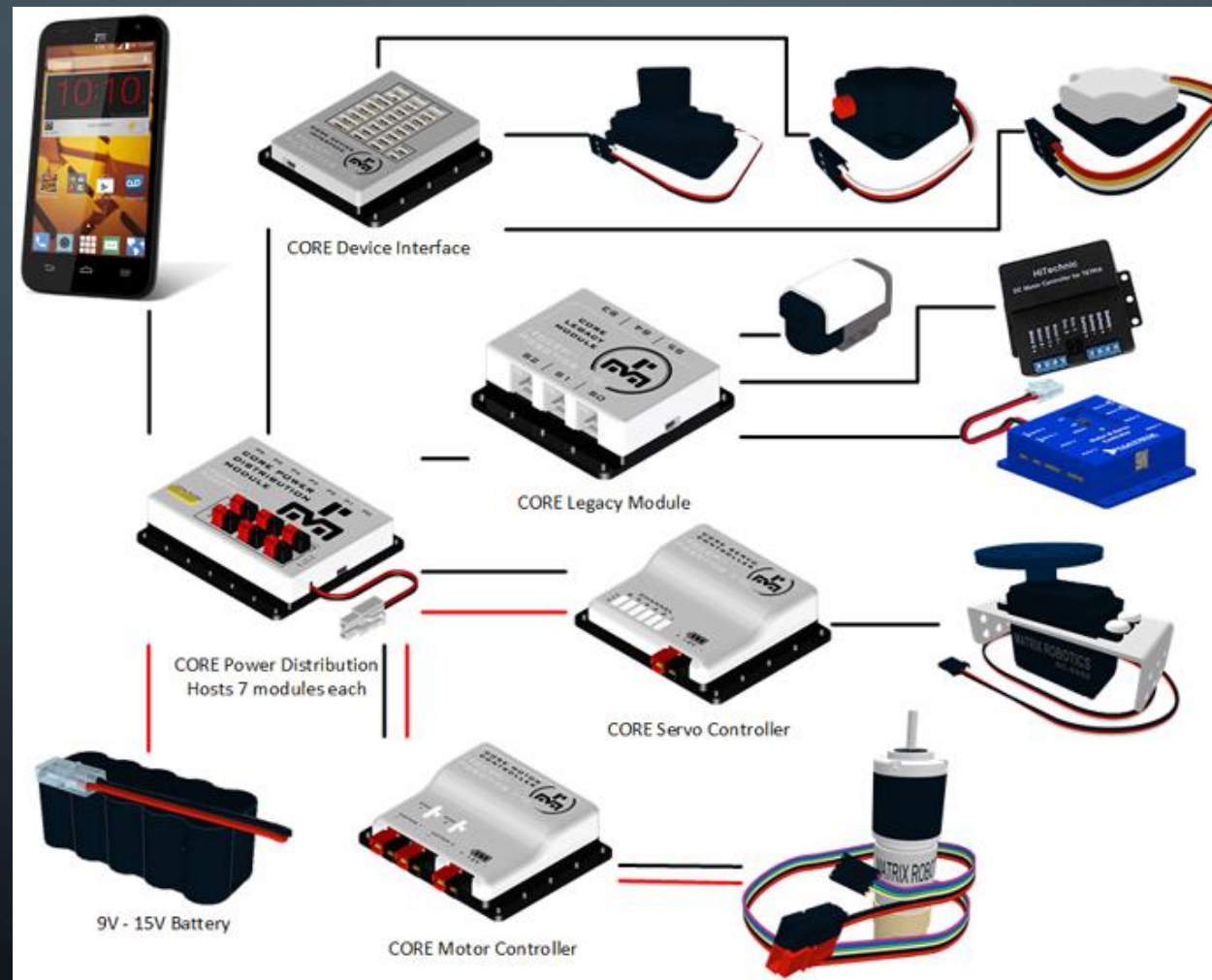# CONTROLLING FTC ROBOTS

THE PLATFORM
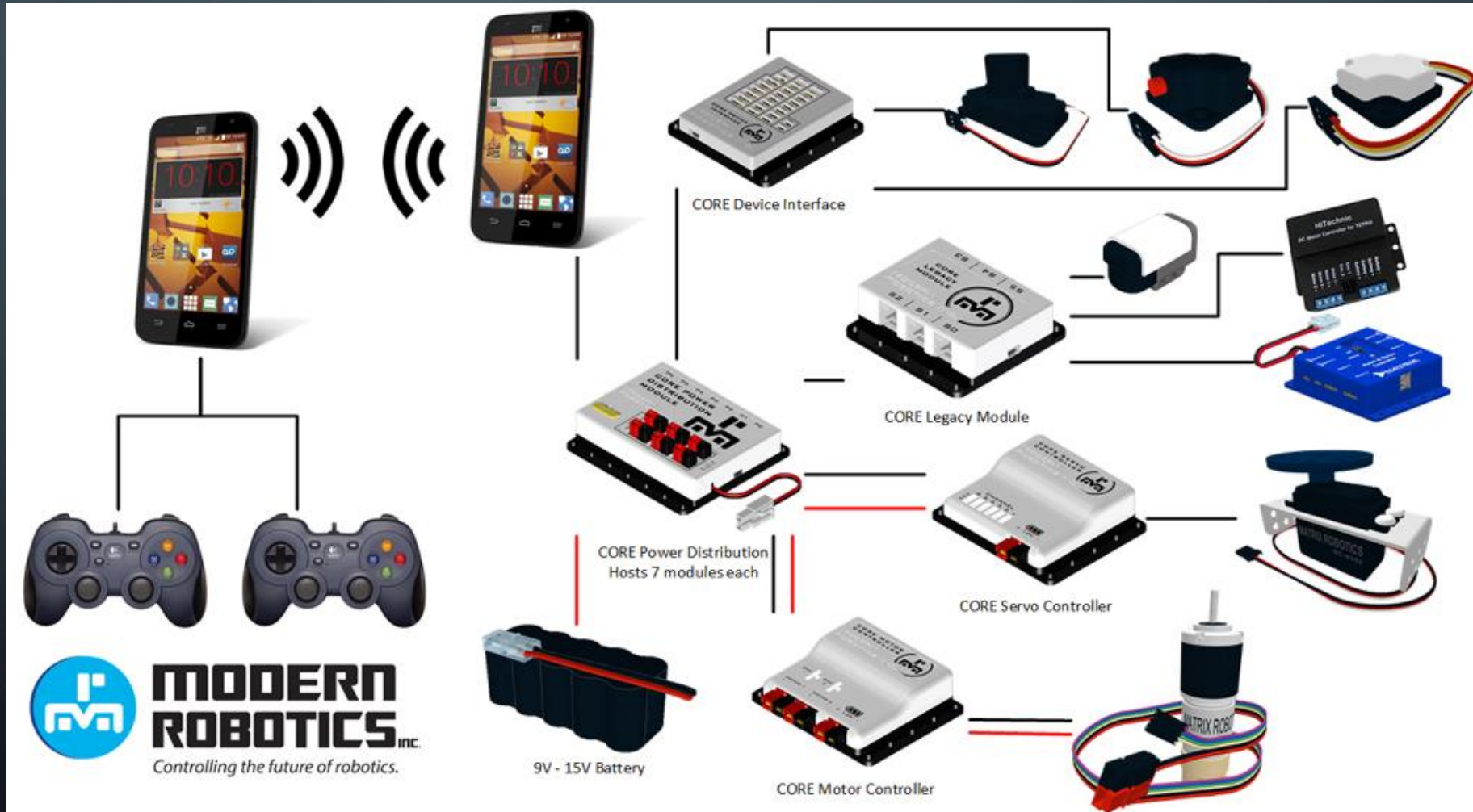
DRIVER STATION

- 1 Android Phone – Sends Input to Robot

- 2 Gamepads – Provides Input for Robot

- 1 USB Hub – Connects Gamepads to Phone

- 1 USB OTG Cable – Connects Phone to USB Hub
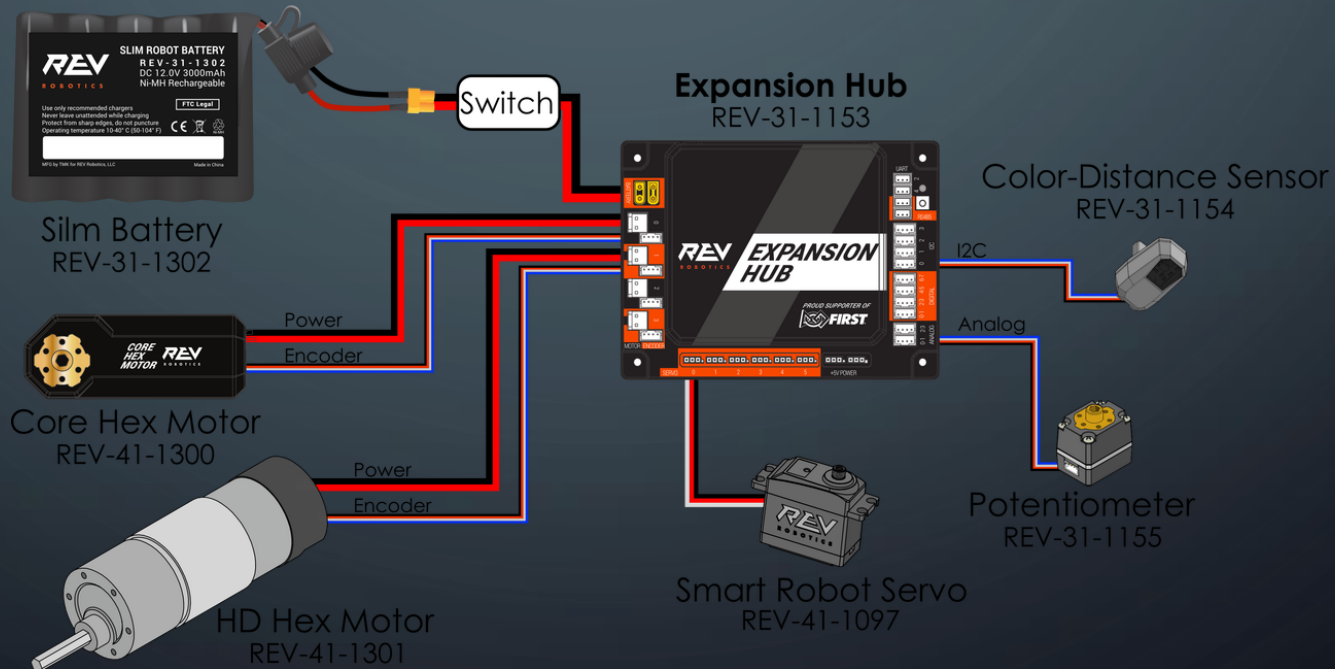
ROBOT: MODERN ROBOTICS

THE ROBOT: REV ROBOTICS

REV Robotics Wiring Reference Sheet

The REV Robotics Expansion Hub is compatable with many other sensors and actuators. Visit our website for more informaiton!

Switch

Expansion Hub
REV-31-1153

Silm Battery
REV-31-1302

Color-Distance Sensor
REV-31-1154

I2C

Power

Encoder

Analog

Core Hex Motor
REV-41-1300

Potentiometer
REV-31-1155

Power

Encoder

Smart Robot Servo
REV-41-1097

HD Hex Motor
REV-41-1301

for more reference guides visit **www.revrobotics.com/resources**

ACTUATORS

- Motors
  - With Encoders
  - Without Encoders

- Servos
  - 180 Degree
  - Continuous Rotation

SENSORS

- Wide Variety of Sensors Available
  - I2C
    - IMU
    - Color Sensor
    - Range Sensors
  - Digital
    - Touch Button
  - Analog
    - Potentiometer
    - Range Sensors

HOW TO PROGRAM ROBOTS

- 2 Options
  - Line by Line Code - Java
  - Block Code – Google Blockly
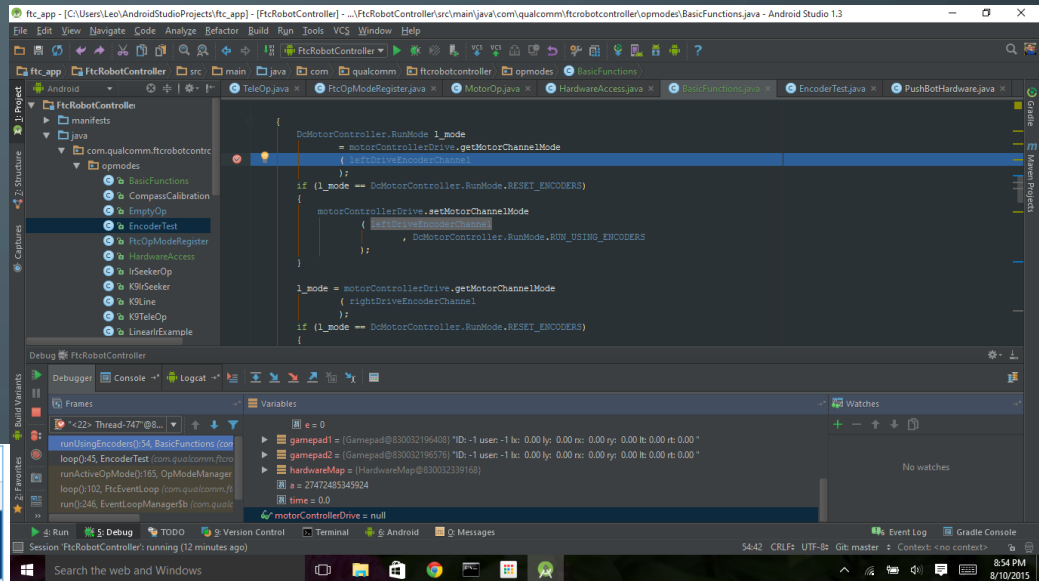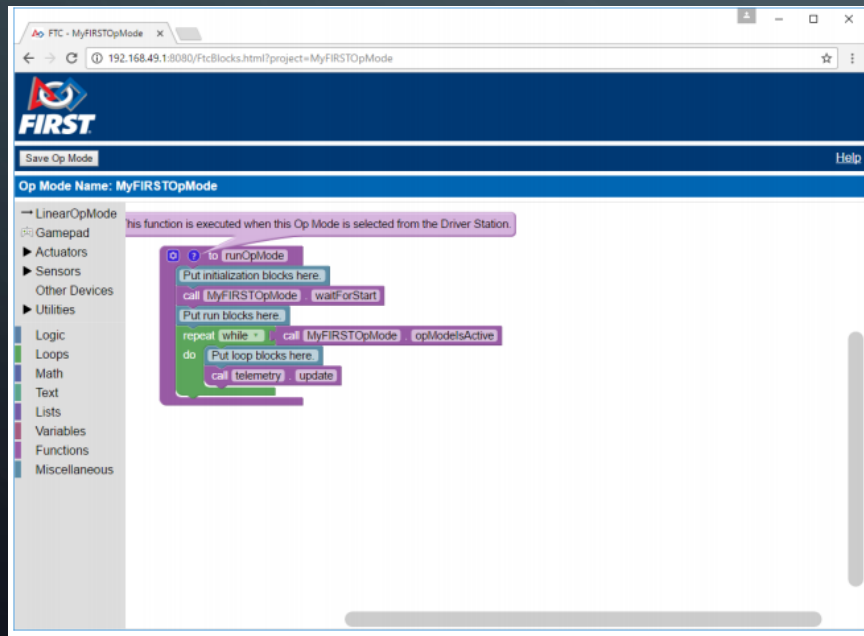
PROGRAMMING GOOD PRACTICE

- Always Consume Pizza and Caffeine Before Programming

- Keep Code Organized and Consistent

- //Comment Comment Comment

- Communicate With The Team Working on Electronics and Other Programmers

- Keep Your Code Modular

  - If using Java, use general OOP design principles

- Find Existing Libraries

DRIVING A MOTOR

- 3 Options to Drive Motor
  - Mapping Controller Input
    - Left Joystick Controls Motor 1
    - Button A Runs Motor 2 at 70% Power
  - Time
    - Drive for T Seconds Then Stop
  - Sensor Input
    - Range Sensor – Drive Until X Distance Away
    - Encoder – Drive X Rotations or Y Distance
    - Color Sensor – Drive Until 0,0,0 RGB Value Found

RUNNING A SERVO

- 3 Options to Run a Servo
  - Mapping to Controller Input
    - Left-Joystick Determines Position of Servo 1
    - A Button sets Servo 2 to 180deg. B Button sets servo 2 to 70deg.
  - Time
    - After 3 seconds, set Servo 1 to 70deg.
  - Sensors
    - Range Sensor- When X distance from wall, set Servo 2 to 45deg.
    - Range Sensor- As distance to wall decreases, increase the angle of Servo 3
    - Color Sensor- If RGB value = 255,0,0 set Servo 3 to 180deg. If RGB value = 0,255,0 set Servo 4 to 180deg.

RUNNING A DRIVE TRAIN

- Tank Drive
  - This is the simplest and most common drive scheme for a robot
    - Left Joystick
      - y-axis maps to Left Front and Left Rear Motor Power
    - Right Joystick
      - y-axis maps to Right Front and Right Rear Motor Power

- Holonomic Drive
  - These are more complex and solutions are specific to the type of holonomic drive
    - A typical control scheme is as follows:
      - Left Joystick
        - X-axis maps to left and right motion
        - Y-axis maps to forward and revers motion
      - Right joystick
        - X-axis maps to rotation of the robot

SENSORS

- Digital
  - Communicates with either a 1 or a 0 depending on its state
  - Switch/Push Button

- Analog
  - Communicates with stream of values ranging from 0 to 255
  - Ultrasonic Sensor, Potentiometer

- I2C
  - Each Sensor has a Unique Address
  - Communicates in Packets both Sent and Received
  - Color Sensor, Hybrid Range Sensor, IMU