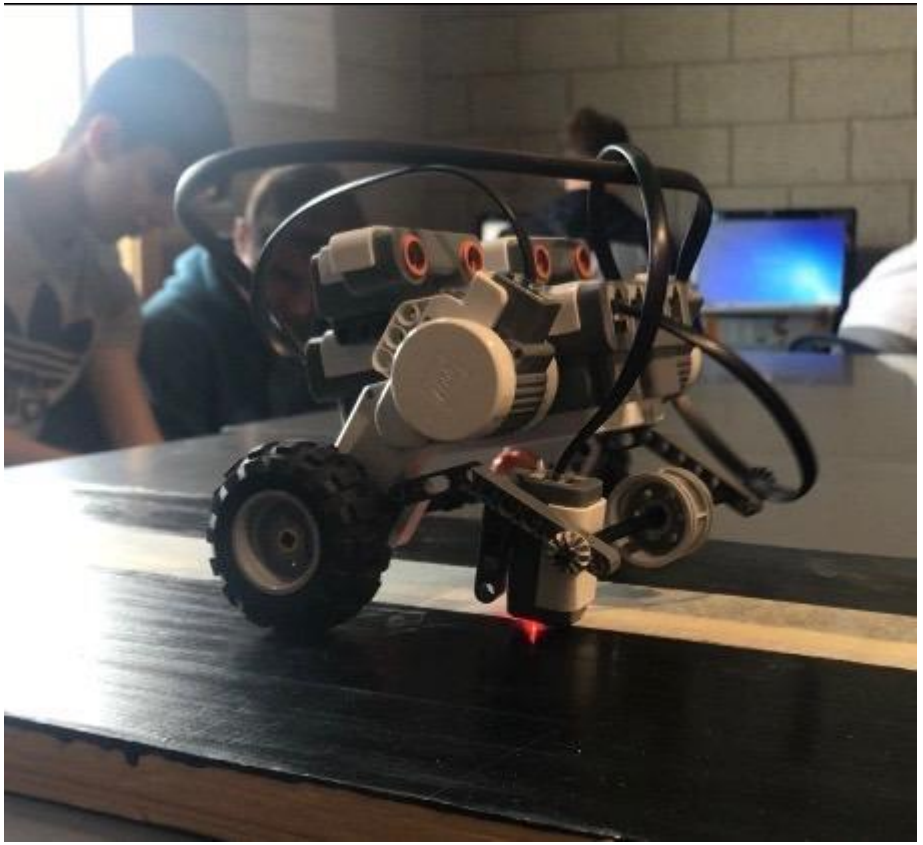
Prototype picture and computer program

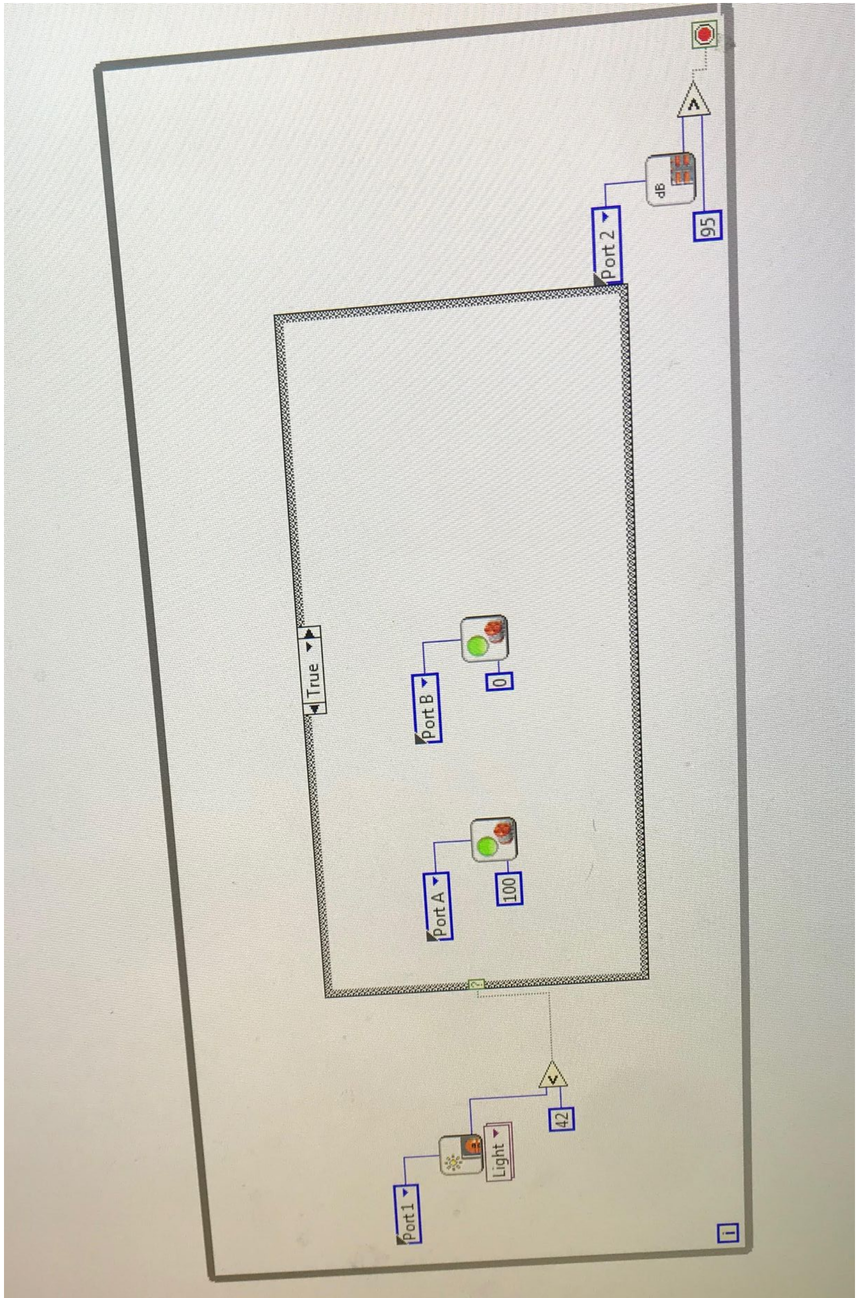


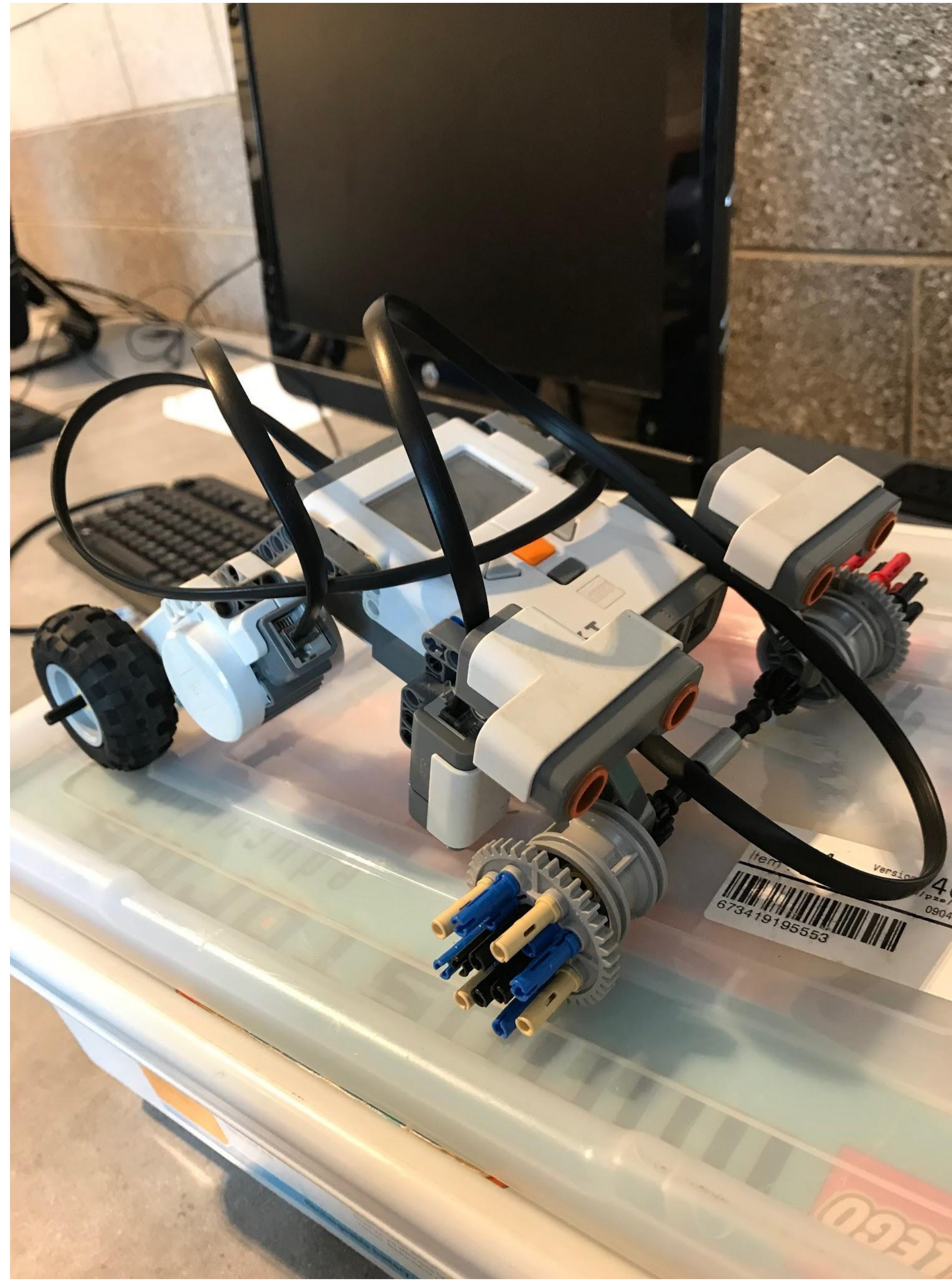
Evidence

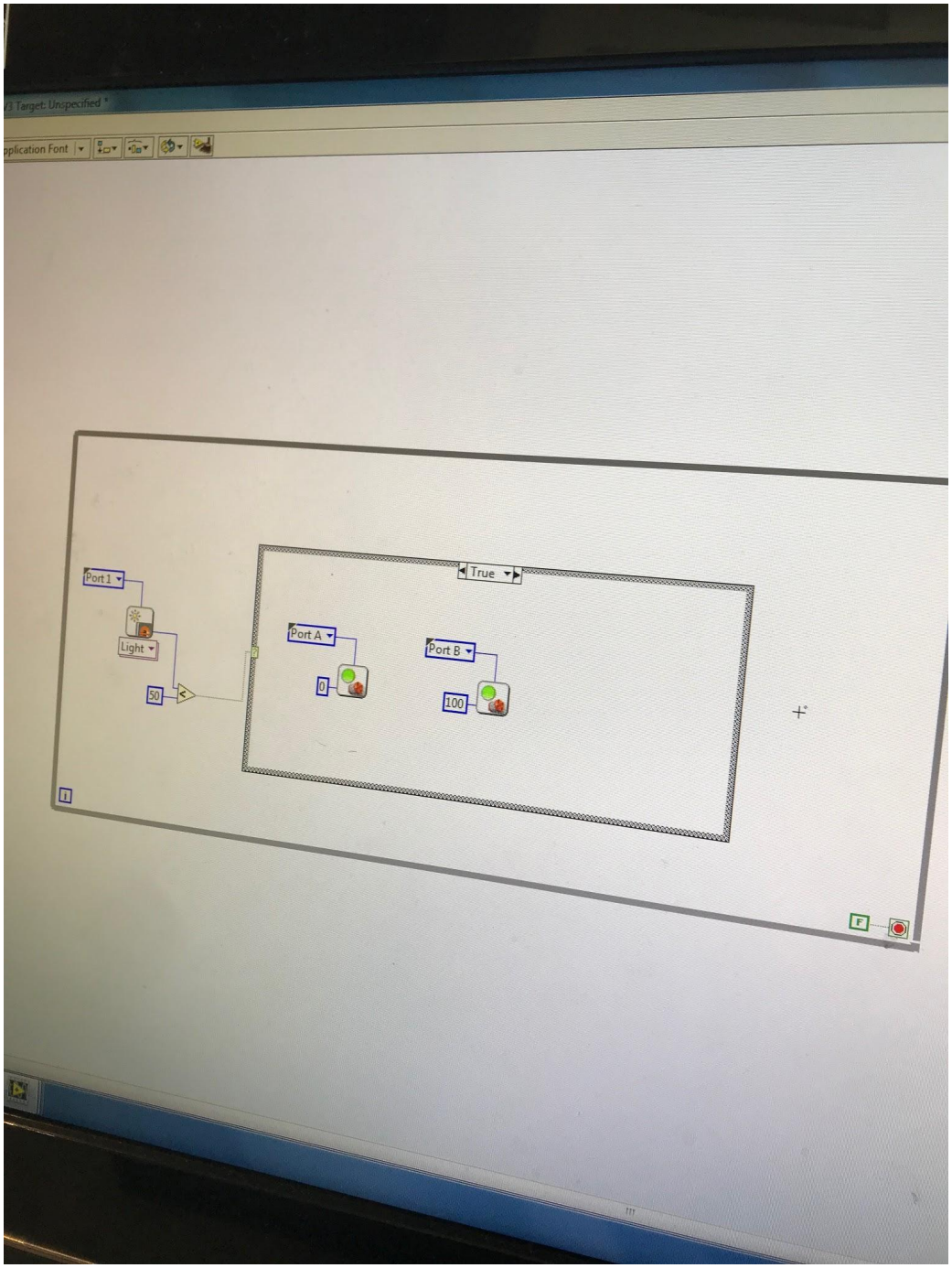
modified prototype picture and computer program






Port 1
Light
42
True
Port A
100
Port B
0
Port 2
dB
95


LEGO


Target: Unspecified
Port 1
Light
50
True
Port A
0
Port B
100
F


NXT

Communicate the solution(s)

Provide the YouTube link of your video that shows how your robot meets the challenge.

YouTube video link :
https://www.youtube.com/watch?v=9uI6JtzQNgQ&list=PLXW_UUDvb14k7M69weuT9UqmrylB4y_eu

Reflection

Think about your professional destination. What skills and or knowledge are you going to need that you don't have or have enough of. Add a slide and make a list
Reflect on your latest assignment in robotics and describe how what you just did supports what is on your list.

- Problem solving
- Metacognitive thinking
- Perseverance

The last assignment in robotics proves this list in every aspect. For problem solving, is just being able solve the problem and figuring out how to create a robot that can follow a line. It helped metacognitive thinking because you think about what you've built or are building and realize how you can make it better. Lastly, perseverance is because of not giving up after multiple prototypes don't work and follow the line

Letter to a future student

Take a few minutes to think of a time when you overcame a struggle in robotics class.
Reflect on the times when you failed at first but through persevering your brain created new neural connections and you eventually became better at the task at hand. Briefly describe this experience in a letter to a future robotics student.

There were multiple times i’ve struggled in robotics class. During this product, the main struggle was learning how to program the robot to follow a line using the light sensor. It took us awhile to build the right robot with the right program. Most of the problems include the robot not turning the opposite direction when it hits a new color resulting in it endlessly going in circles. We also had to remodel our robot just for it to fit on the board.

Take a look at your Weebly website. How has your thinking changed as you progressed through robotics engineering?

My thinking has changed as robotics has processed over time by how to solve the problem. At this point we already have the robot built and understand what parts need to be modified to change the situation into the right way. We also know the general building of the programming now.

Instructions for posting to Weebly

1. Go to file->download file and then choose PDF document (.pdf).

2. Then on your weebly website under Build Media section drag the file option and upload the PDF of your Slides presentation to your website