

# 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?**

**The build of the bot didn't have enough mass to push another object. We planned on adding more torque**

**Goal setting Set realistic goals. How much time do I have?**

**I did the wrong SLide so I don't have anytime but i had roughly 1 ½ weeks bc i was sick for the week it started**

**Monitoring progress Am I on the right track?**

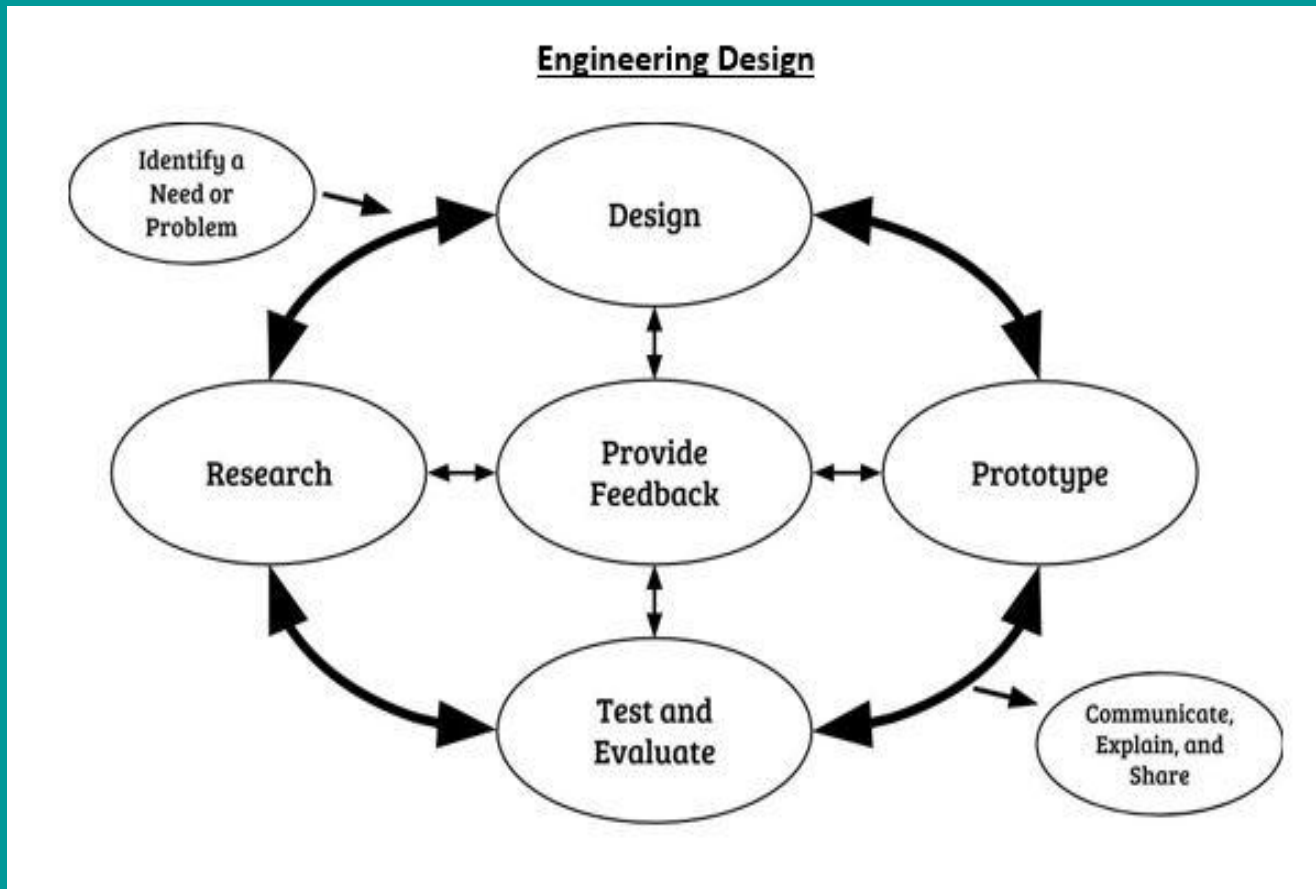
**Yes and no, we were always on the right track but we got thw bot done in time**

**Adjusting What did I learn. Did I get the results I was expecting? If I could do this over again I would.....**

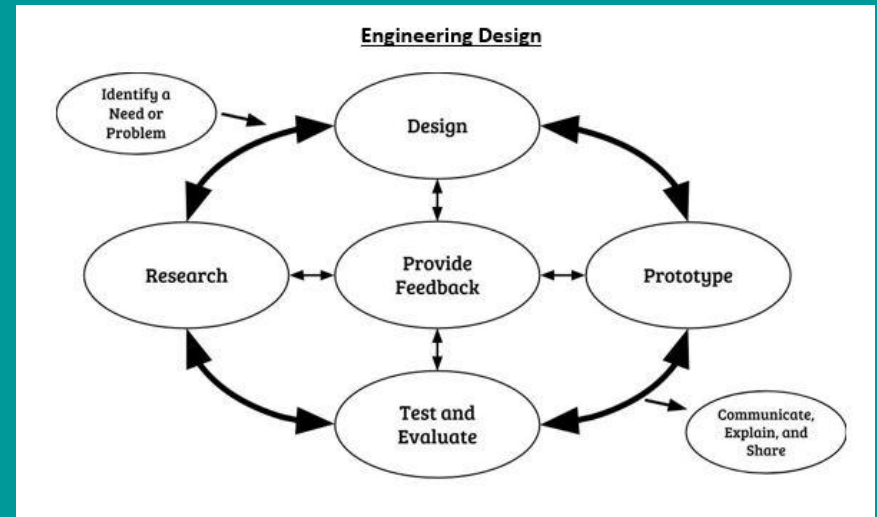
**Eventually we came up with a bot that was sufficient enough.**

# Standard 1.1 Engineering Design Process

2016 Revised Massachusetts State Framework



Identify the need or problem



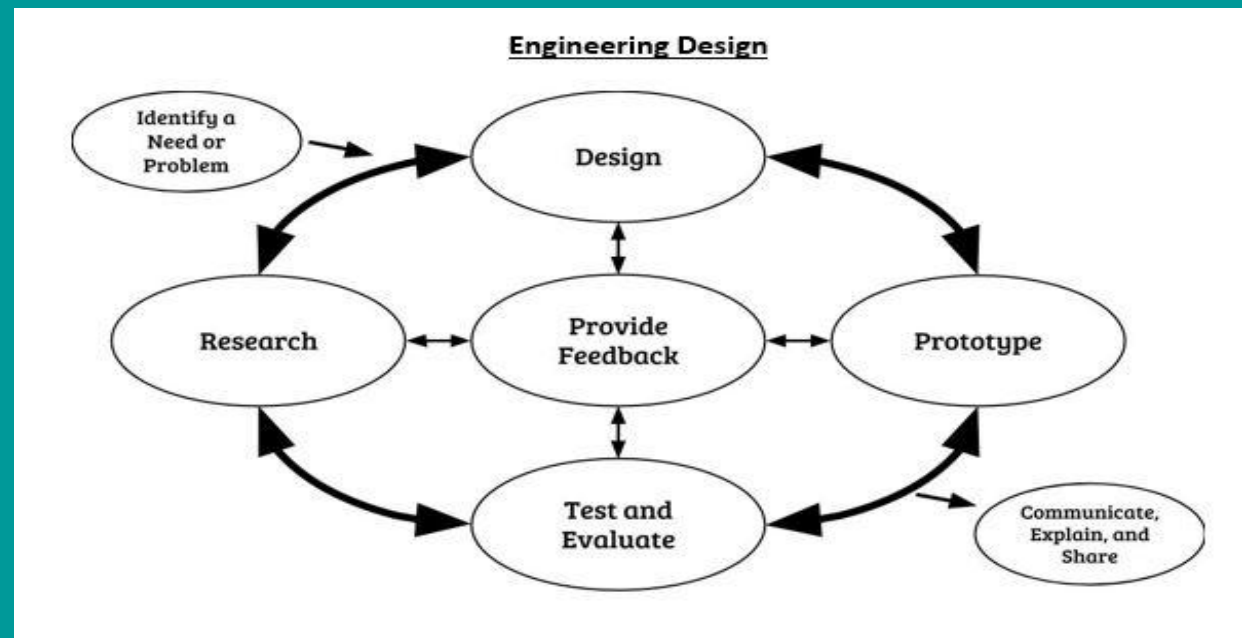
**Identify a need or a problem.** To begin engineering design, a need or problem must be identified that an attempt can be made to solve, improve and/or fix. . This typically includes articulation of criteria and constraints that will define a successful solution.

**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 or think you will need to solve this problem.**

- I already knew the bot needed more mass to be stronger and push another bot fighting back
- We needed torque to allow the wheels for better grip and strength
- We needed speed to get a quick and early advantage

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,

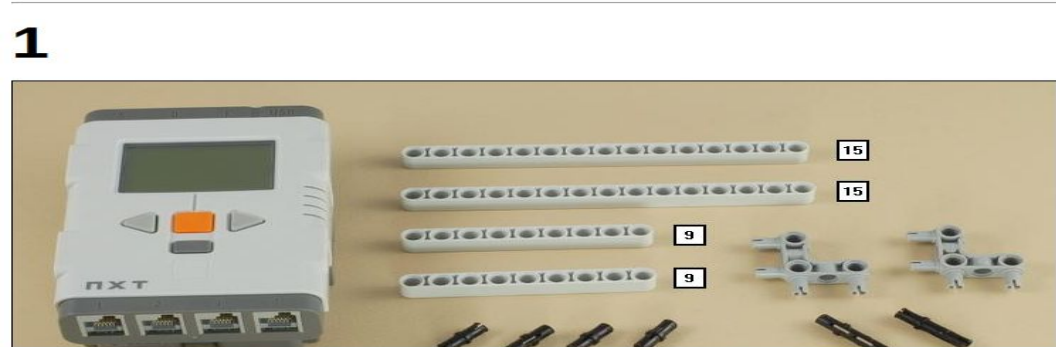
*On your PowerPoint file show add a slide to show what you did for research. **Evidence***

## Castor Bot

[Building:](#) ■ ■ ■  
[Program:](#) (none)

Designed for **NXT 1.0** (8527, or 9797 + 9695/9648)

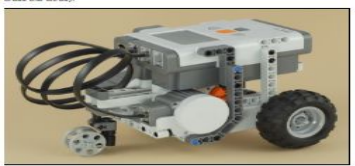
### Building Instructions



**11**

Use two medium length wires to connect the two drive motors to ports **B** and **C** on the NXT.

**Important:** Keep the left wire on the left and the right wire on the right (do not cross the wires).



**Building Tip: Weight Balance**

When building a robot with a castor wheel, it is important to consider the weight balance of the robot. For good turning, you want to have most of the robot's weight over the drive wheels, if possible. But there must also be enough weight over the castor to keep the robot stable and avoid tipping over. If too much weight is over the castor, the robot may struggle to turn, might get caught up, or the drive wheels might slip or spin. However, if too much weight is over the drive wheels, the robot may slip or skid when given a lot of power with the drive wheels in the back (see the [SumoBot](#)).

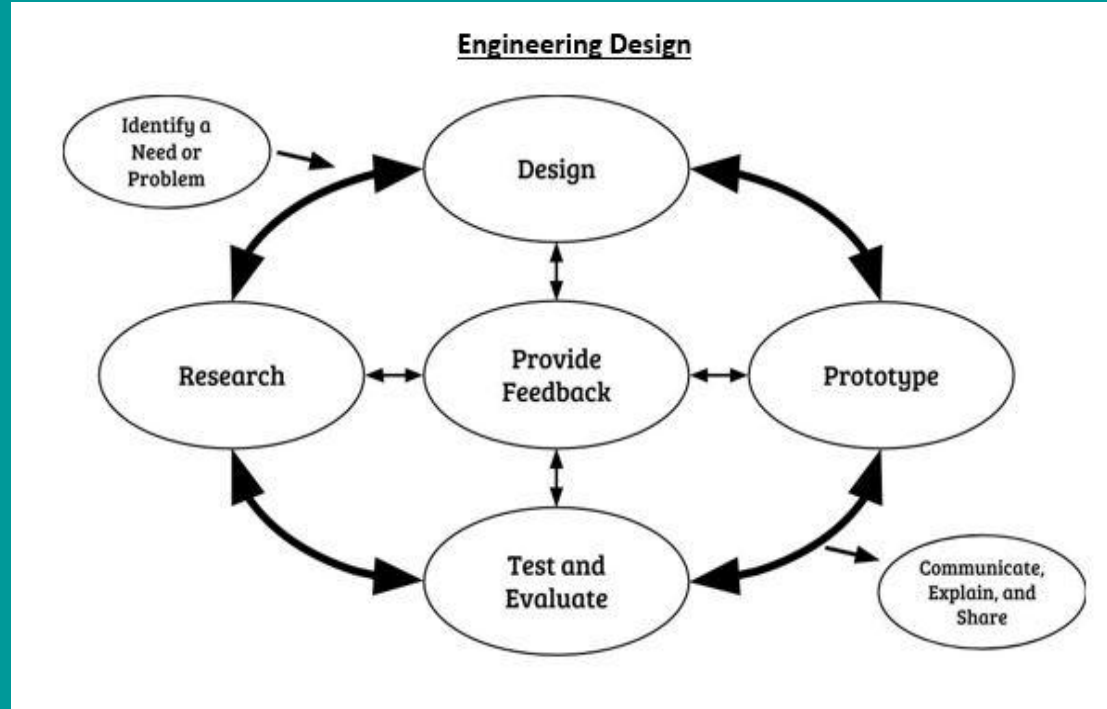
As determined by the experiment below with a small scale, the Castor Bot robot has a total weight of 600 grams, with 350 grams over the drive wheels. This works out to 58% (350/600) of the weight over the drive wheels.



**Castor Bot Programming**

The Castor Bot is a basic two-motor drive robot with sturdy construction that turns easily. You can use it as a starting point for your own projects, and program it however you want. To get started, you could try the "NXT Program" feature of the NXT brick to watch some simple movements using the buttons on the NXT brick.

# 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.

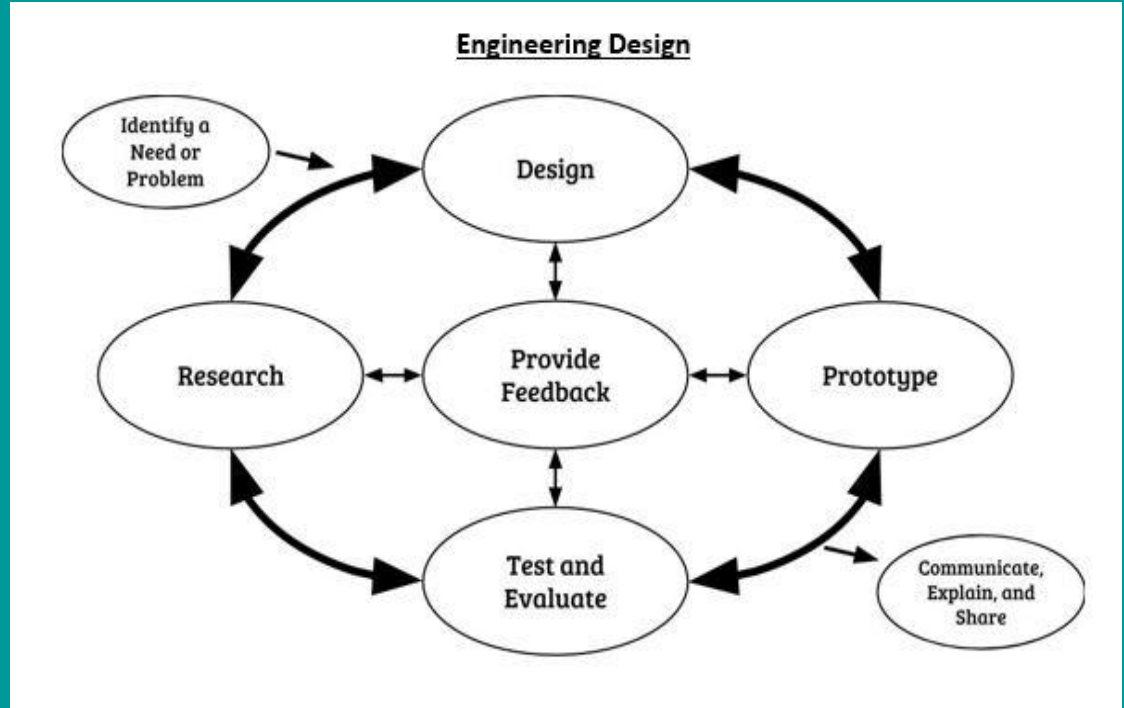
List the role of each member on the team

Evan: Builder and researcher

Me: Builder and researcher

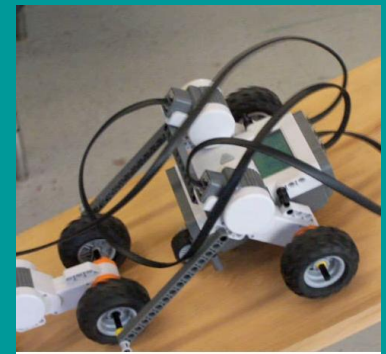


# Prototype

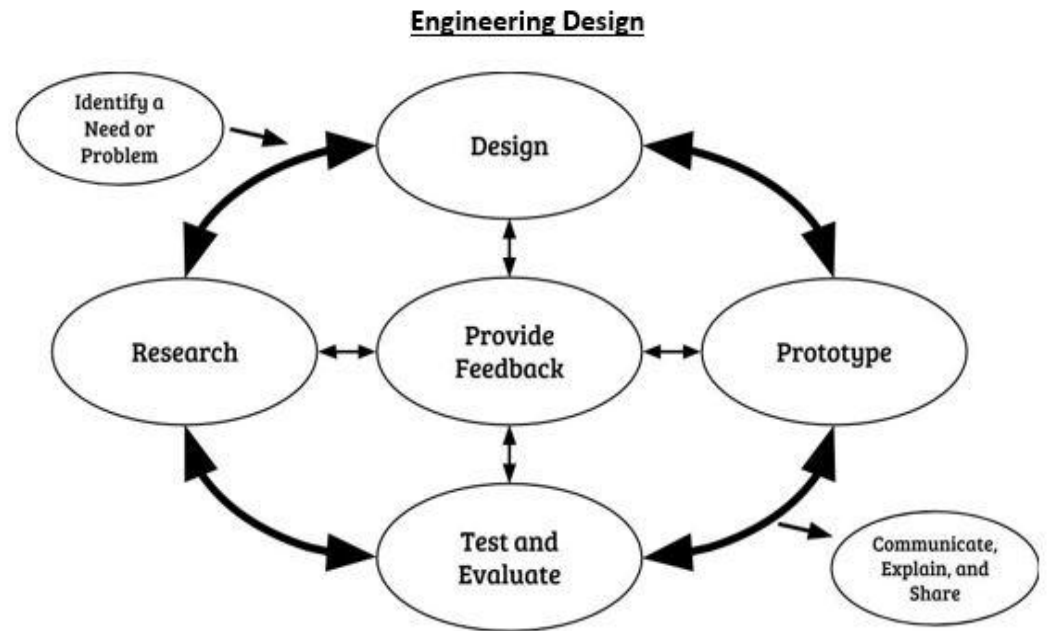


A prototype is constructed based on the design model(s) and used to test the proposed solution. A prototype can be a physical, computer, mathematical, or conceptual instantiation of the model that can be manipulated and tested.

**Evidence** : We made the original bot and after testing we made the proper changes to succeed.



# Test and evaluate



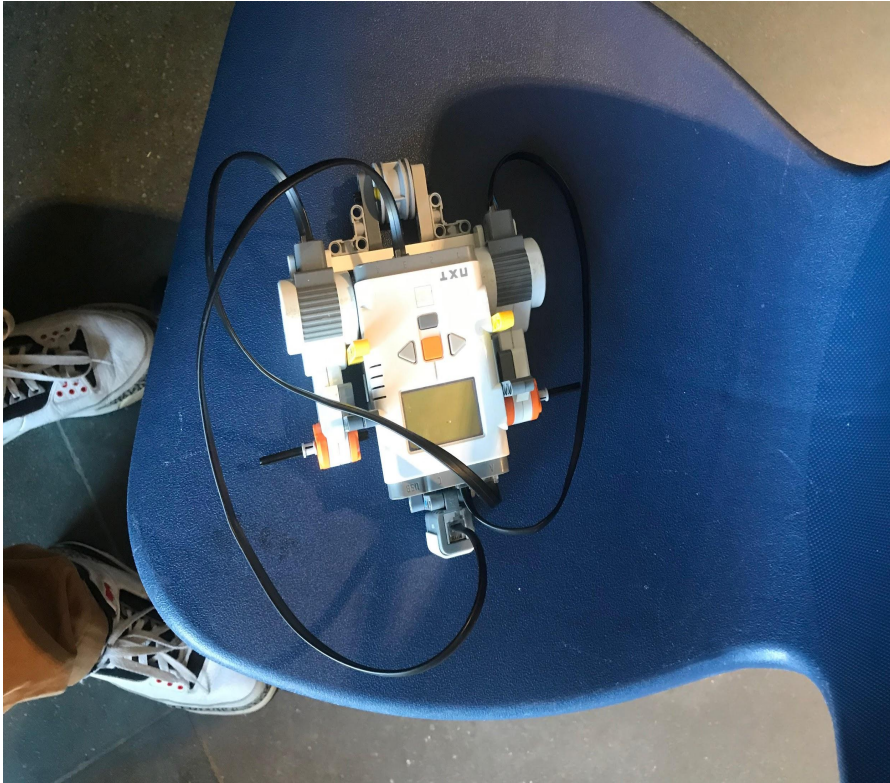
The feasibility and efficiency of the prototype must be tested and evaluated relative to the problem criteria and constraints.

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

- Does your robot work? Yes
- Did it perform as expected? No, Then yes
- What changes are necessary for the robot and the program? Mass, size , and torque
- Does it meet the original design constraints? Yes
- Is it safe? Yes
- Students present their solution to the other teams and celebrate the work of the problem solvers

# Evidence

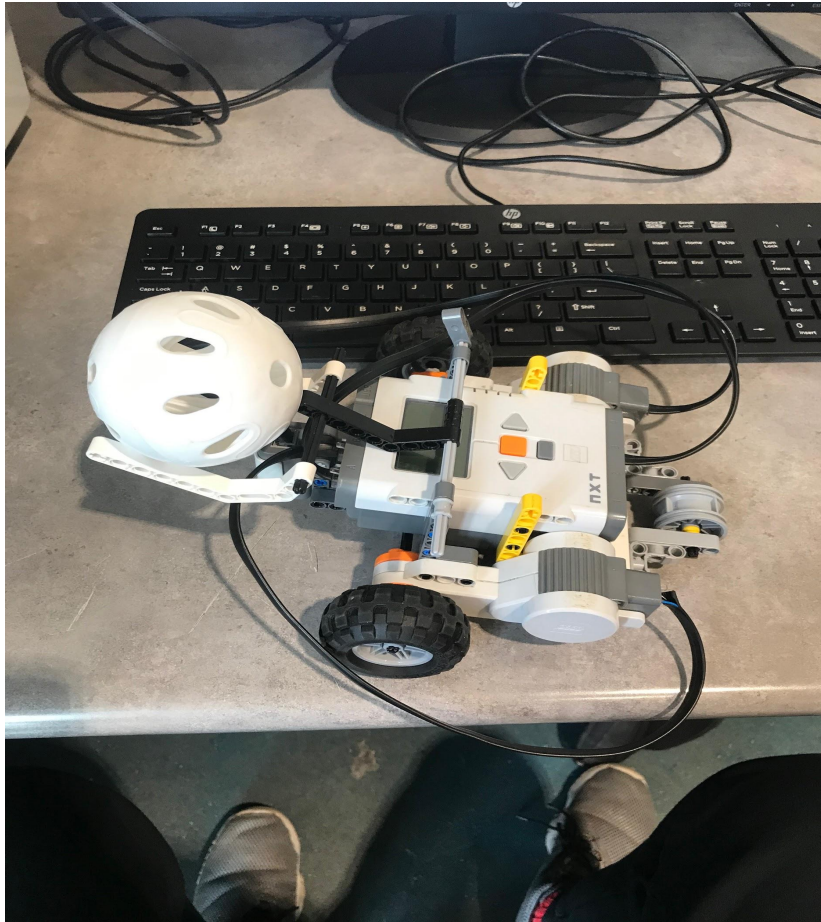
Prototype picture and computer program



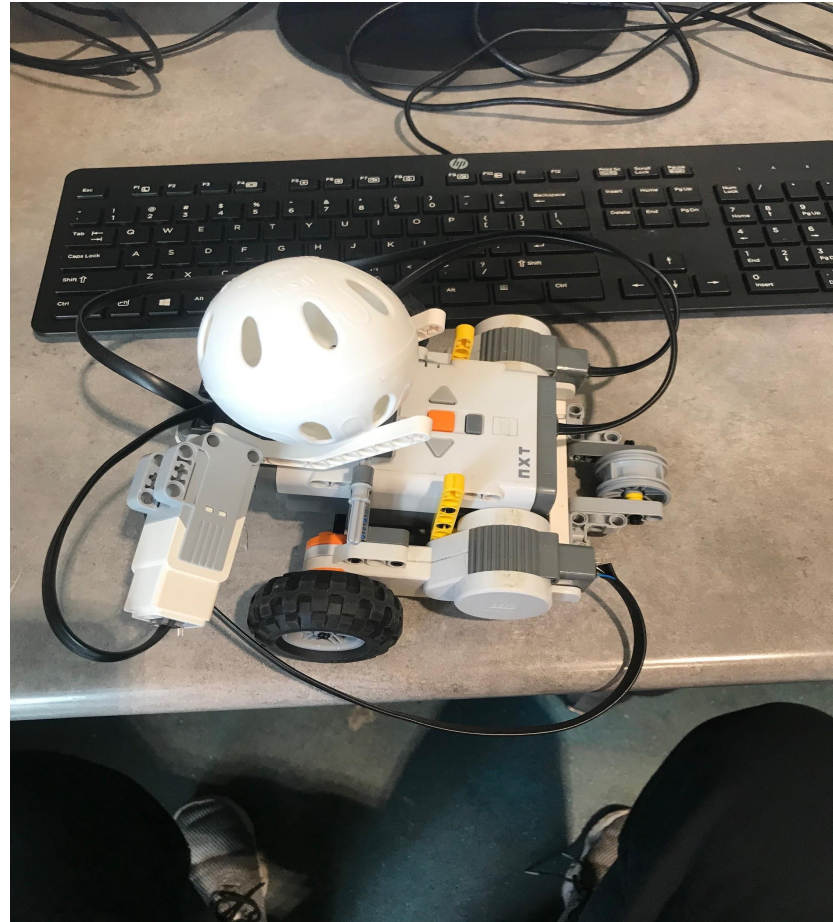
Original Build

# Evidence

modified prototype picture and computer program



Modified Build



Enhanced Build

Communicate the solution(s)

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

**YouTube video link** : <https://youtu.be/twRgERxztFg>

## 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.

I plan on being a physics teacher and with that, skills I will use from robotics could be problem solving, brainstorming, and/or cognitive thinking. I'll have to use problem solving more for my major than career but it will be helpful to figure out why something may or may not be happening. Being able to cognitively think and brain storm will also help with why a measurement or estimate is so off or not coming out correctly as well as helping me with figuring out a second way to solve said problem.

# Letter to a future student

I recommend you don't take this project lightly. It isn't easy and can't be done in a day. It takes time effort and consistency. Take your time and try different prototypes and you'll be fine. Keep striving for that end goal.



## What metacognitive strategies are you using?

I'm using metacognitive skills such as solving a problem by figuring out what we did to make it not work, and not necessarily what to do based on what we didn't do. Also thinking about how the bot will be able to work before even making changes to it and just brainstorming how we can get it to function properly.

## 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

References Faculty Focus .Com  
Khan Academy  
Massachusetts 2016 frameworks