Urban-Octo-Robot

Introduction

- Why the name “Urban-Octo-Robot”
  - Urban-Octo-Robot is the name github suggested

- Project Goal
  - Create an inexpensive robot for prorammer training
  - Students program with the First Robotics toolkit
  - The code is operating actual hardware (no simulation)
  - But it isn’t running on a competition bot
    - It’s Robot Programming, where the Robot is a toy car

Parts List and Costs

- Parts list with Amazing Prime links
  - $5 ESP8266 micro-controller (this is an IOT device)
  - $12 Motor Controller & Wheels
  - $6 Encoders
  - $5 Maybe some Sensors
  - $15 USB Battery Pack
  - <$5 3D Printed Body
- ~$50, electronics are all easily obtained

Coding & Communication

- Two hardware components in the setup
- Component 1: A Windows Laptop
  - This is where the Robot Code will run
- Component 2: The actual Robot
  - The robot accepts simple commands from the laptop
  - i.e., “set Motor A to 50% power”
- The Laptop and Robot communicate by Wifi
  - The Robot can connect to or make a hotspot

Windows Hardware

- Windows Laptop Component
  - Runs the standard First Robotics Java environment
  - Students run their code in FRC Emulation Mode
  - Robot “device driver” Java libraries will be created
    - These will emulated the interfaces students would typically use when programming a robot
  - The libraries will talk to the robot via TCP/IP
    - Example: The library might send the text “motora=50” to the robot to set the robot’s “A” motor to 50% power

Robot Hardware

- Robot Component
  - The Robot’s “brain” is an ESP8266 board
  - These boards are programmed like Arduinos
  - Like an Arduino, resources are limited (Specifications)
  - Link to the prototyping repository
    - Written in C++ and a work in progress
    - There May be alterantives that are more student friendly
    - But this is a safe choice for a prototype

Where are things right now

- The basic Firmware skeleton is done
  - Non-blocking Network Communications layer
  - Co-operative multi-tasking “Action” task engine
- Proof of concept Motor Controller object
  - Can “set speed” on a single motor over the network

What needs to be done

- Robot has to be CADed & 3D Printed
- Proof of concept for encoders
- Proof of concept Java Library
- Nice to Have: Design & Fab proper circuit board
- Tutorials (i.e., sample First Robotics projects)

Final Thoughts

- This is a is a proof of concept
- I’ll get a prototype or two done by fall
- If the result isn’t useful – that’s why we prototype
- If it is useful, IP will be on github & open source