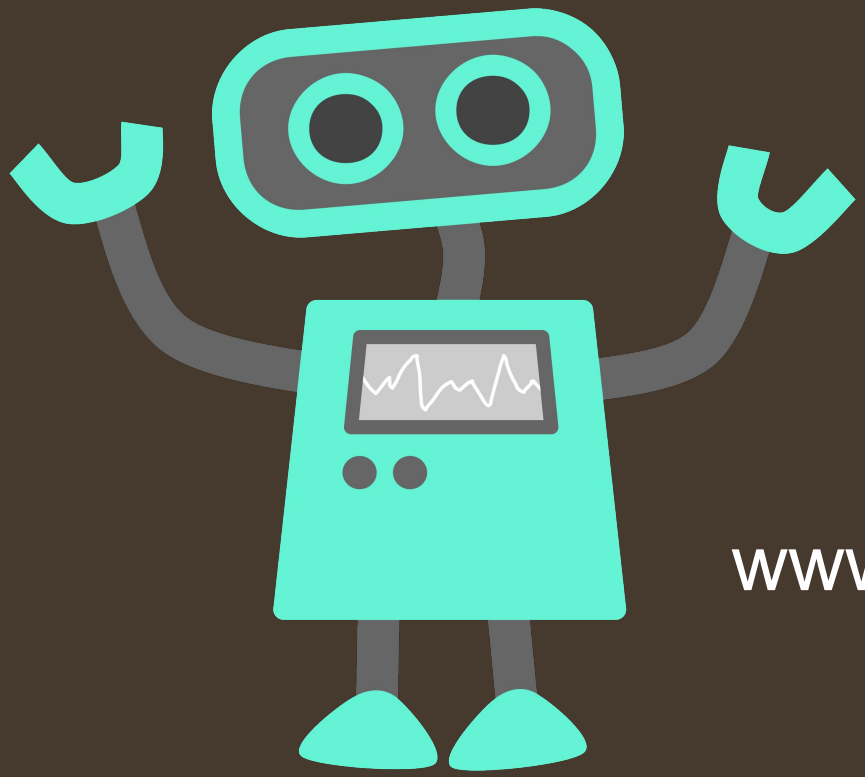
ChickTECH



Robotics

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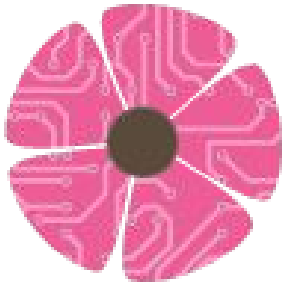
Goals



By the end of the workshop, you will:

- Know what a robot is and where to find them
- Build a robot using Arduino software and hardware
- Drive robots with phone app to complete a challenge

Chloe Fleming

Robotics PhD Student at OSU

Studied Computer Science at ASU

From Portland, OR

Proud owner of Douglas the Dalmatian

Samantha Hemleben

Company: Plural Additive Manufacturing

Position: Technical and Marketing

Where you're from: Columbus, Ohio

Where you went to school: Wofford College BS, Oregon State University MS

Humanize yourself!

Hobbies: I live with Chloe and our dogs play together

Interests: Cooking, Traveling, and Eating

Steph Walker

Currently at:
Oregon State University
Dual Ph.D. MatSci & Robotics

From San Diego, CA

Previous Degrees:
B.A. Applied Science (Graphic Design)
San Diego State University

B.S. Chemical Engineering
Oregon State University

Hobbies: Gardening, thrifting, art of all kinds

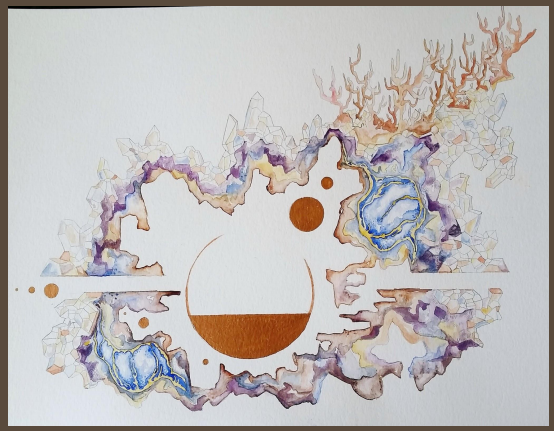
Interests: sustainability, crafts, 3D printing, making science more accessible to everyone!

Alison Shutterly

From Micanopy, FL

Currently Working On: Mechanical Engineering/Robotics Master's Degree at OSU

Previous Degrees:
B.S. in Biochemistry, B.A. in Studio Art from Florida State University



Hobbies: Painting, sculpting, cooking, hiking and writing

Interests: Traveling, science and getting out in nature!

Emily Longman

I'm a Security Analyst at OSU

I'm from Vancouver, WA and came to OSU six years ago

Graduating with my BS in CS

I love video games, crafting, and binge watching Netflix

I have a munchkin cat named Poppy

I did my senior project on the Robotic Operating System, and I wish someone had told me sooner that I would enjoy working in tech

Sarah Huang

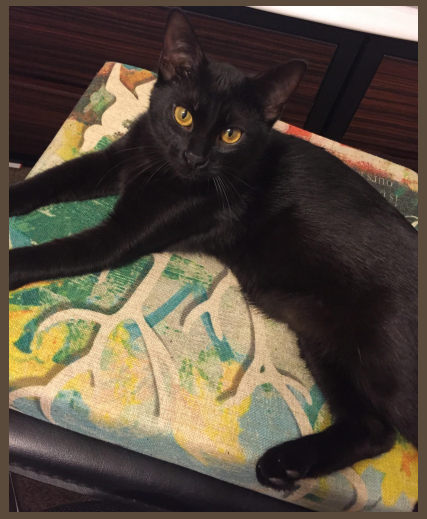
Sarah

I am from China

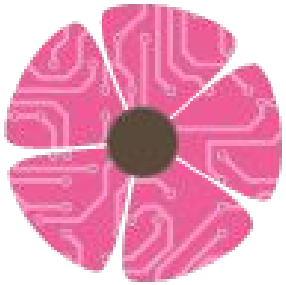
Study CS in OSU

Swimming

Watch Cartoon and anime



Workshop Roadmap



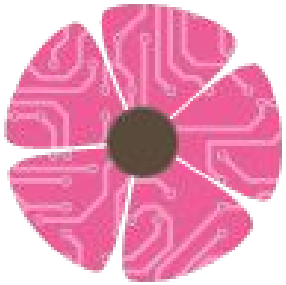
Morning

- Talk about what robots are
- Assemble our robots
- Test basic operation, correct problems

Afternoon

- Basic programming to drive robot
- Body and decoration
- Adding a gripper

Can you think of a robot?



Think of a robot from a movie, TV, book, etc.

Talk with the person next to you about this robot.

What is realistic about it? What seems unrealistic?

Are there any real robots?

What is a robot?

"A computer controlled machine capable of complex sequences of operations, determined by a program, with behavior that can be altered by inputs from sensors."

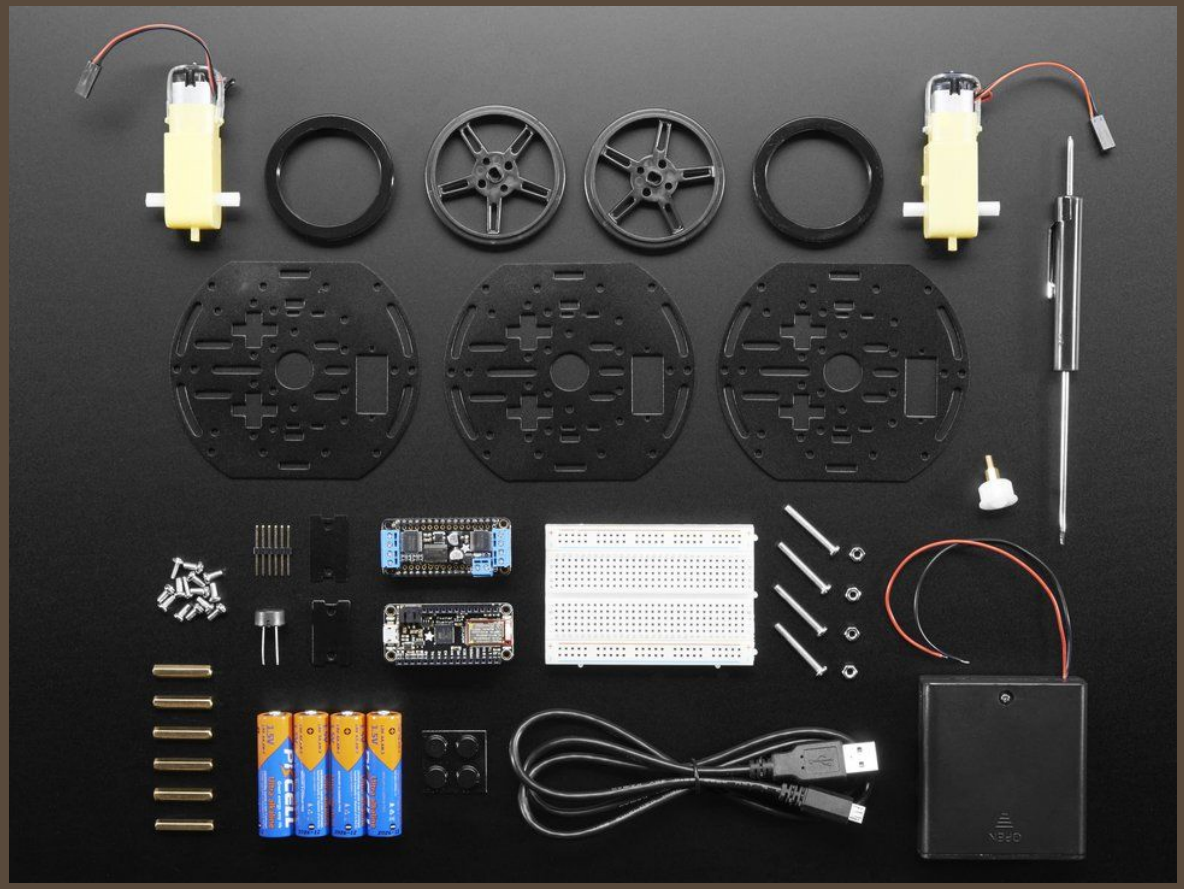
A machine that carries out tasks. The tasks can be programmed in advance, or the robot will perform tasks as a reaction to its environment.

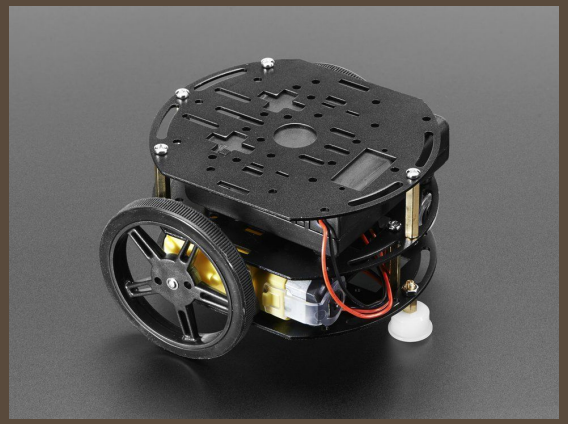
What are roboticists working on?

What are roboticists working on?

Robots don’t always work!

Our Robot

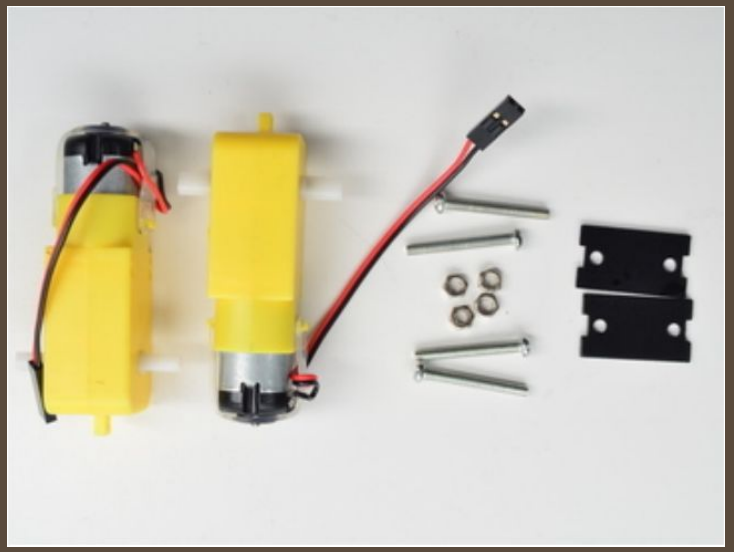


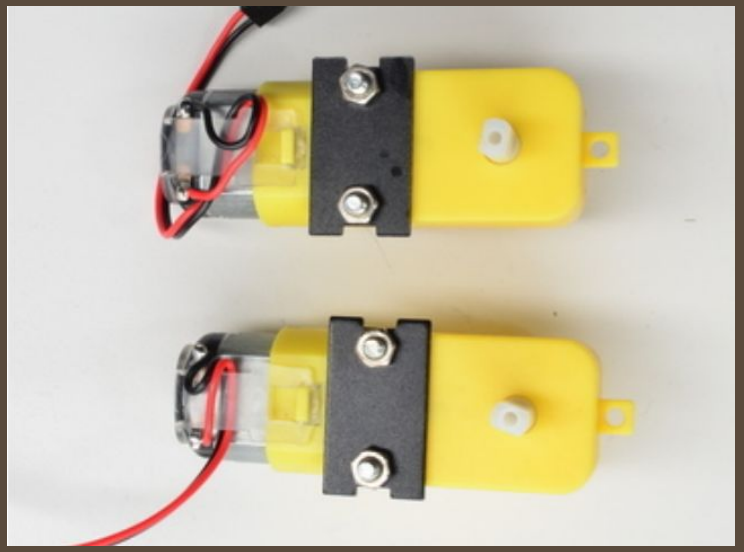


Our Robot

Assemble the Wheels

Use four long screws and hex nuts to attach black panels to wheels.

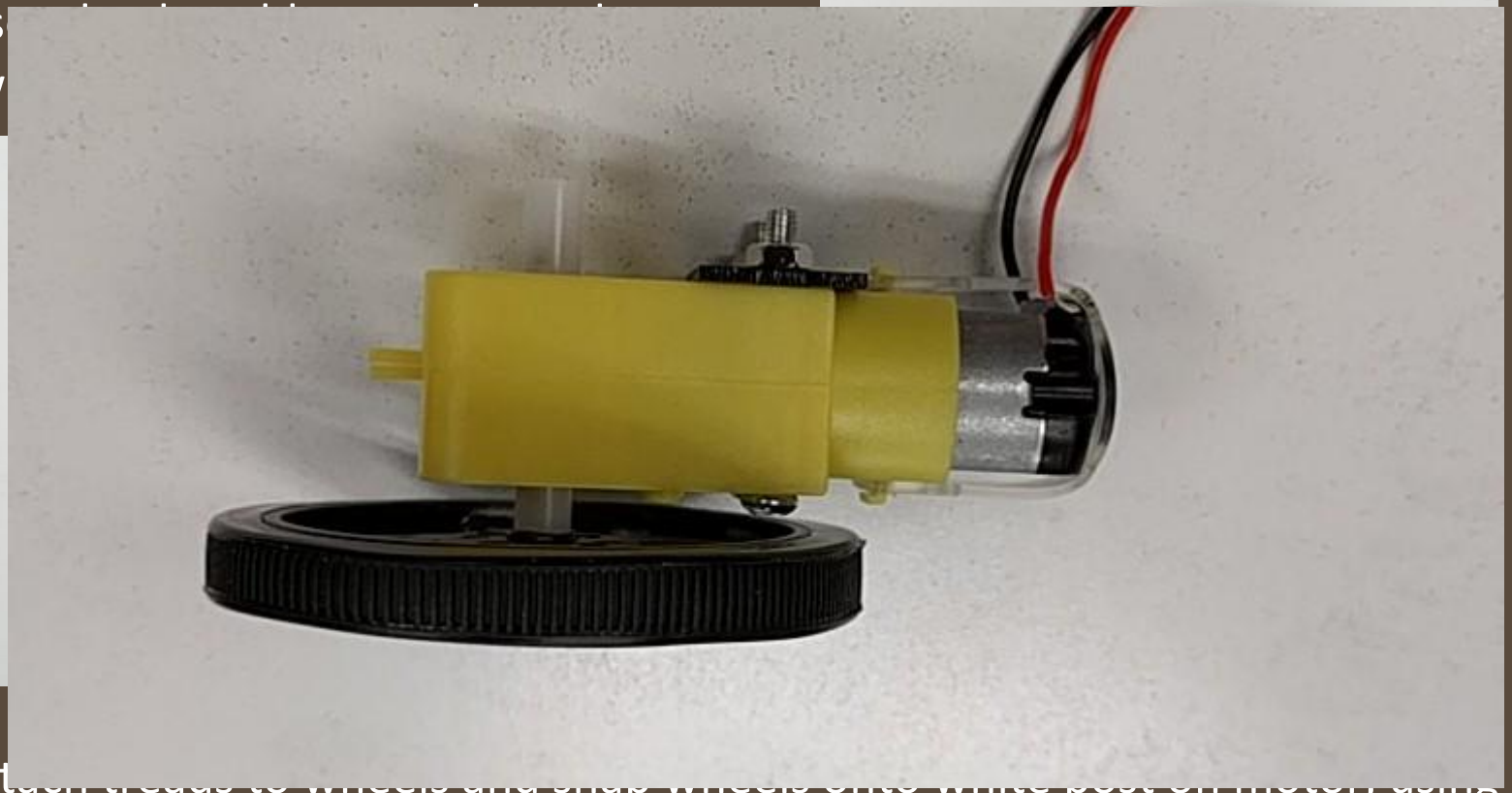




The panels go on the side of the motor with the red and black wires.

Assemble the Wheels

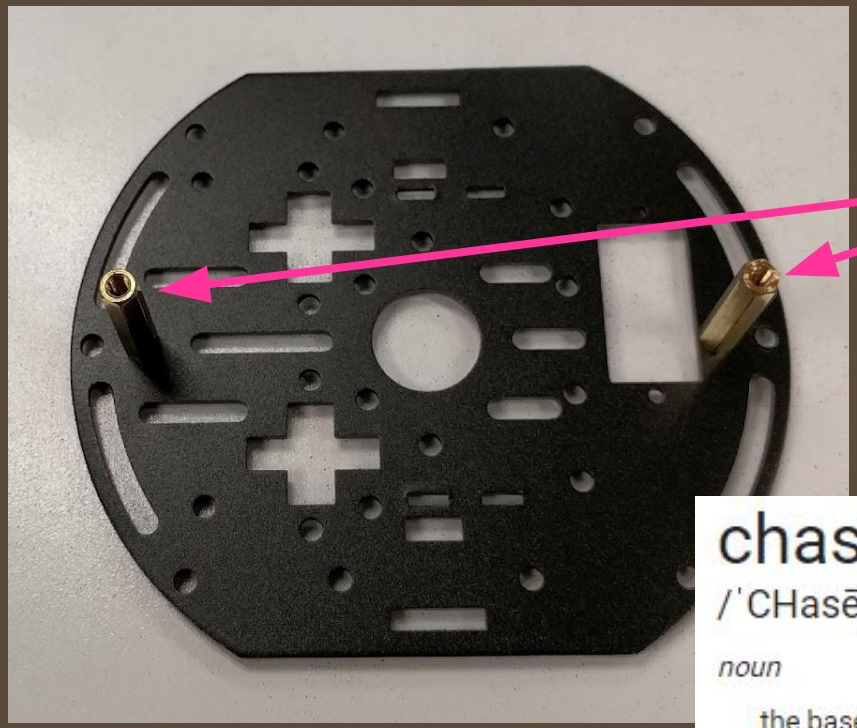
Us
tw



Att
screw to secure wheel/motor.

Assemble the Chassis

Use one layer and two brass standoffs.



Attach standoffs to the two interior holes! Not the holes near the edge of the frame.

chas·sis

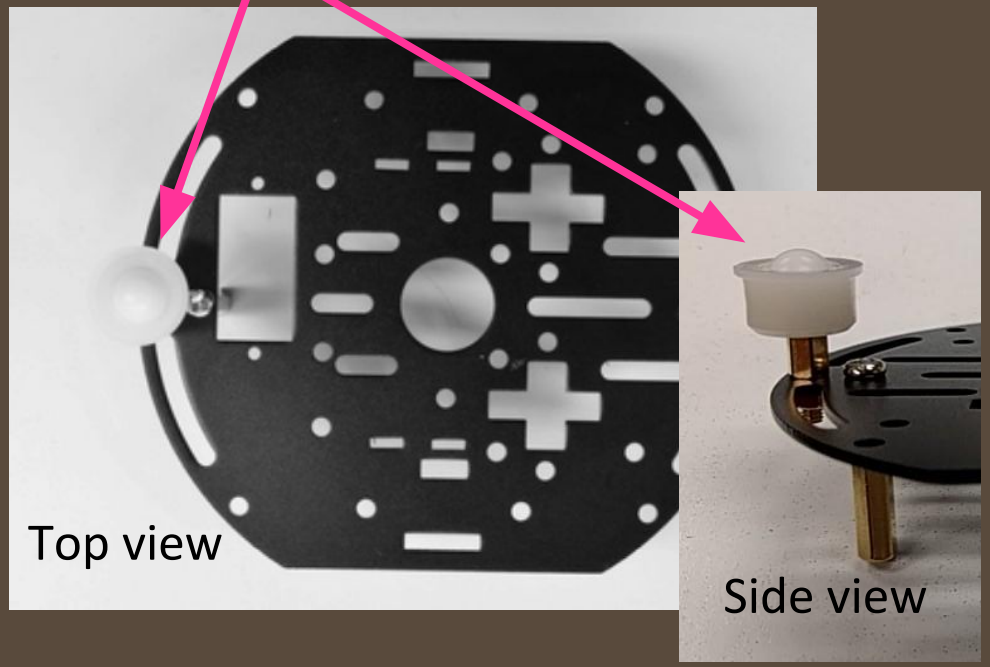
/ˈCHasē,ˈSHasē/

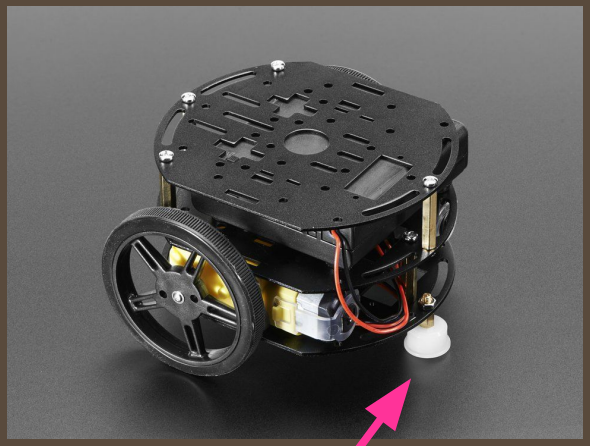
noun

the base frame of a motor vehicle or other wheeled conveyance.
synonyms: framework, frame, structure, substructure, shell, casing
"the chassis of the car is in mint condition"

Assemble the Chassis

Flip over the layer!
Attach the white wheel to the other hole on the side with the rectangle.

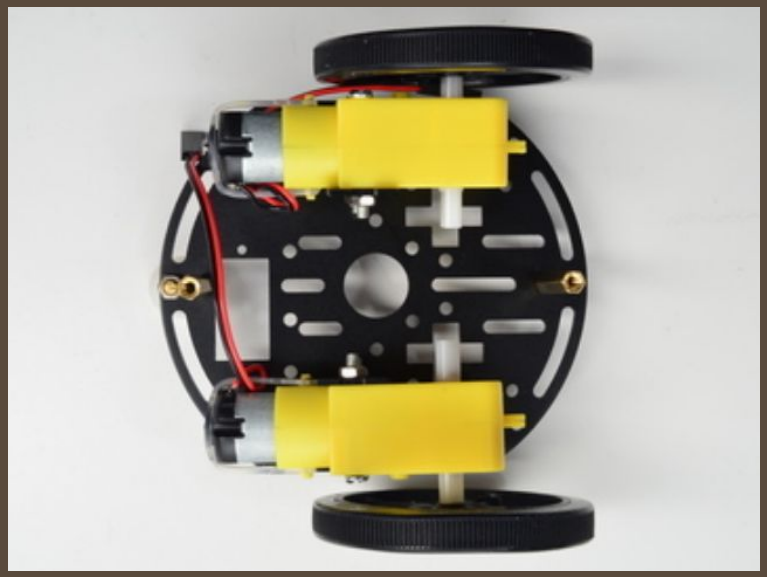




Here's that wheel!

Attach the Wheels

Flip over again!
The black pieces we attached to motors should slot into chassis.



Now sandwich the motors with the next layer! Use screws to attach into standoffs.

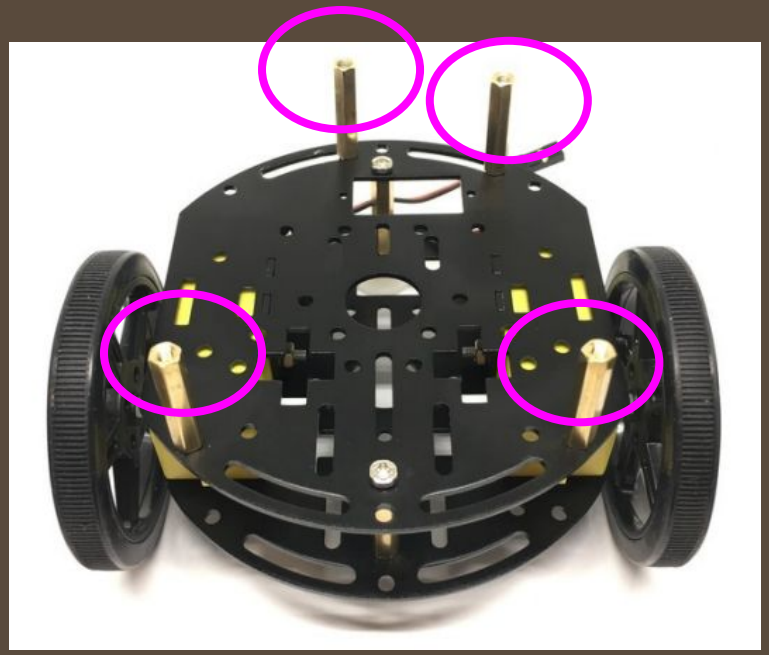
Add the Battery Pack

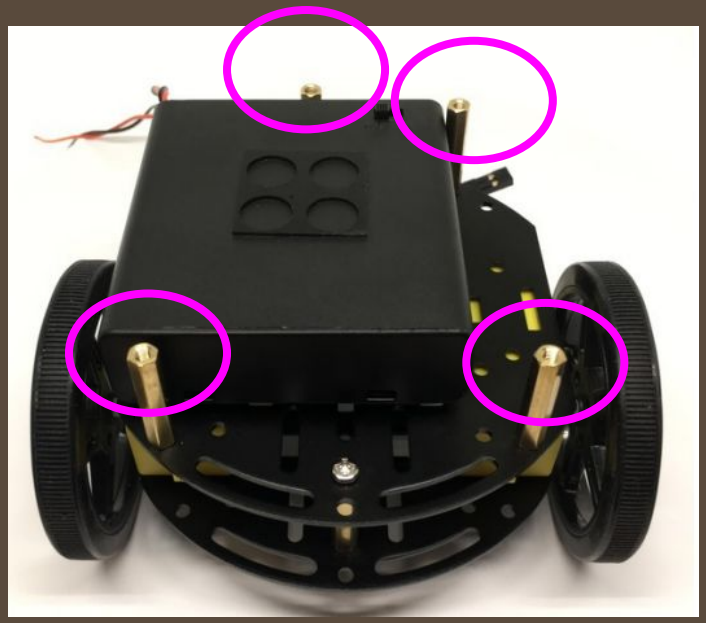
Insert batteries into pack (screwdriver required) and place stickers on box.

The tiny screw might be inside the battery box, so be careful not to lose it!

Add the Battery Pack

Attach four more standoffs in the pattern shown below.

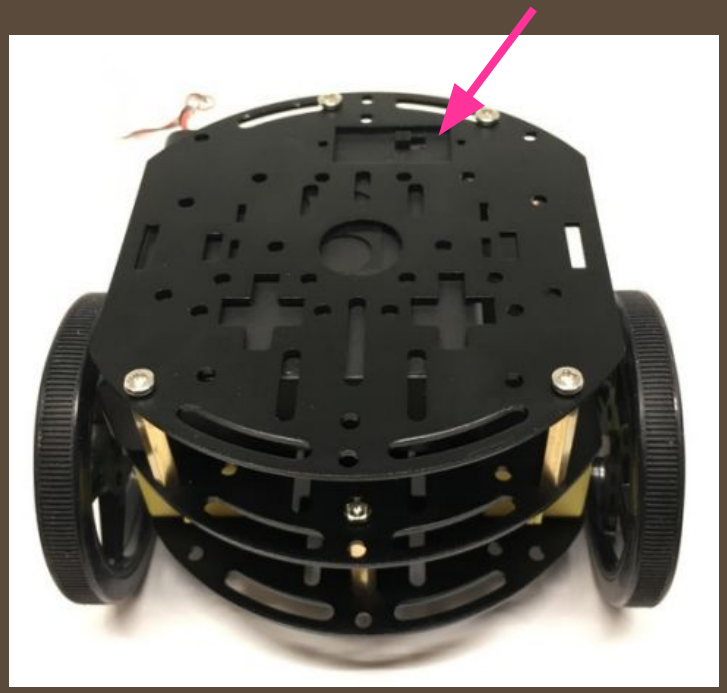


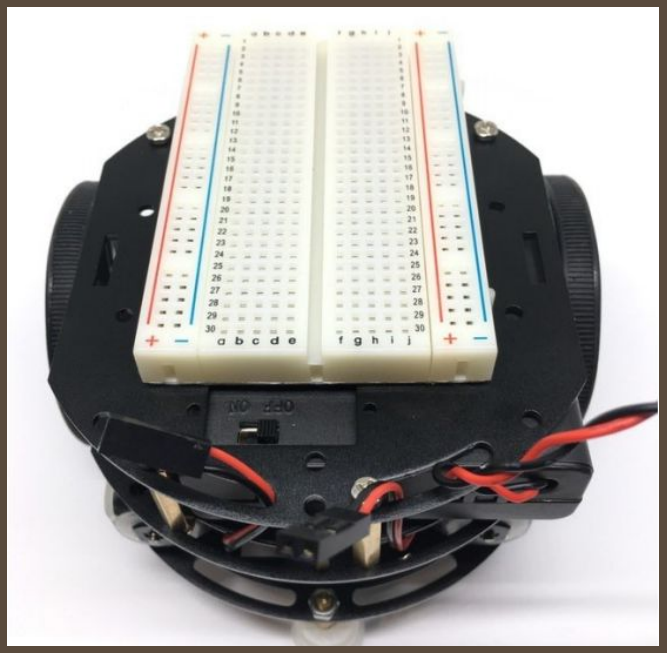


Place battery pack on chassis!

Finishing the Chassis

Attach top layer and make sure that on/off switch lines up with hole.

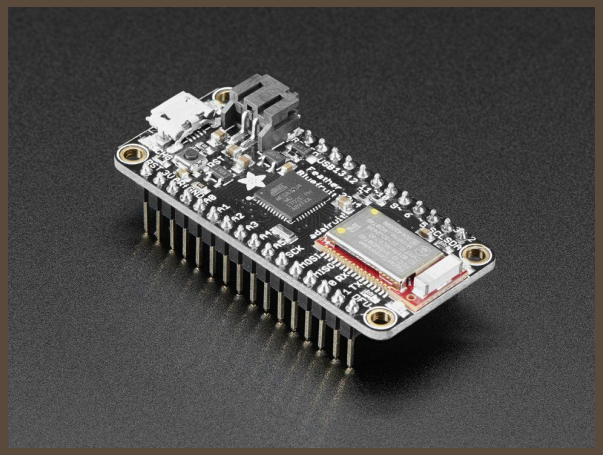




Pull wires through holes and attach breadboard by pulling off sticker backing.

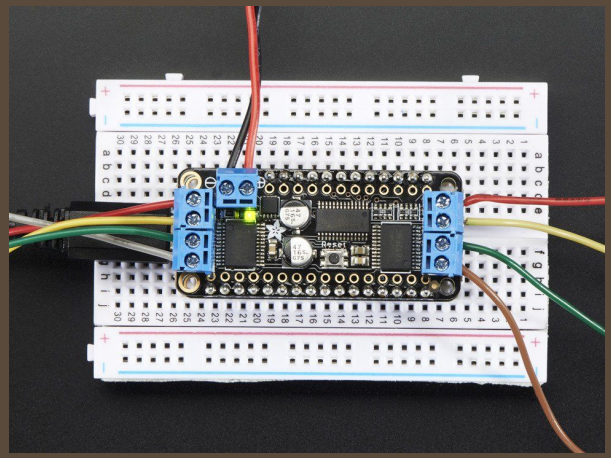
What Controls the Motors?

Arduino board



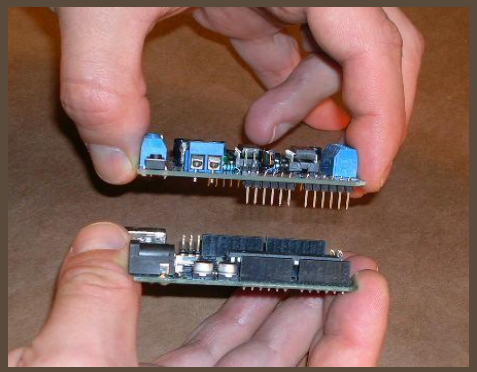
- Brains of the robot
- We will program the Arduino with our computers
- Says “Feather Bluefruit” on it

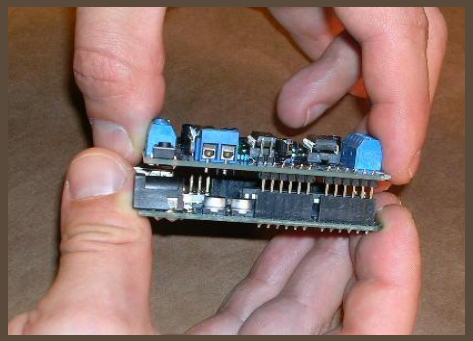
Motor controller



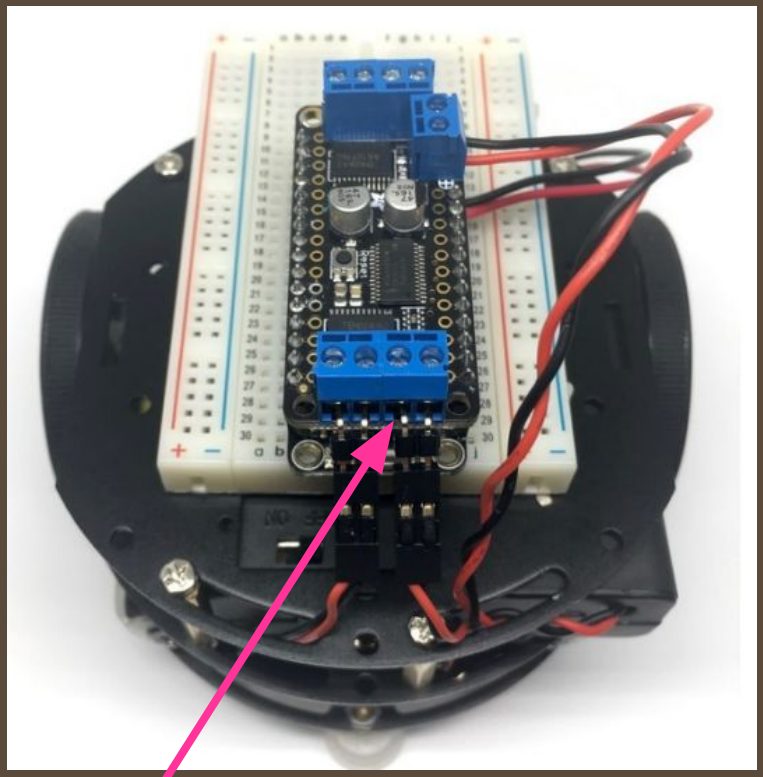
- Sends power to the motors
- Arduino by itself cannot send enough power to run the motors
- Has blue ports on top

Add Arduino and Motor Controller



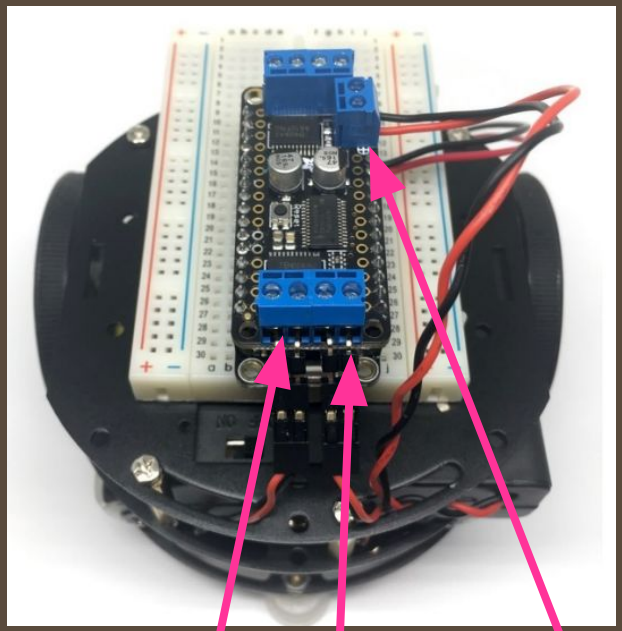


Press the boards together (motor controller on top)



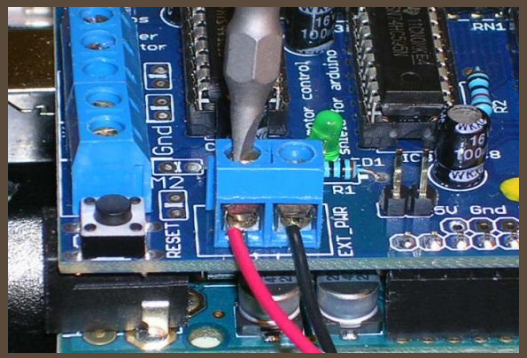
Press the boards into breadboard so that blue ports line up like this above the battery switch.

Wire Power to the Motor Controller



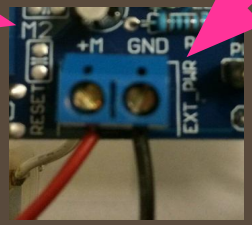
Connect battery pack wires and motor wires to blue ports. The power connector is the blue port with two screws by itself.

Loosen screws with screwdriver, stick in wires, and tighten screws

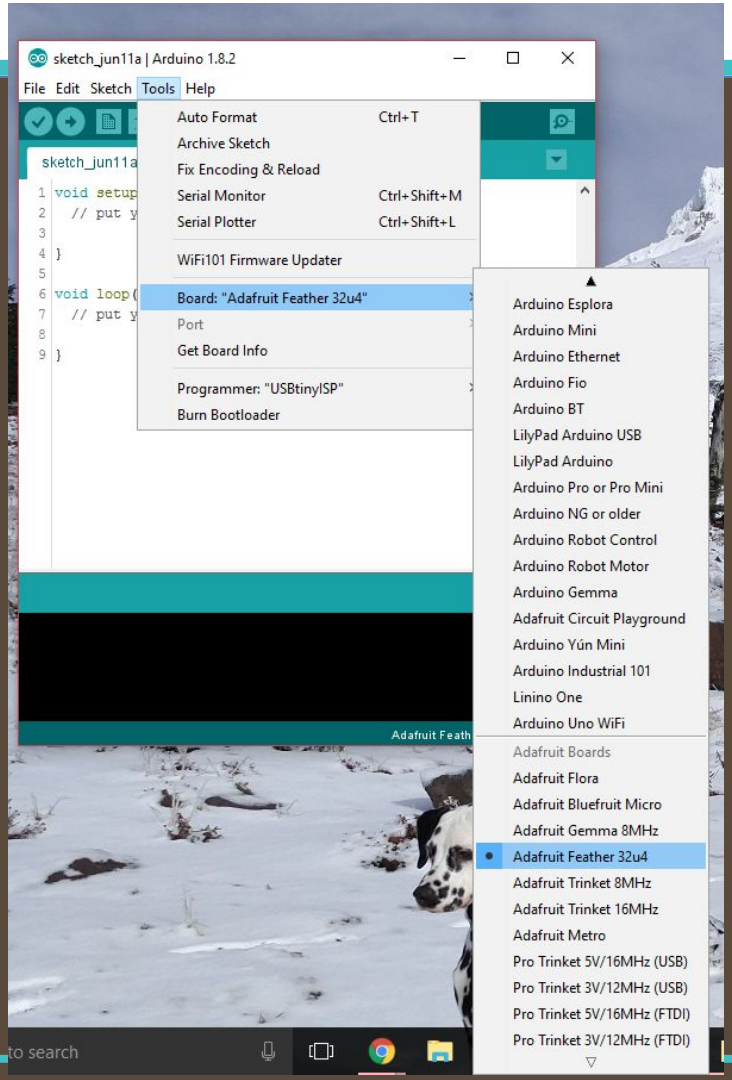


+M is for red wire

GND is for black wire



Programming the Robot



Open “DCMotorTest” from flash drive.

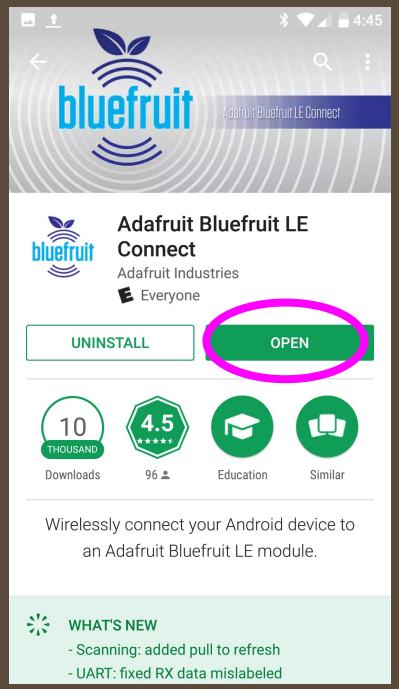
Set board to “Adafruit Feather.”

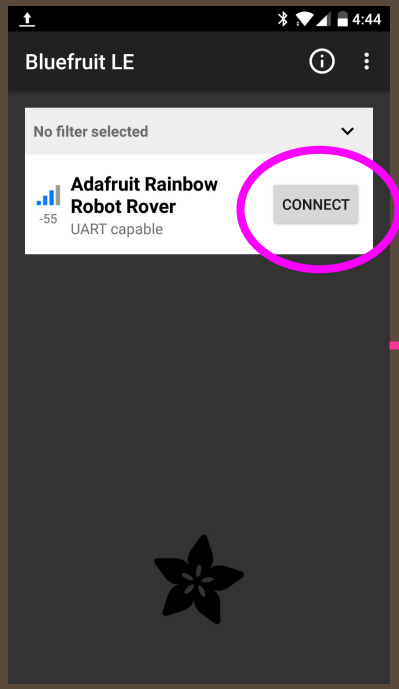
What do you notice in this code?

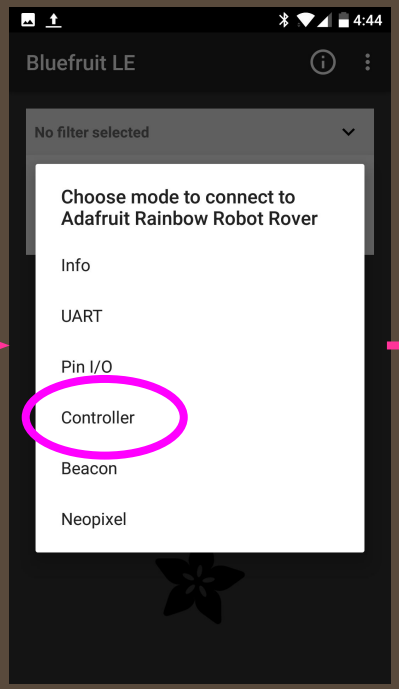
We’ll work together to control motors.

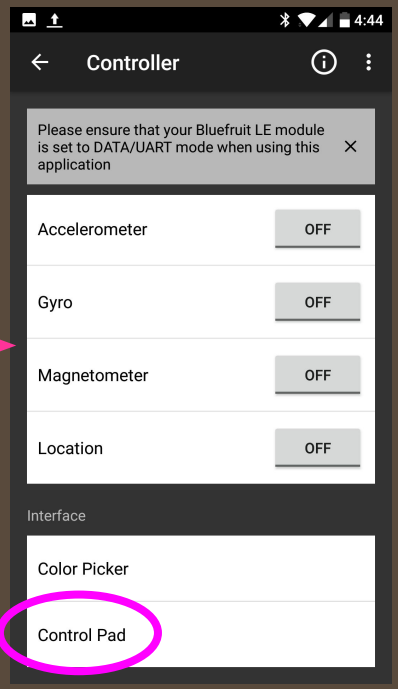
Open “BLE-Black-Robot-Rover” when motors are working.

Using the App!

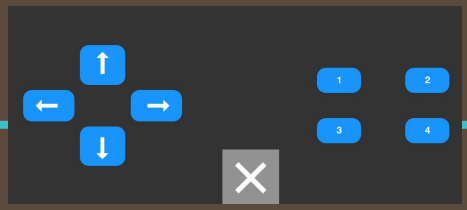




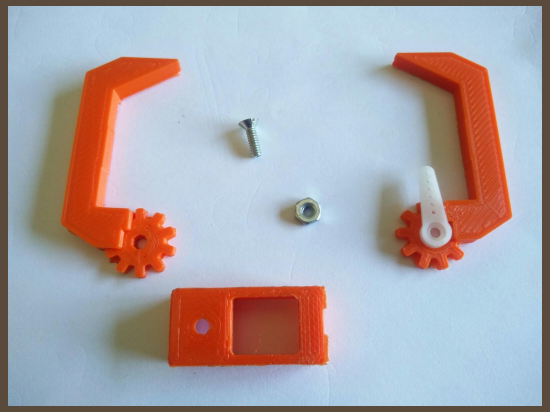


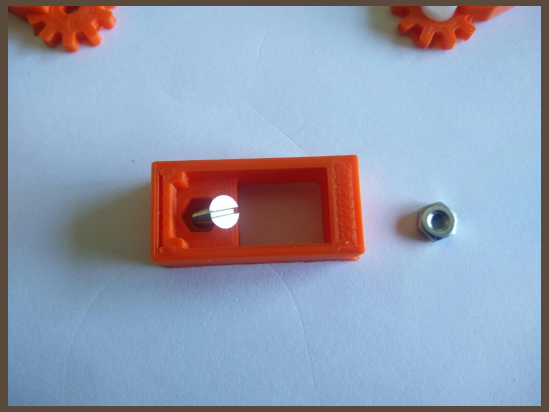


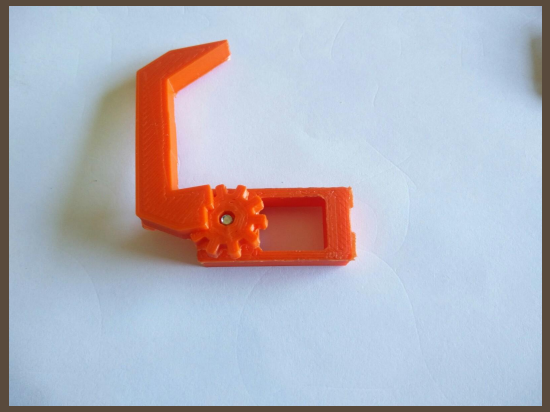
Install **Adafruit Bluefruit LE Connect.** Follow the steps above to connect to your robot once it has been programmed and powered on!
You should see the control pad.

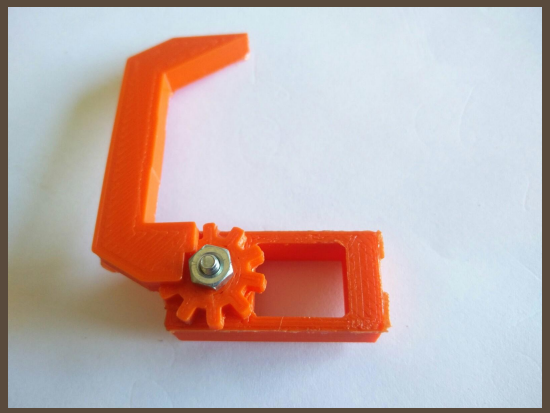


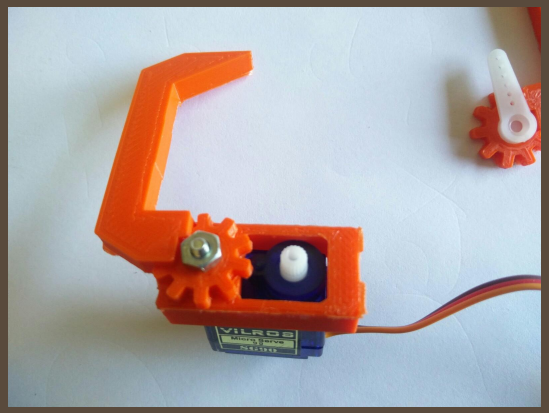
Build the Gripper

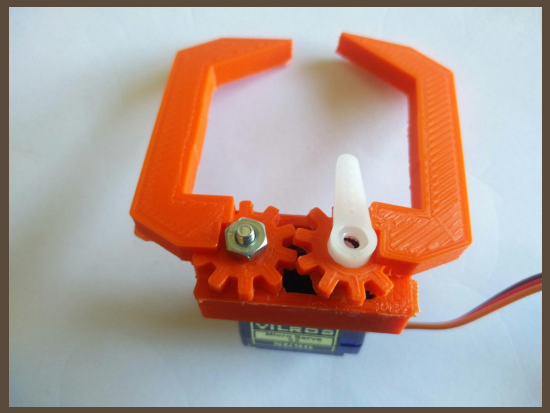




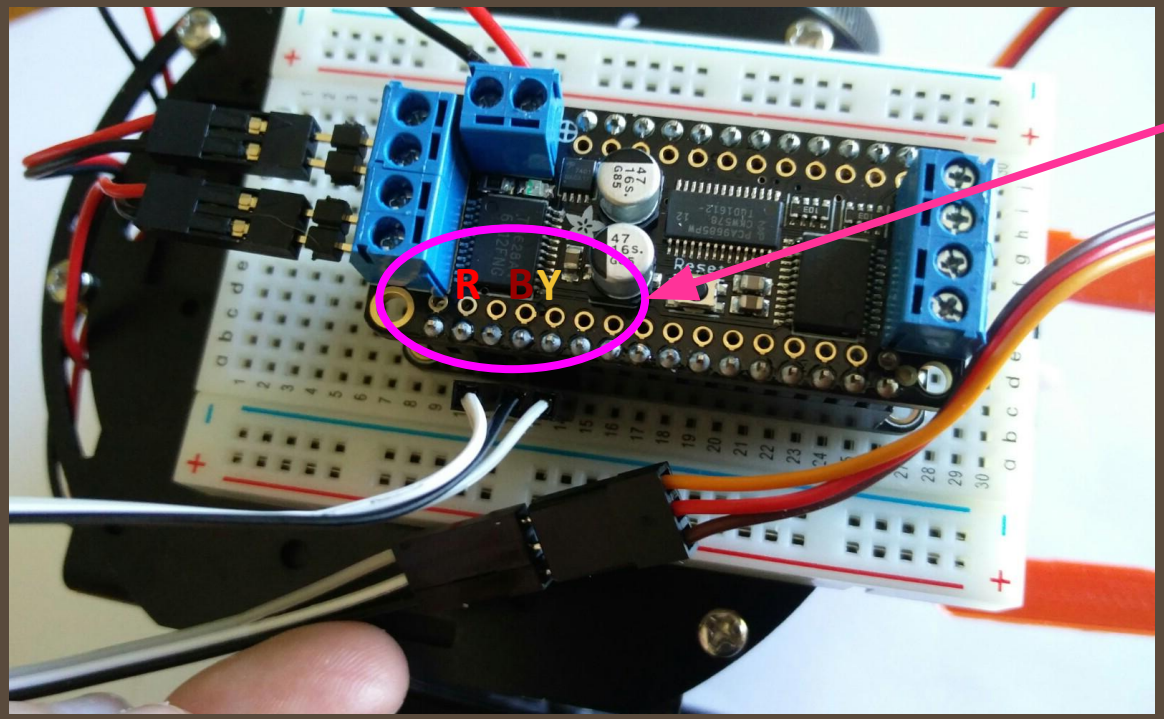




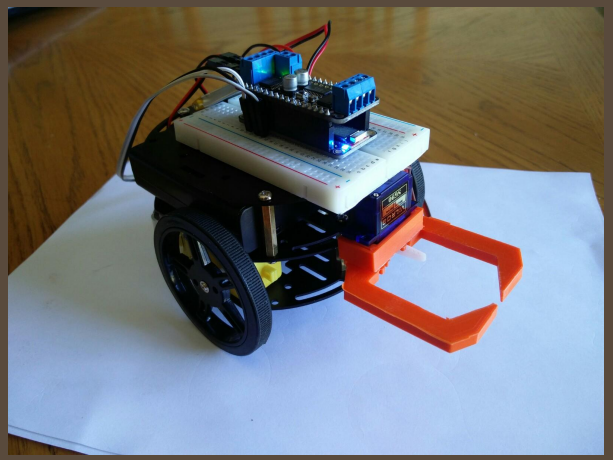




Attach & Wire

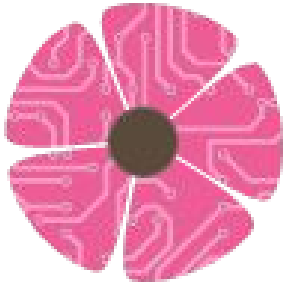


Red -> 2nd
Brown -> 4th pin
Yellow -> 5th pin



Connect the servo to the Adafruit Feather Arduino with some extra wires.
Attach the gripper to the front of the robot using the sticky breadboard back or tape.

Programming the Gripper

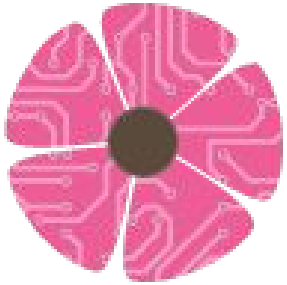


Use the “ServoTest” code to test the gripper.

What happens when the servo moves? Does the gripper open/close correctly?

You might have to reattach the claw so that it is closed when the servo is set to 0 degrees.

A challenge!



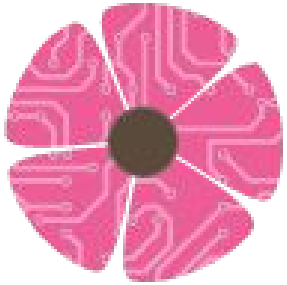
Work together to design a robot obstacle course.

Keep in mind what the robot can and can’t do!

The robot should pick up an object and drive back.

Try a relay race on the obstacle course!

What do you think?

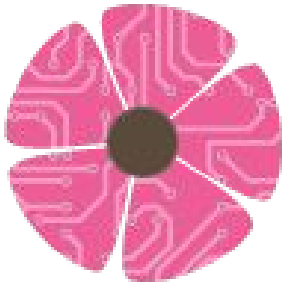


What were the hardest things today? Easiest?

What are robots good at? Bad at?

Is there a problem we could solve with robots?

Thank you!



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