“Octo-Robot”

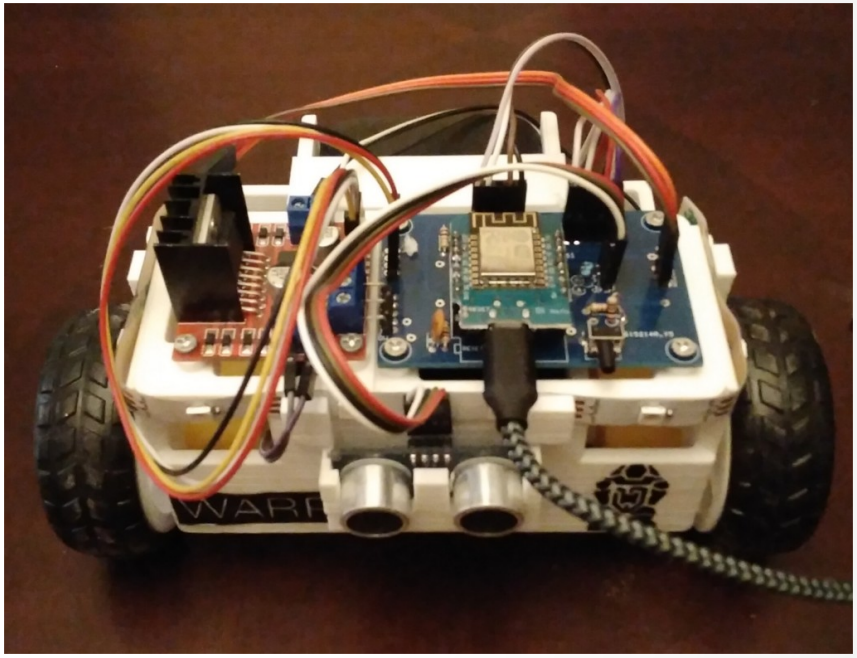
Presentation Outline

- Intro – what were we trying to accomplish
- Robot Hardware & “Firmware”
- Low Level Robot Command Speed Run
- First Robotics Java Emulation Code
- First Robotics Example Code

Goals

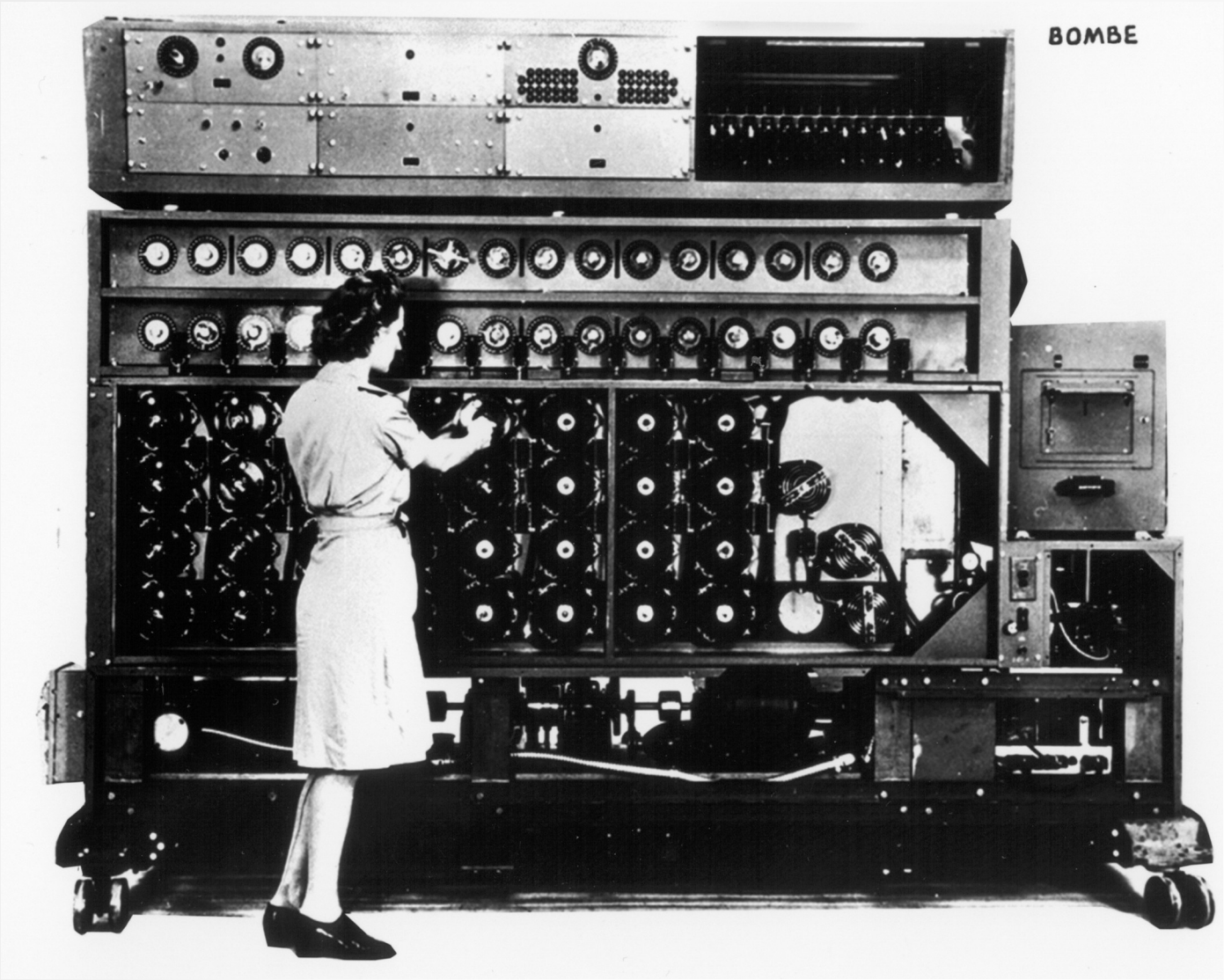
What is it

- Inexpensive Trainer for First Robotics Programming
- Hardware Features
  - Two motors
  - Two encoders
  - Sonar Range Finder
  - Status Lights



- “Driven” from a PC
  - Like a remote controlled car,
  - But student robot code is doing the driving

Goals



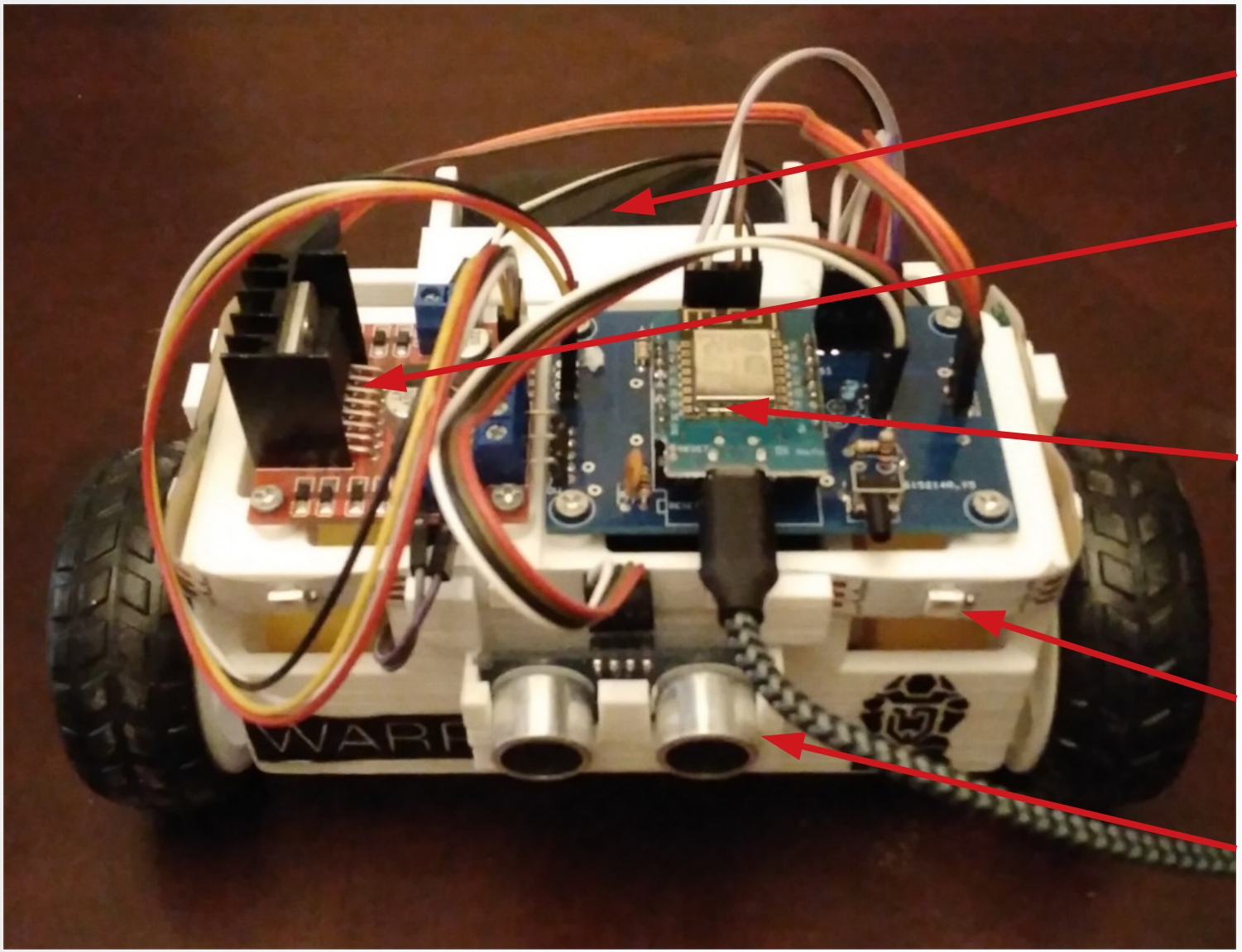
“Make it easy to start First Robotics programming”

Goals

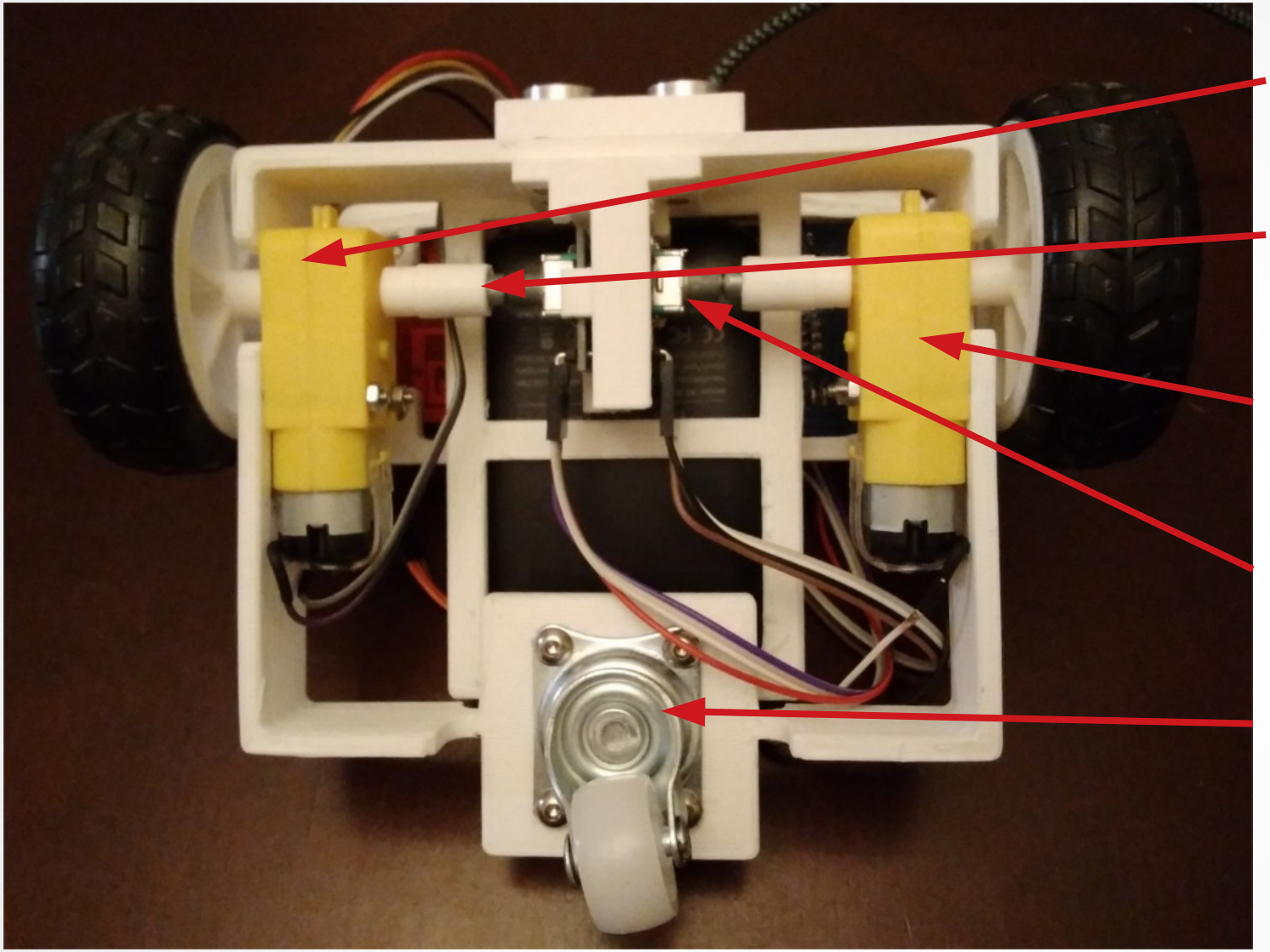
- Inexpensive and friendly (parts cost <$50)
- Programmed like a competition robot
  - Visual Studio Code Java Environemnt
  - First Robotics Smart Dash Board
  - First Robotics like hardware interfaces
- Enough hardware for basic Robot tasks
  - Encoders for PID Controllers + Sonar Range Finder

Robot Hardware & “Firmware”

Robot Hardware



Robot Hardware



How it Works

The Robot Creates a WiFi Access Point

- Robots have unique SSIDs. Password is graciousp

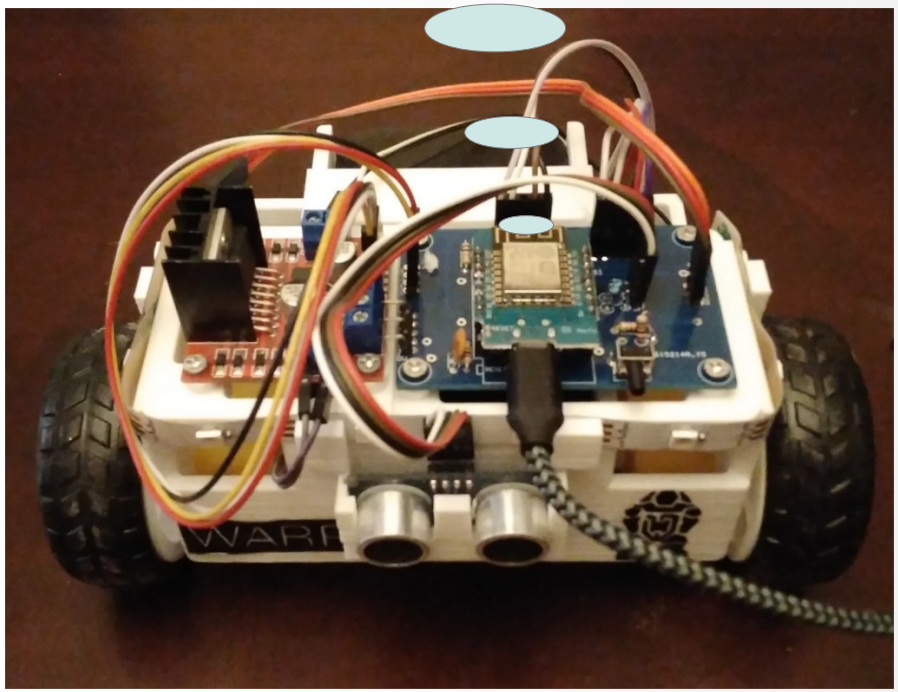
How it Works

Computer Connects to WiFi access point

- The computer & robot form a private “intranet”

How it Works

Listening to 192.168.4.1
Port 4999

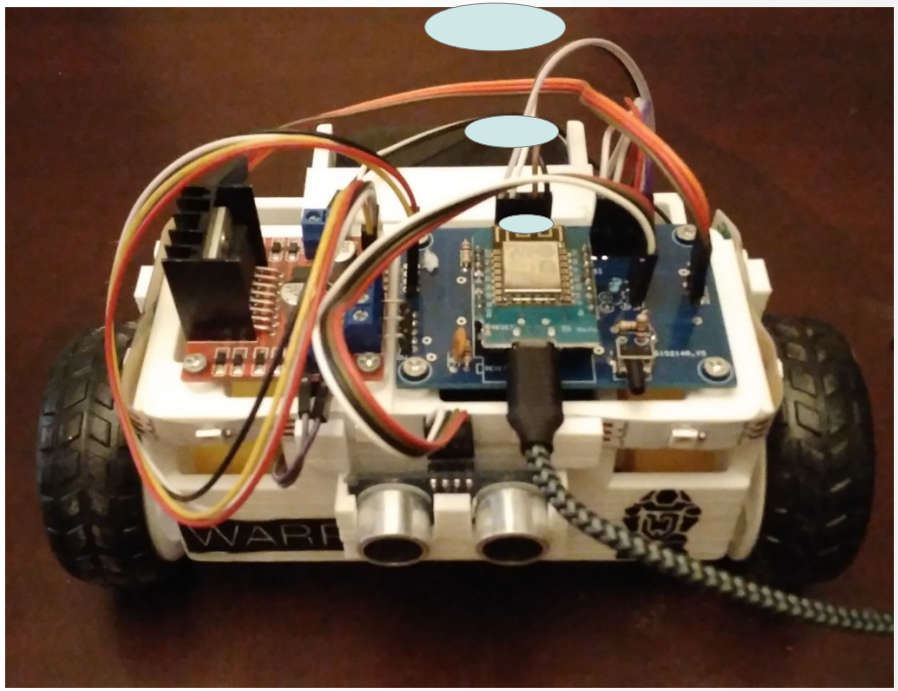


The Robot Listens to a TCP/IP Socket

- Web Servers work in a similar way

How it Works

Connect to 192.168.4.1
Port 4999



Listening to 192.168.4.1
Port 4999

The Java Code on the laptop connects to the robot

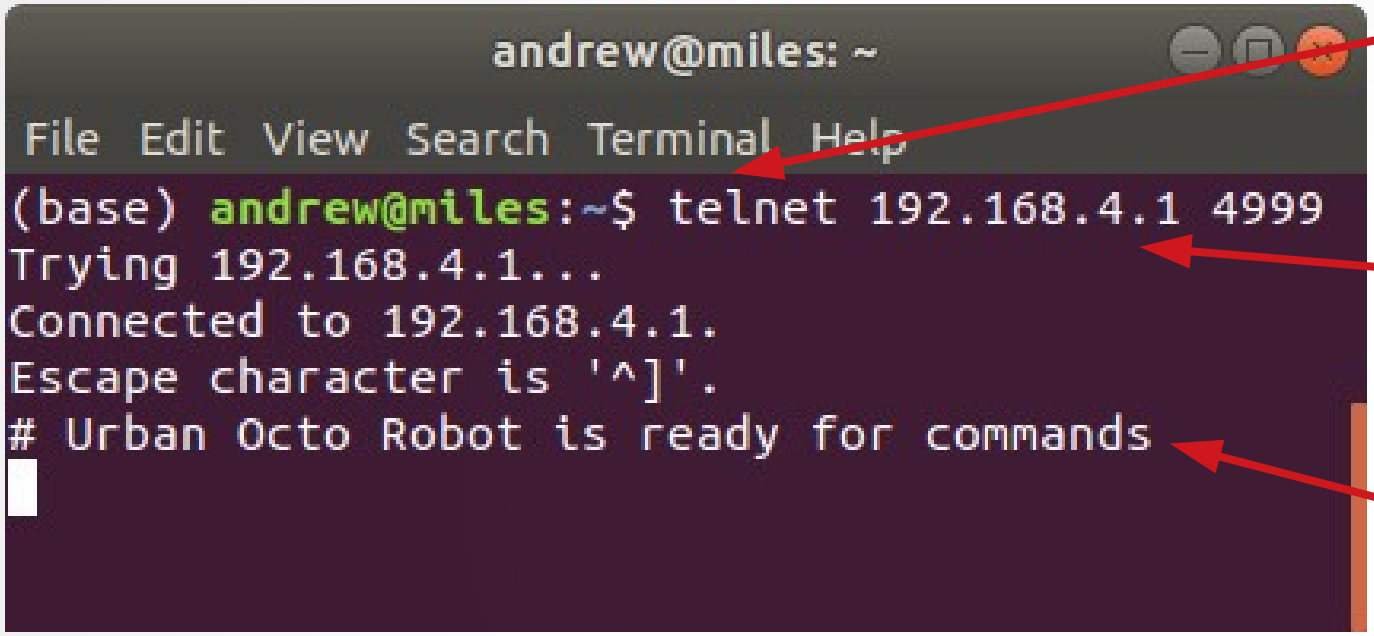
- Like a browser connecting to a web server

The Physical Robot is Pretty Basic

- First Robitics Competition Robot
  - Robo Rio is the brains of the robot
  - Robo Rio talks to devices like motors through a bus
  - Libraries for talking to the devices are provided
- Trainer “Oct-Robot”
  - Your PC is the true brains of the robot
  - PC talks to devices like motors through the WIFI
  - Libraries for talking to the devices are provided

Low Level Robot Command Speed Run

Low Level Commands - Connecting

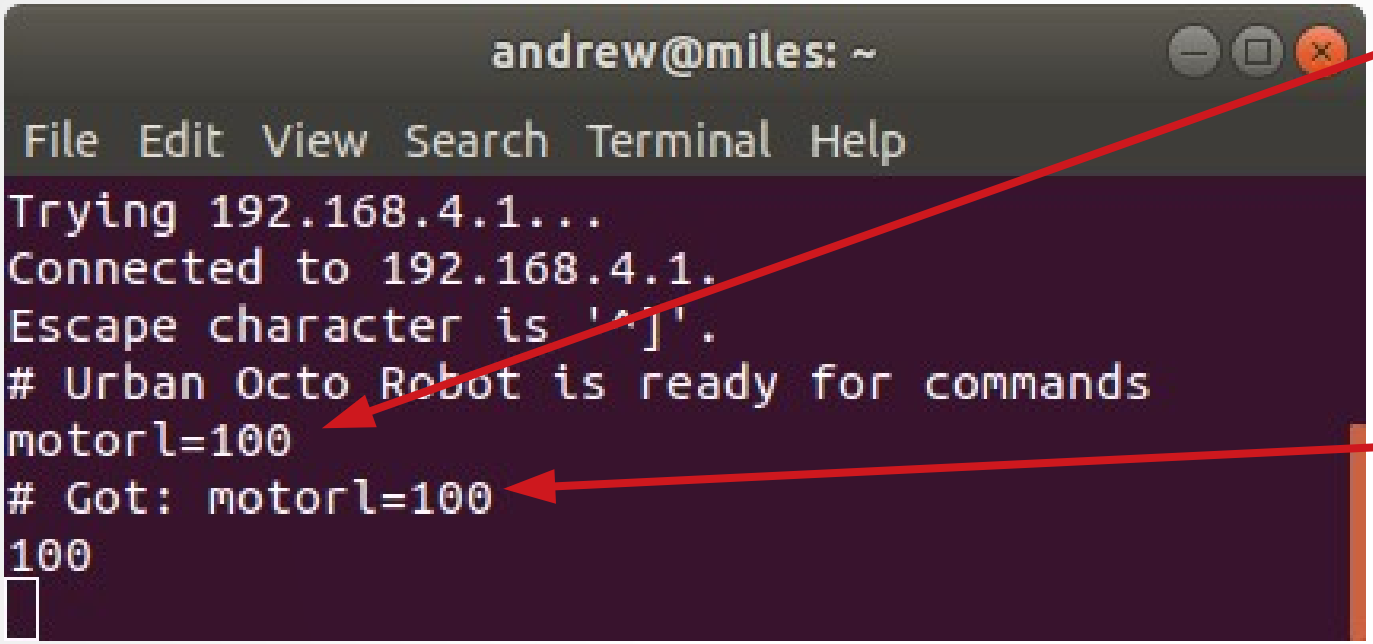


Command that connects to robot

Robot's Address and port

Robot saying "I'm listening & ready"

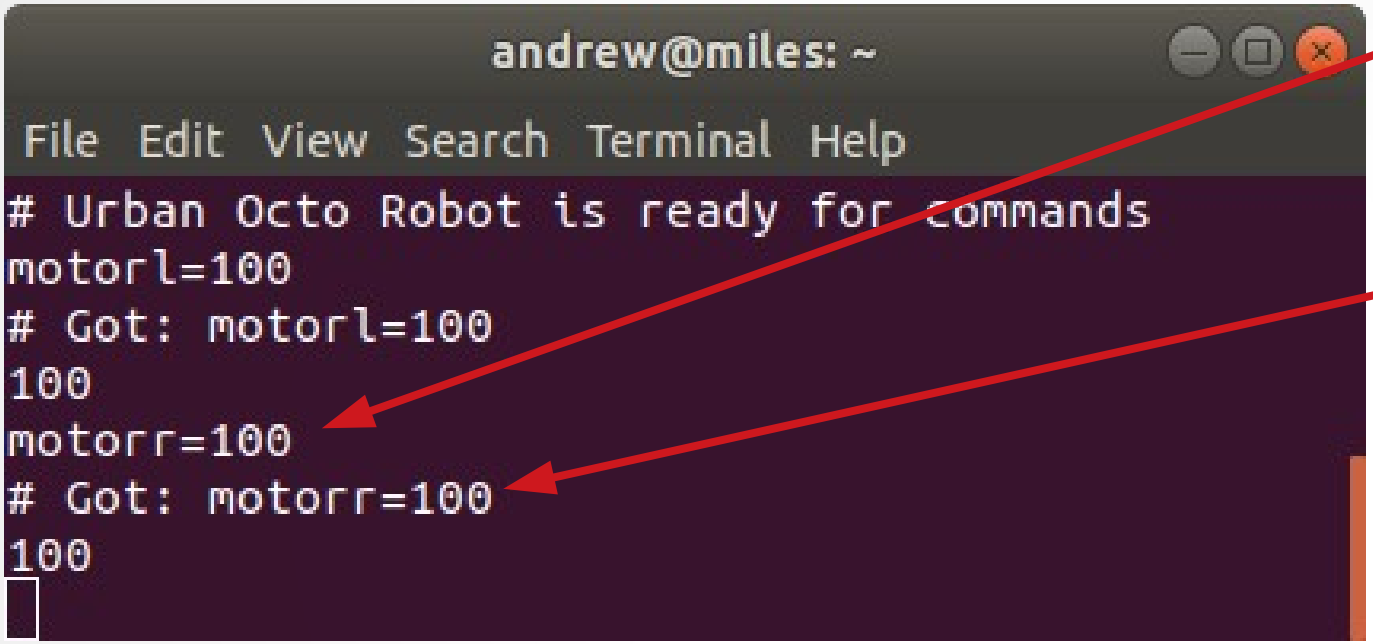
Low Level Commands - Motor



Tell Left Motor to go at 100%. This is something I typed in by hand

Robot saying “I got the command”

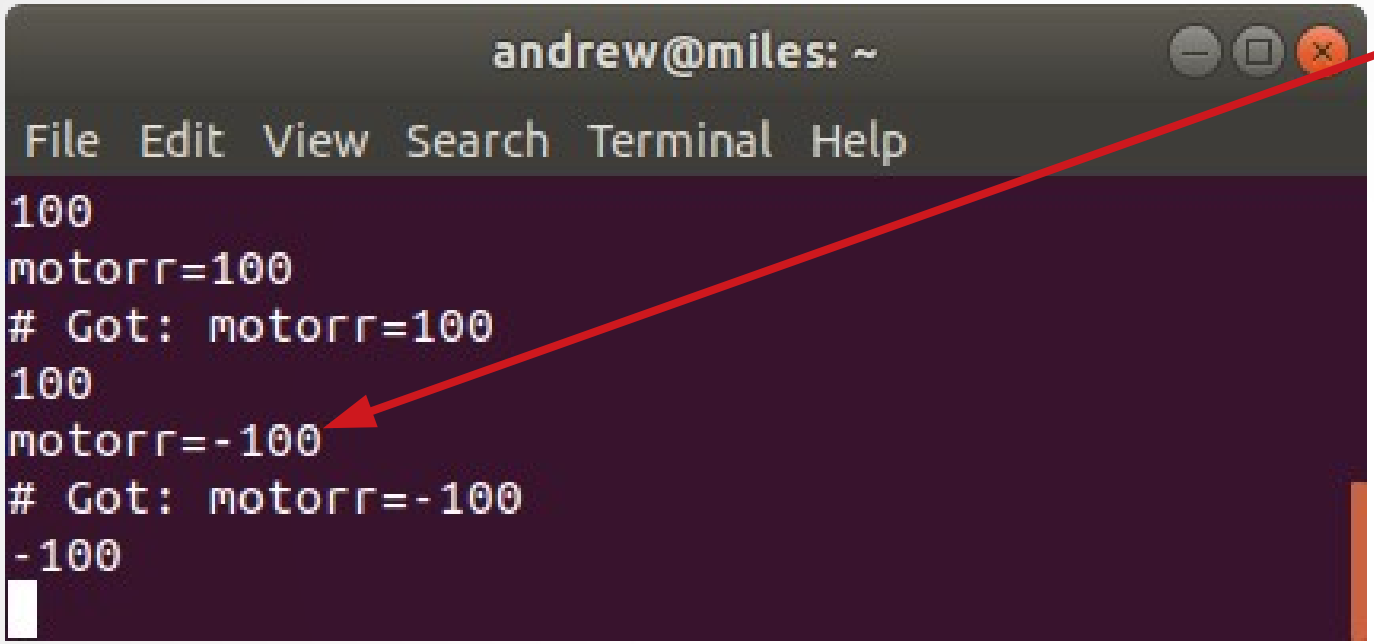
Low Level Commands - Motor



Tell Right Motor to go at 100%.

Robot saying “I got the command”

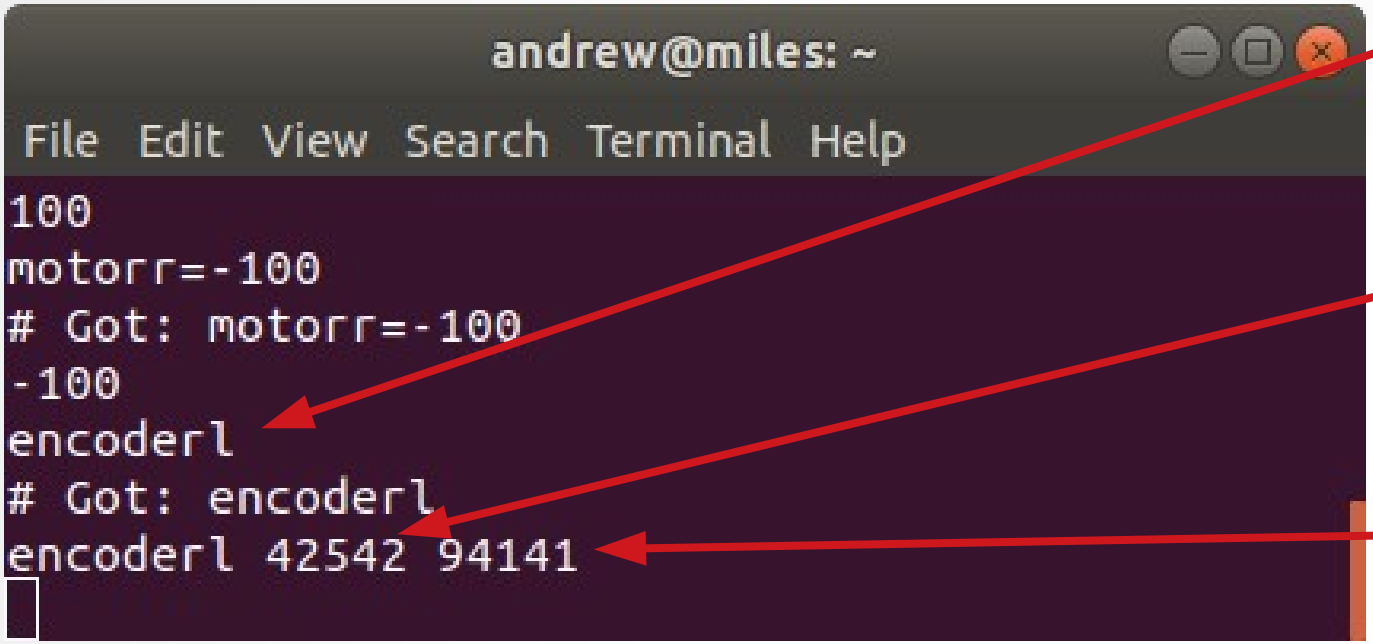
Low Level Commands - Motor



Tell Right Motor to go at -100%.

“Go counter clockwise instead of clockwise”

Low Level Commands - Encoder

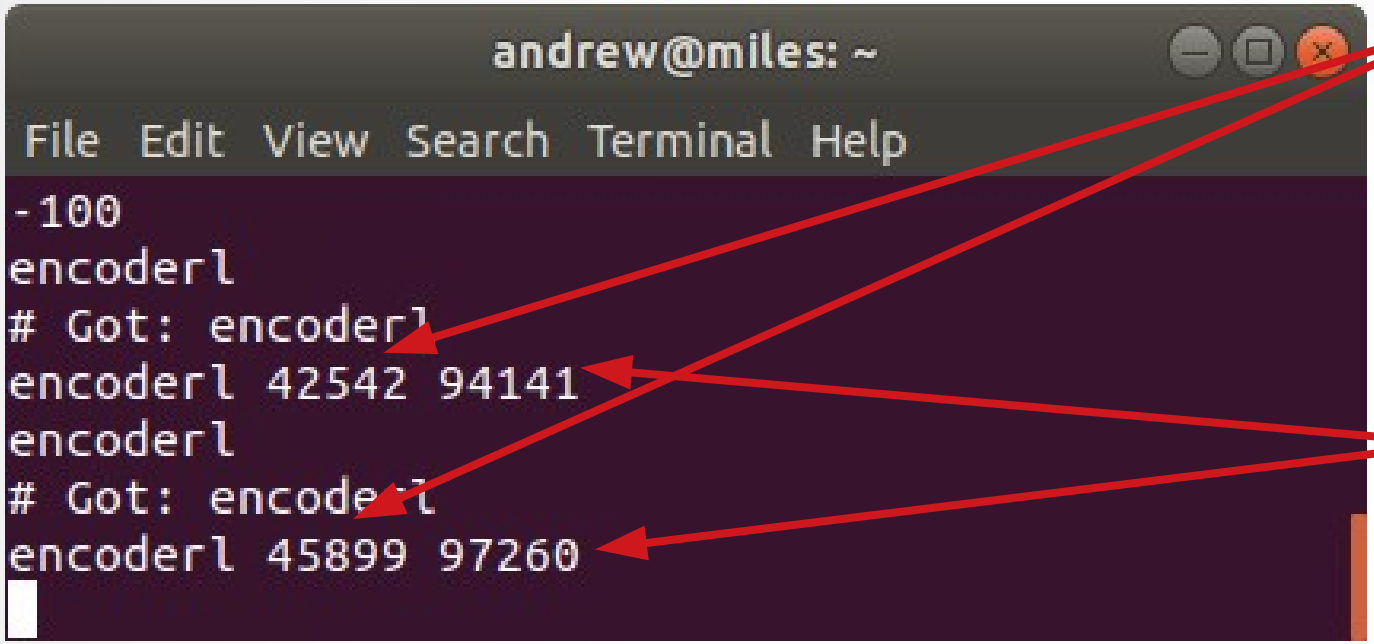


Read the Left Encoder

Left Encoder Position

Left Encoder Rotation Speed (94141 = ~1.44 rotations / sec)

Low Level Commands - Encoder

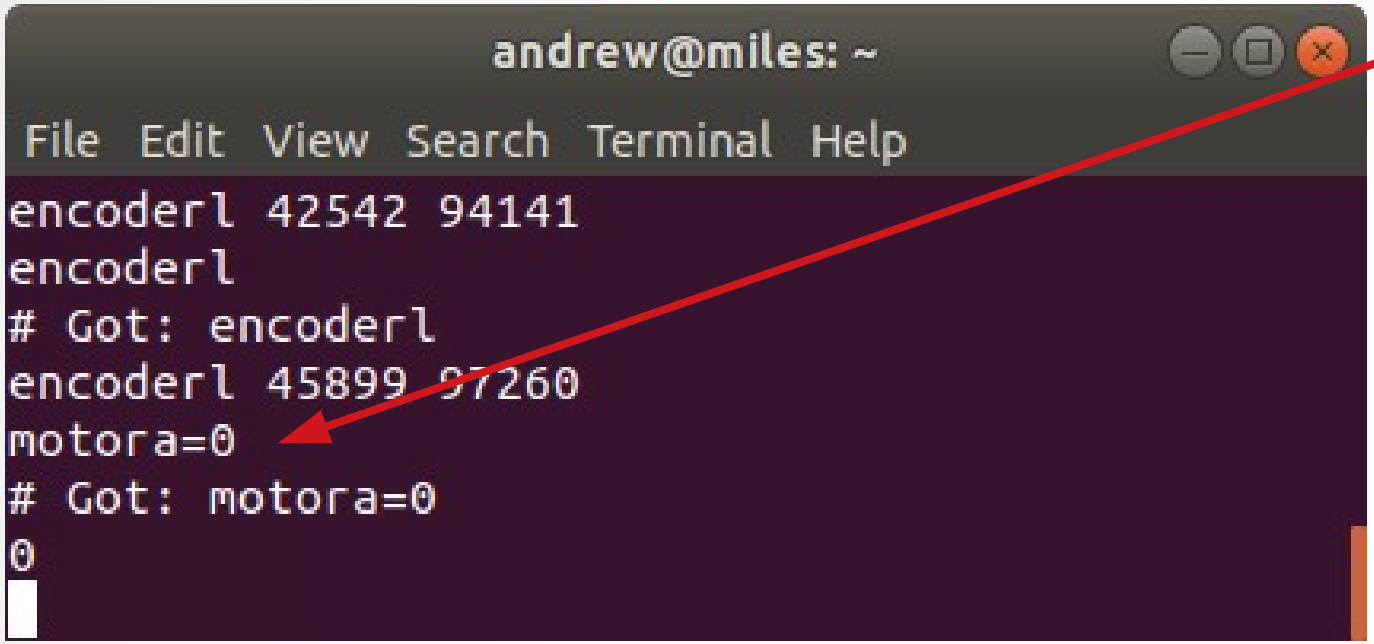


Encoder Position Changes while the wheel runs at 100%

Encoder Speed is about the same

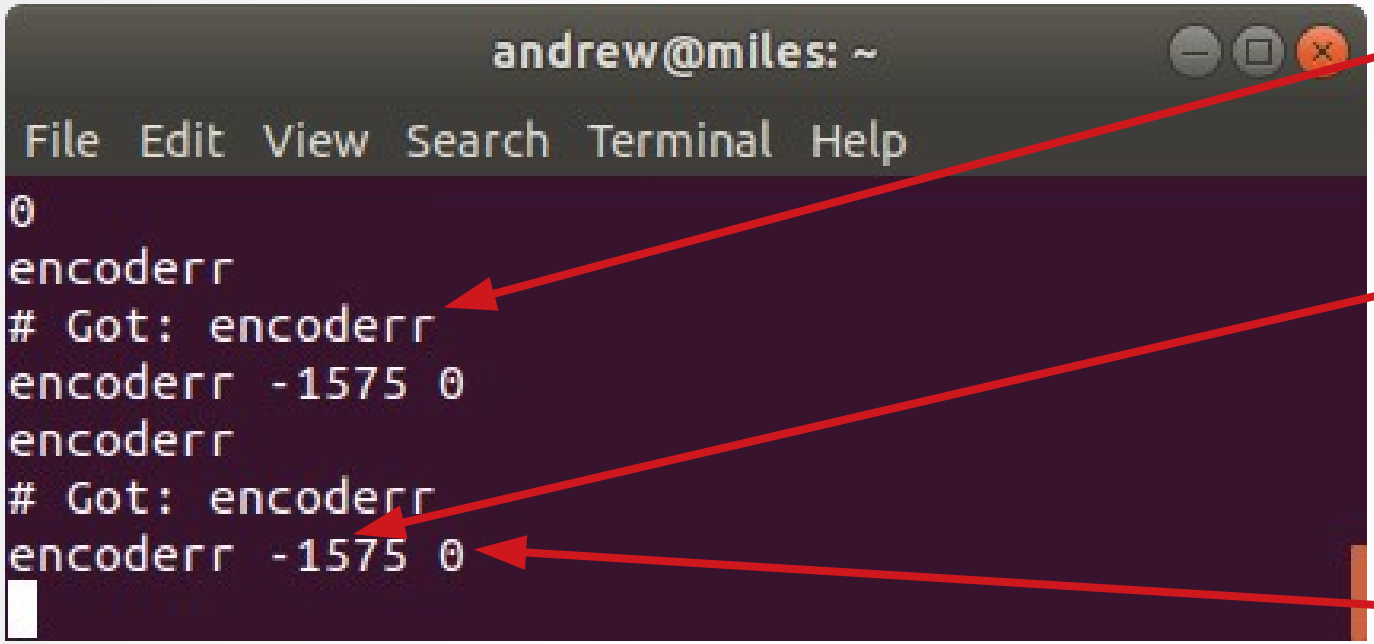
94141 = 1.44 rot/s
97260 = 1.48 rot/s

Raw Commands - “motora”



“motora” sets all motors. Setting all motors to 0 stops the robot

Low Level Commands - “encoderr”

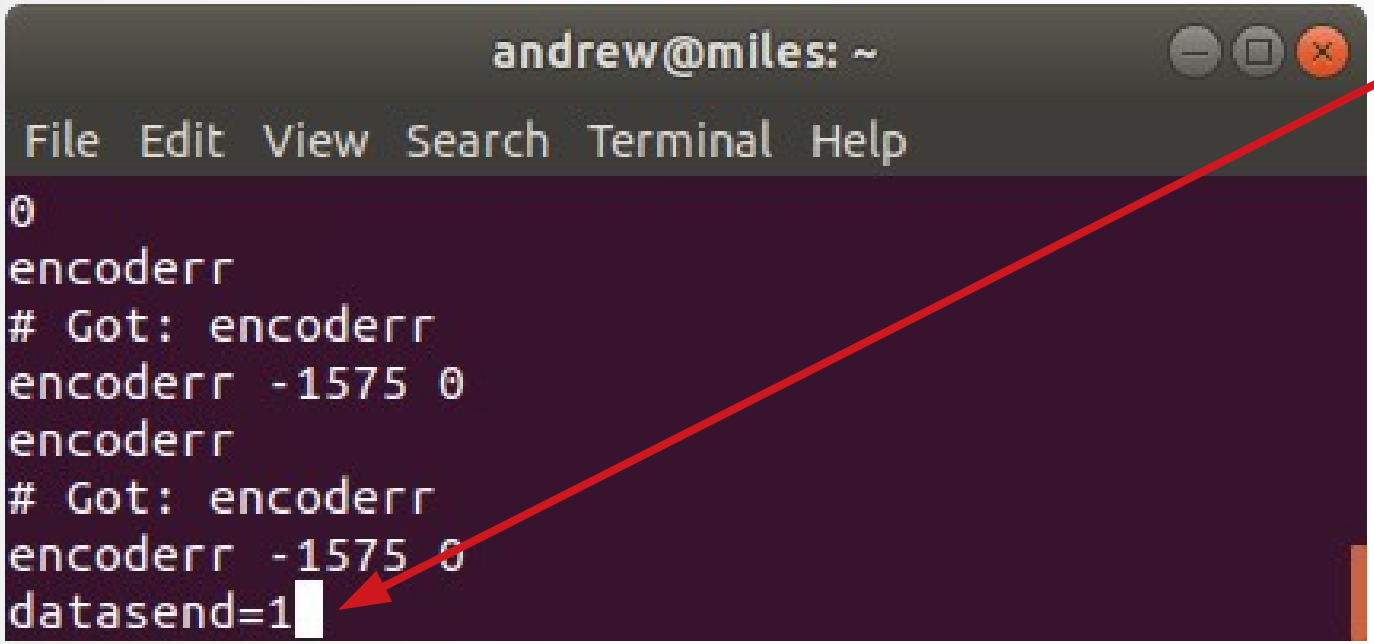


“encoderr” gets the right encoder

If the motors are off, position doesn’t change

And rotation speed is 0

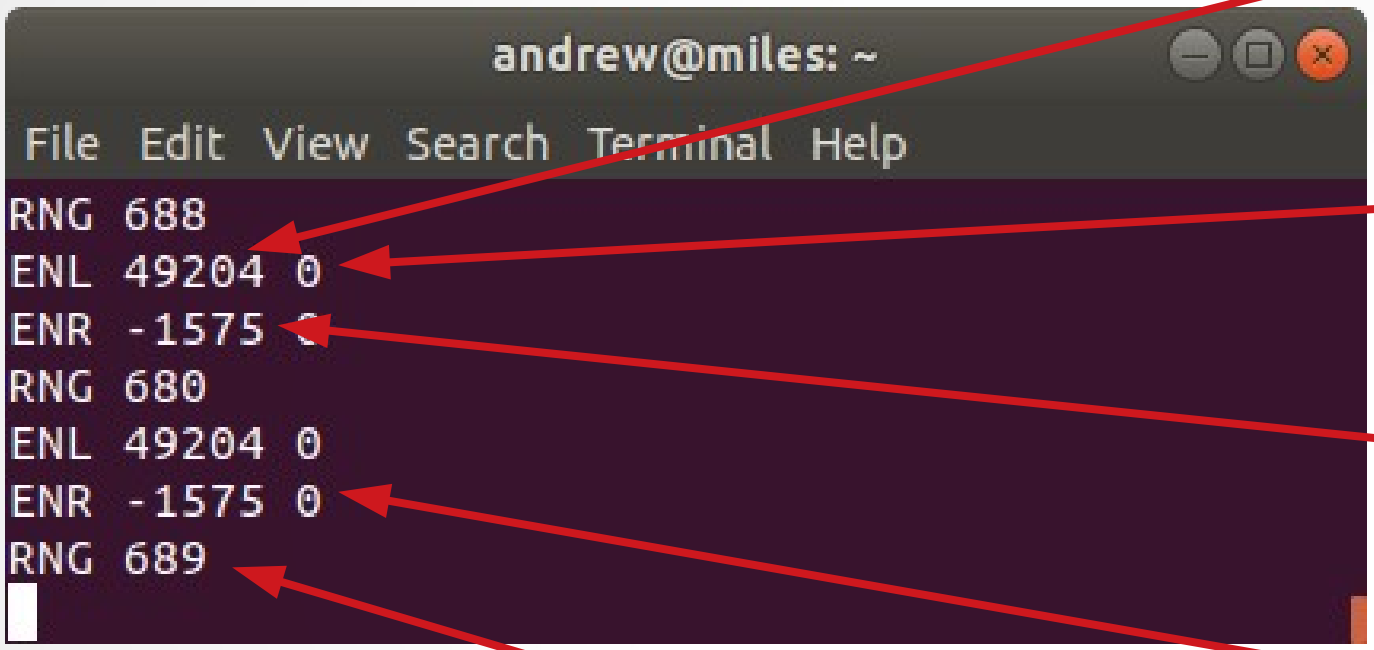
L.L. Command - Spam Sensor Data



datasend=1 tells the robot to send encoder and sonar range finder data every 1/10th of a second

datasend=0 turns this off.

L.L. Command - Spam Sensor Data



Left Encoder Position

Left Encoder Rotation Speed

Right Encoder Position

Right Encoder Rotation Speed

Sonar Sensor Distance in mm

First Robotics Java Emulation Code

TODO

- TODO
  - TODO

First Robotics Example Code

TODO

- TODO
  - TODO