

CONTROL SYSTEMS

ASSIGNMENT #1A

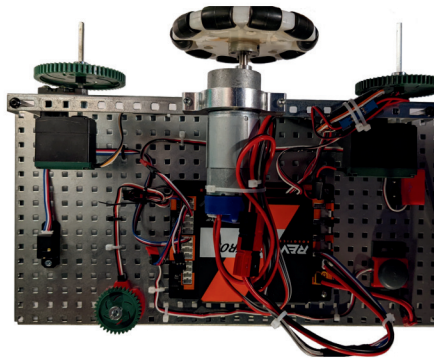


An introduction to the Rev Control Hub, the Driver Station App, and the testBoard

REQUIRED ELEMENTS



BATTERY



TESTBOARD



**ANDROID
PHONE**

TESTBOARD ELEMENTS

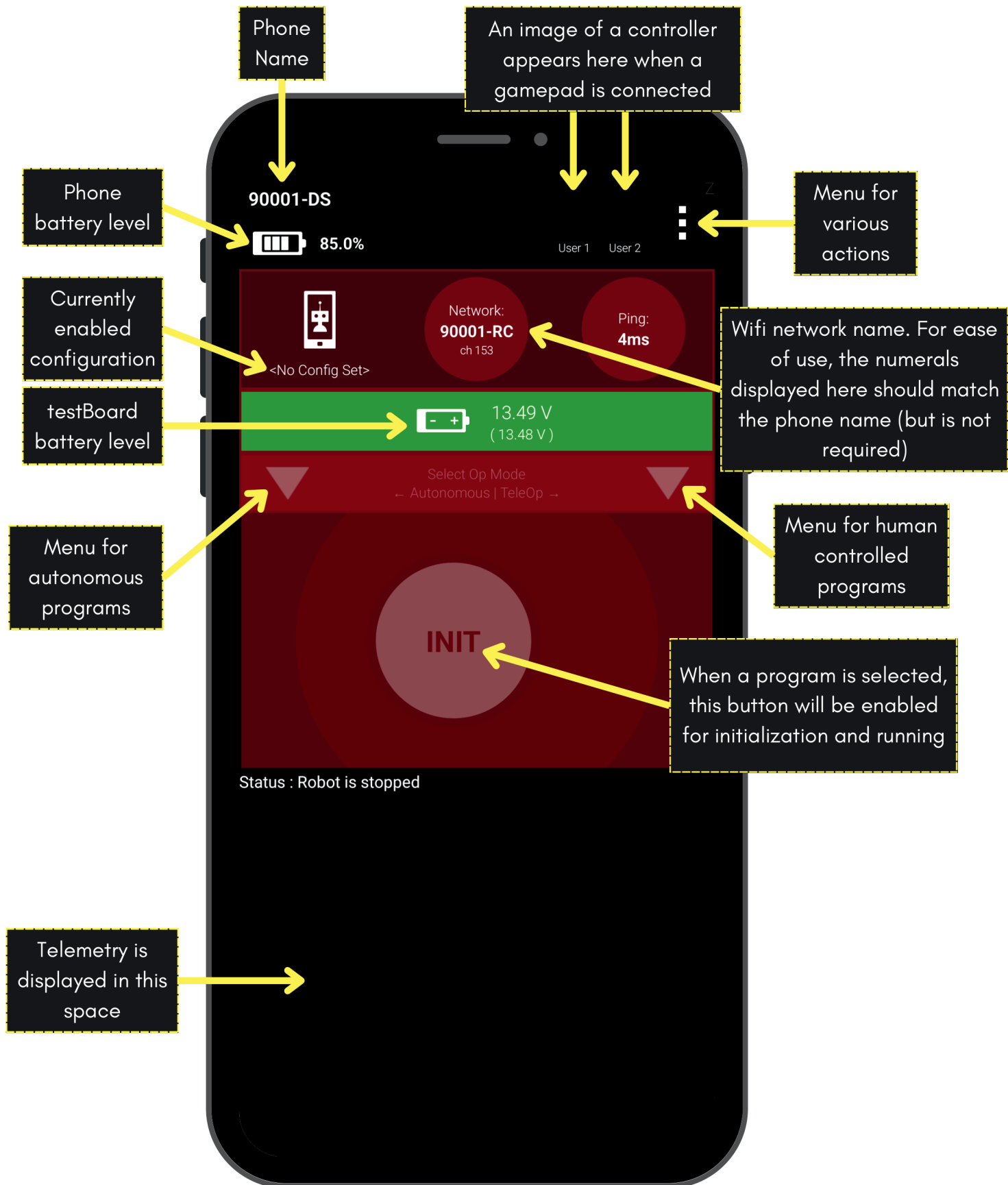
- Rev Control Hub
- 1 Motor
- 1 Standard Servo
- 1 Continuous Rotation Servo
- 1 Potentiometer
- 1 Limit Switch
- 1 Push Button
- 1 Color Sensor

THE CONTROL HUB



The elements on the testboard are controlled by the Rev Control Hub. The control hub is capable of controlling numerous elements and contains a large number of ports for motors, servos, sensors, and many other similar devices. The hub runs an Android operating system that is paired with the phone you are using over wifi.

THE DRIVER STATION



GETTING STARTED

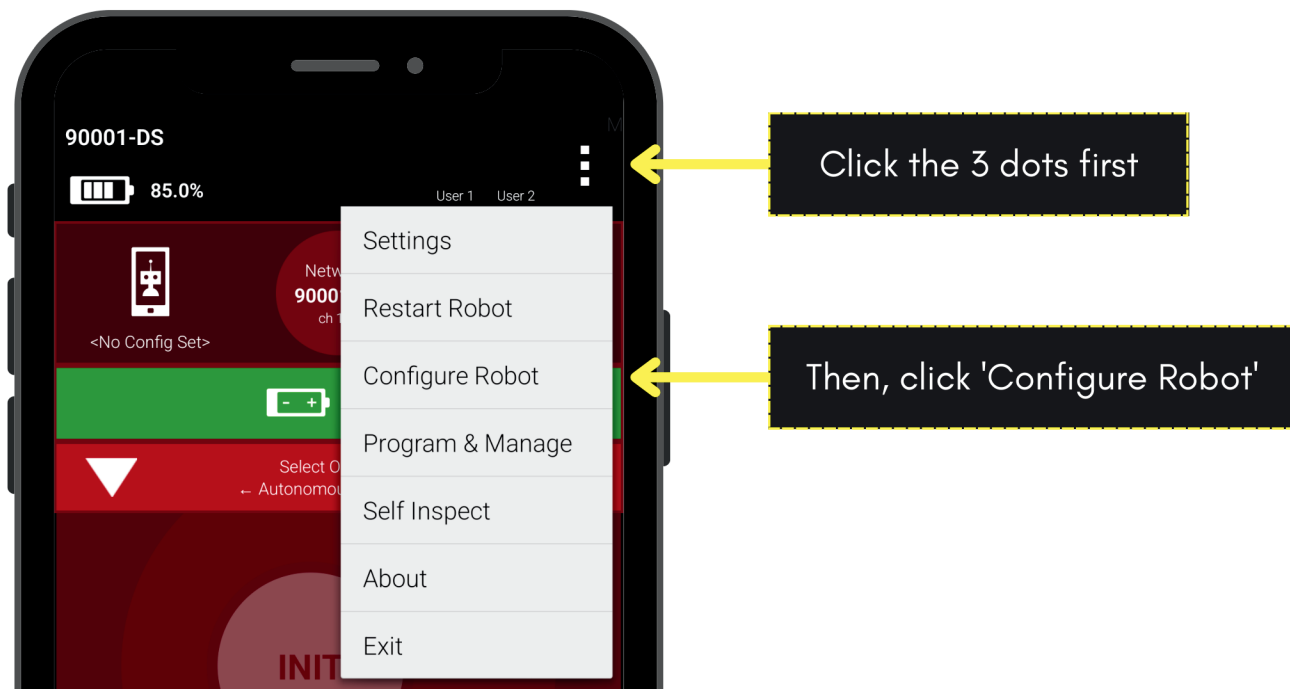
1. Flip the Power Switch to the 'On' position
2. Wake up the phone
3. Open up the app called 'FTC Driver Station'
4. Wait for everything to load on the screen
 - a. The Network bubble will update with a network name once you have successfully connected to the testBoard
 - b. If you are still not connected after approximately 1 minute, please ask for assistance

CREATING A CONFIG

To control the testBoard, you will need to configure the Control Hub to recognize all the devices on the testBoard.

A configuration matches devices to specific ports on the board.

You will do this by accessing the 'Configure Robot' menu found on the phone.



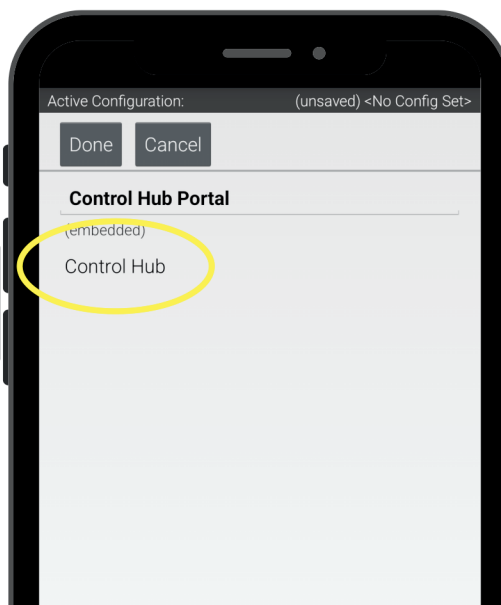
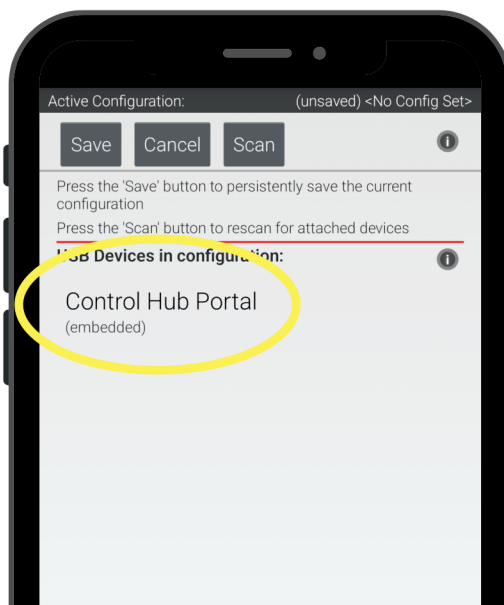
CREATING A CONFIG

There are a series of screens you will need to navigate through for this step. Follow the images below carefully.

SCREEN 1

This first screen lists *all* available configurations stored on the Control Hub. You may see any number of configurations here.

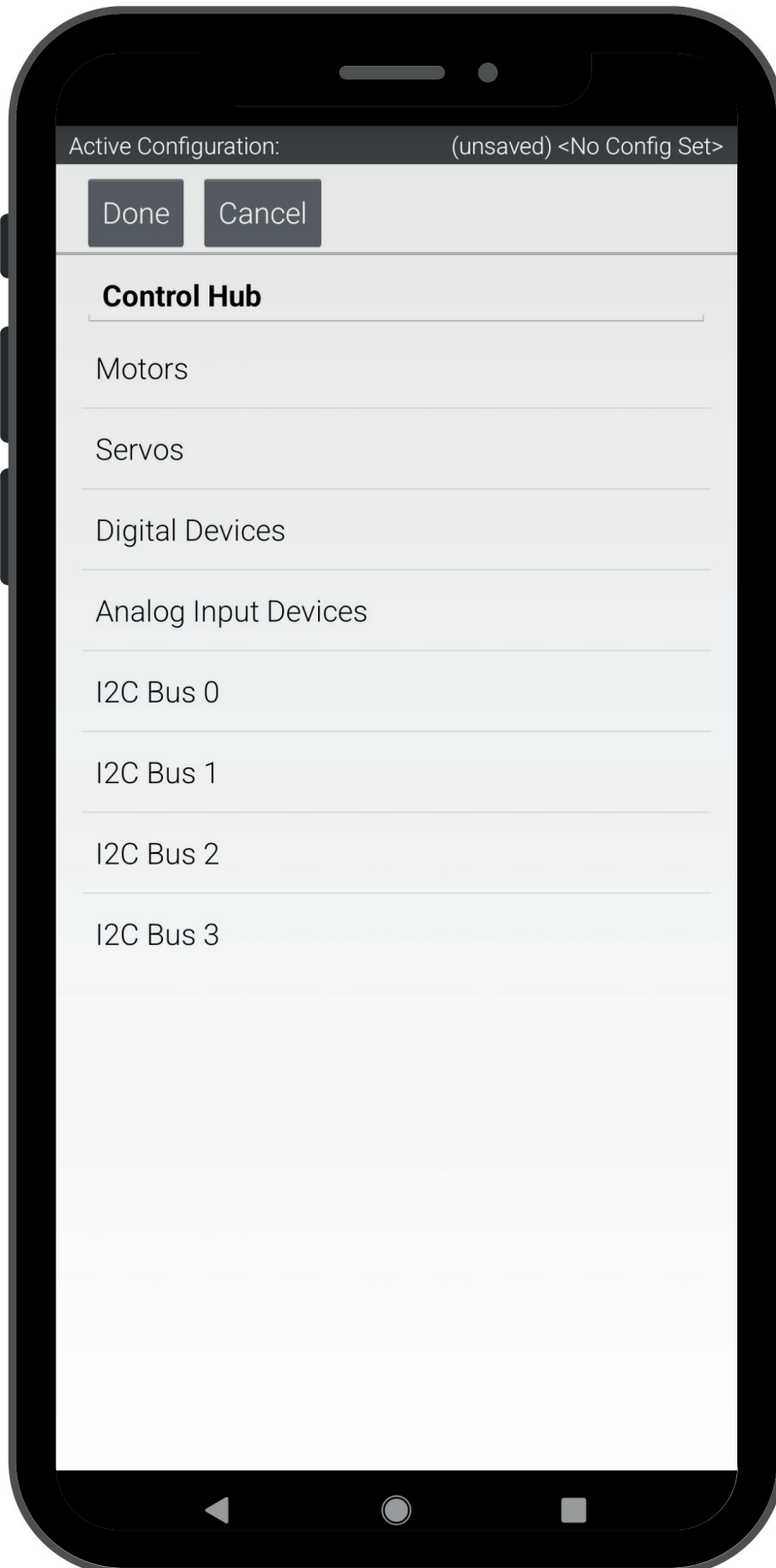
Click the 'New' button at the very top to create your configuration.



SCREENS 2 & 3

Click the text displaying 'Control Hub Portal' and 'Control Hub' on these screens.

ASSIGNING COMPONENTS



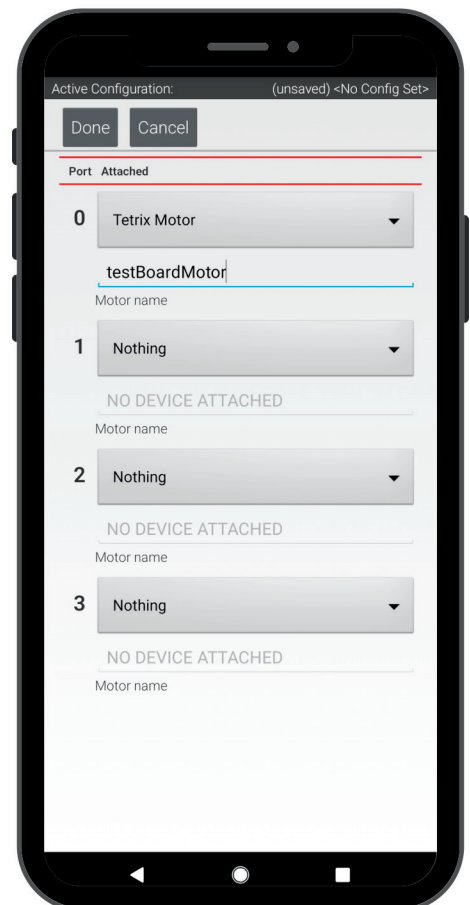
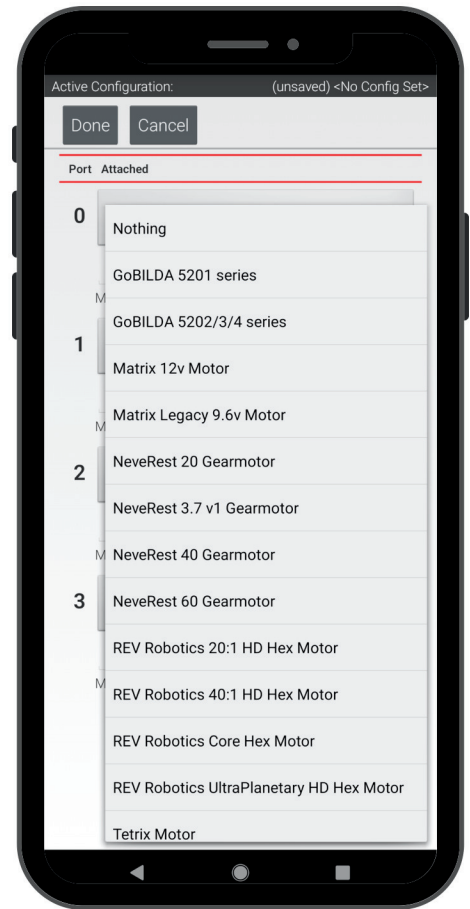
You will be returning to this screen frequently when creating your configuration for the testBoard.

Each menu controls various aspects of the Control Hub, depending on the connected component type.

Start by pressing 'Motors'

MOTORS

1. You will be presented with 4 data entry groupings. Each with a listed port number (0-3) and the attached device (which is a dropdown menu).
2. Within this dropdown menu, there are many different potential devices to select from.
3. On the testBoard, trace the wire from the motor back to the Control Hub. This will tell you which port it is plugged into.
4. On the back of the motor, you will be able to find the name of the device. Select that motor type. See below for extra assistance.
5. Underneath that, there is a text field. You need to type in a specific name of the motor so that it can be referenced in the code. Since you did not write this code, you need to write in *exactly* what I named it.



Type in: testBoardMotor

Throughout this unit, you will primarily be using one of two motors, pictured below. Select the one that matches what you see on the testBoard.



REV Ultraplanetary



Tetrix Motor

Hit the 'Done' button to return to the devices menu

SERVOS

- You will be presented with 6 data entry groupings. Each with a listed port number (0-5) and the attached device (which is a drop-down menu).
- There are two servos on the testboard. One is a continuous rotation servo and the other is a standard servo.
 - If you need a refresher on their differences, please refer back to Assignment 0 on Canvas

Standard Servo

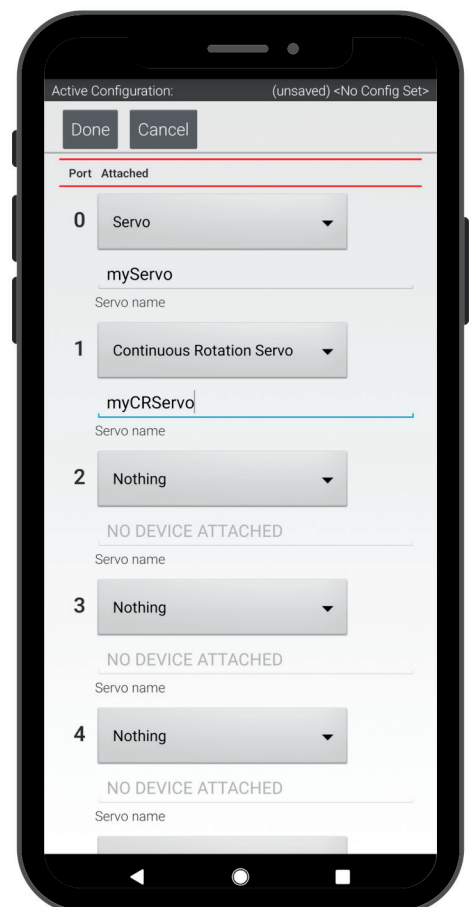
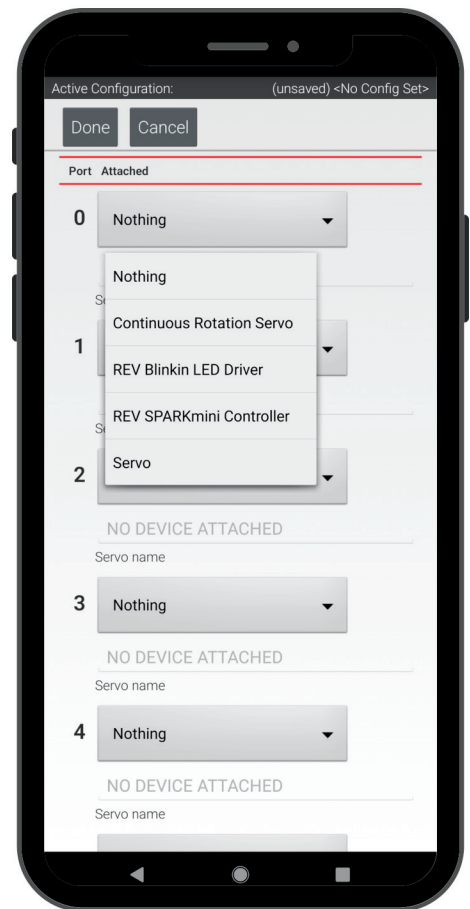
1. Find the standard servo on the testBoard. Trace the wire back to the Control Hub to determine the port it should be assigned to.
2. For the correct port in the menu on the phone, select 'Servo' from the drop down menu.

Type in: myServo

Continuous Rotation Servo

1. Find the continuous rotation servo on the testBoard. Trace the wire back to the Control Hub to determine the port it should be assigned to.
2. For the correct port in the menu on the phone, select 'Continuous Rotation Servo' from the drop down menu.

Type in: myCRServo



Hit the 'Done' button to return to the devices menu

DIGITAL DEVICES

- There are two digital sensors present on the testBoard. If you need a refresher on types of sensors, refer back to Assignment 0 on Canvas
- The sensor ports on the Control Hub are designed so they can take in signal from two different sensors through each port.
 - Even numbered ports are on the outside
 - Odd numbered ports are on the inside

Limit Switch

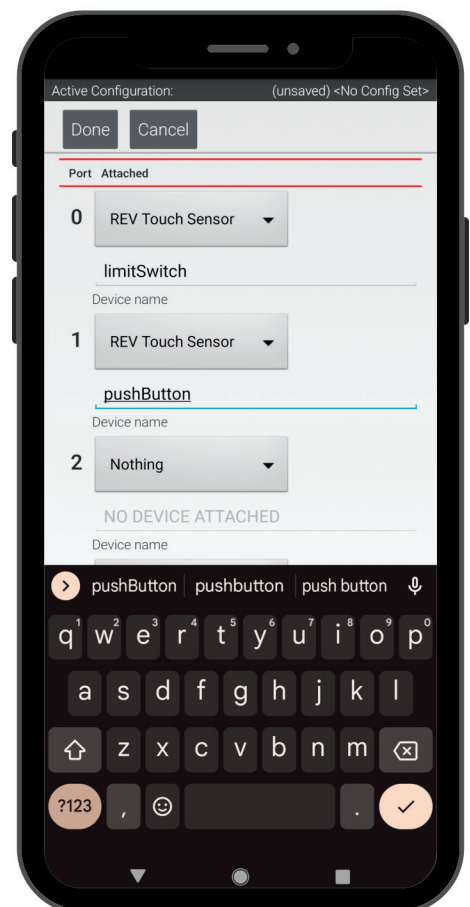
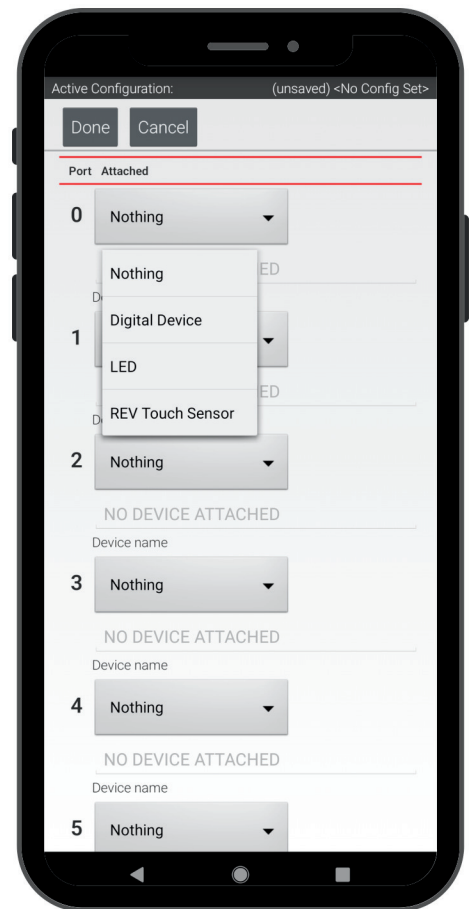
- Find the limit switch on the testBoard. Trace the wire back to the Control Hub to determine the port it should be assigned to.
- For the correct port in the menu on the phone, select 'REV Touch Sensor' from the drop down menu.

Type in: `limitSwitch`

Push Button

- Find the push button on the testBoard. Trace the wire back to the Control Hub to determine the port it should be assigned to.
- For the correct port in the menu on the phone, select 'REV Touch Sensor' from the drop down menu.

Type in: `pushButton`



Hit the 'Done' button to return to the devices menu

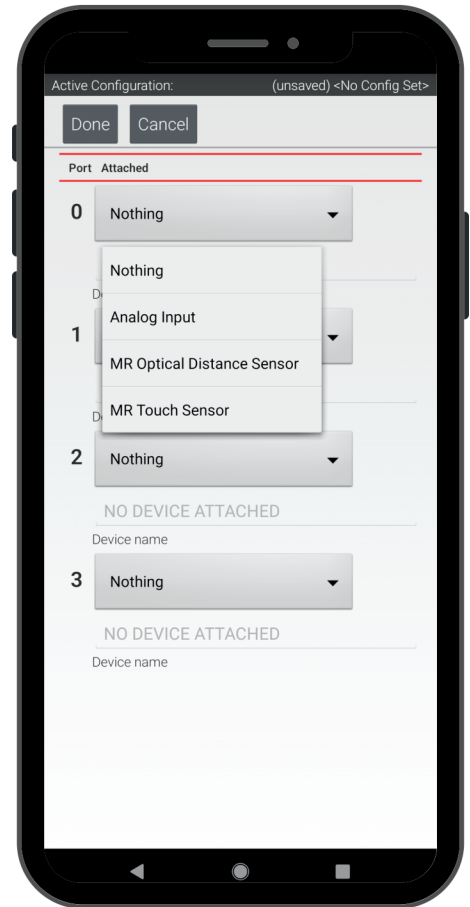
ANALOG INPUT DEVICES

- There is one analog sensor present on the testBoard. If you need a refresher on types of sensors, refer back to Assignment 0 on Canvas
- The sensor ports on the Control Hub are designed so they can take in signal from two different sensors through each port.
 - Even numbered ports are on the outside
 - Odd numbered ports are on the inside

Potentiometer

1. Find the potentiometer on the testBoard. Trace the wire back to the Control Hub to determine the port it should be assigned to.
2. For the correct port in the menu on the phone, select 'Analog Input' from the drop down menu.

Type in: potentiometer



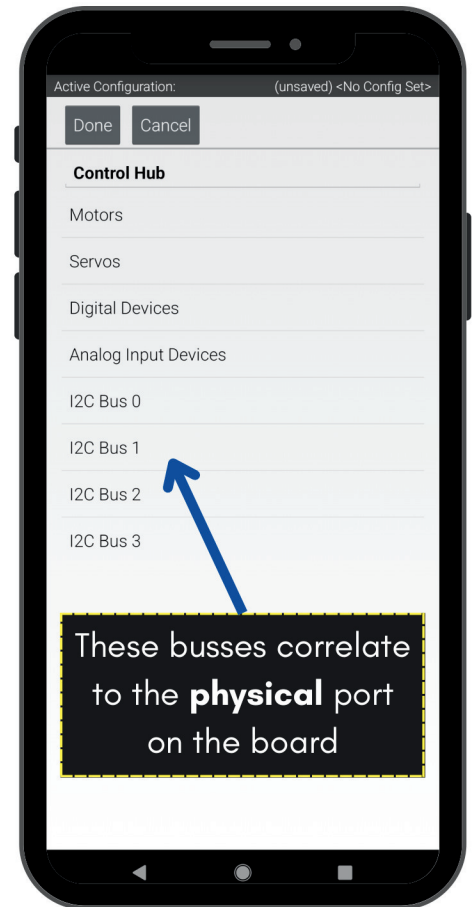
Hit the 'Done' button to return to the devices menu

I2C SENSORS

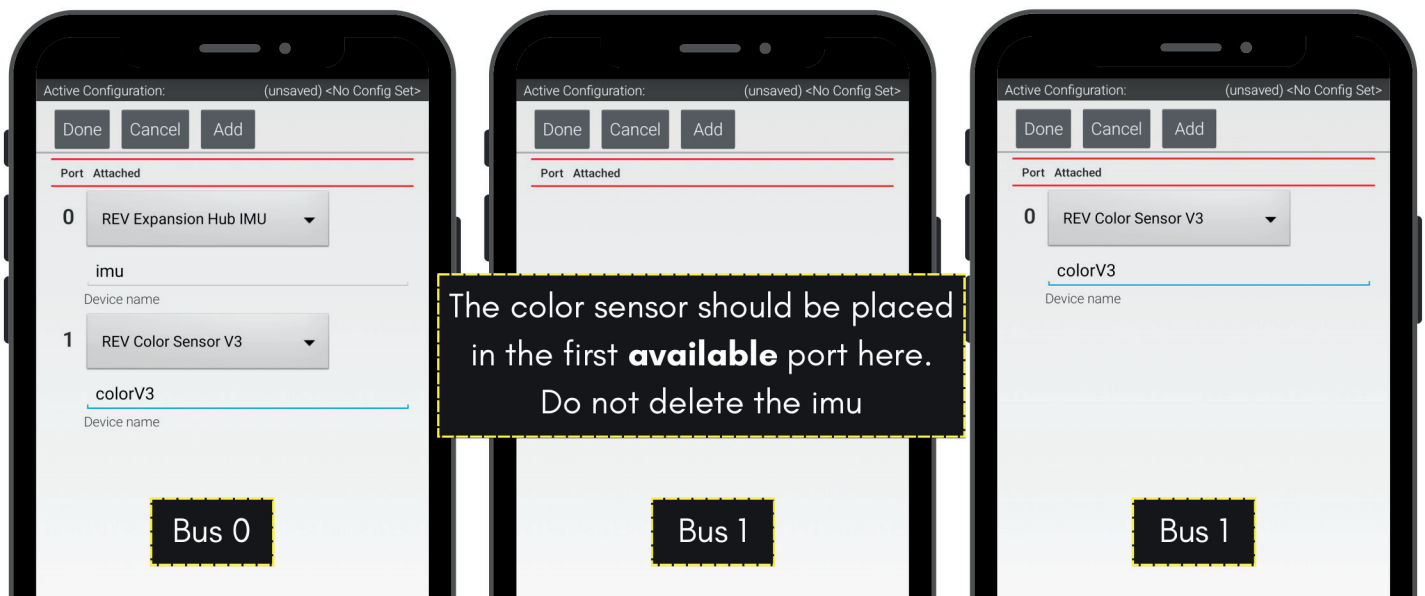
- There is one I2C sensor present on the testBoard. If you need a refresher on types of sensors, refer back to Assignment 0 on Canvas
- The I2C ports on the Control Hub are referred to as 'busses', with each capable of supporting multiple ports and devices.

Color Sensor

1. Find the color sensor on the testBoard. Trace the wire back to the Control Hub to determine the **bus** it should be assigned to.
2. Select that bus
3. On the next screen, click 'Add'
4. On the generated dropdown, select 'REV Color Sensor V3'
 - a. If you are on Bus 0, this will be port 1
 - b. If you are on one of the other busses, this will be port 0
 - c. Note: These ports do **NOT** correlate to the physical port on the Control Hub



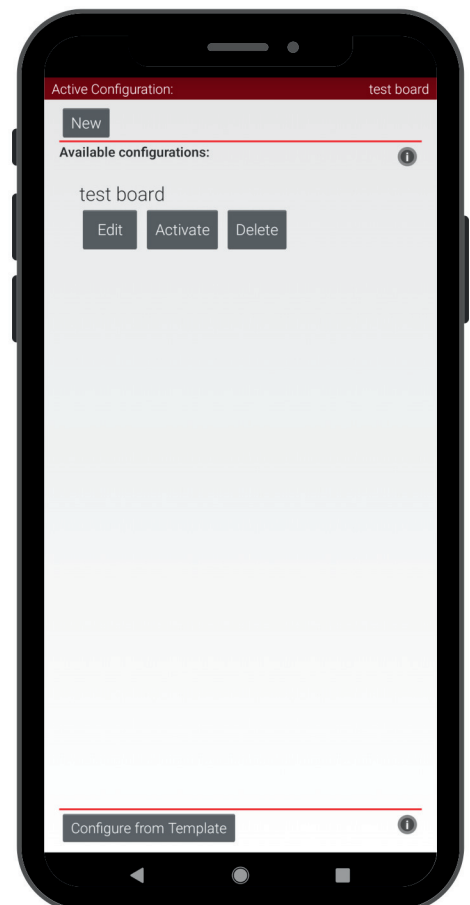
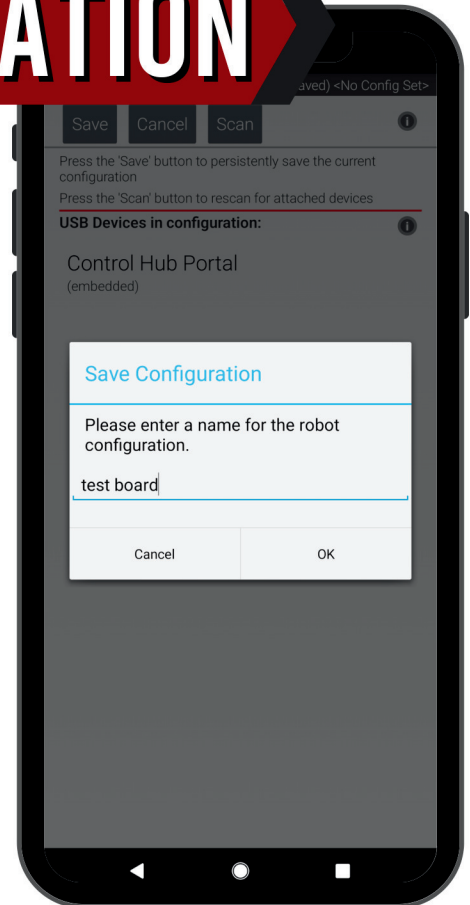
Type in: colorV3



Hit the 'Done' button to return to the devices menu

SAVING THE CONFIGURATION

- Press 'Done' on every menu until you get to the option to 'Save'
- Press 'Save'
- Type in the name you want to use for you configuration
 - Make sure this name is identifiable to you, you will need to be able to select it again later
 - Example: test board - jack
- After saving, you will see that your configuration is active by checking in the upper righthand corner of the phone on this screen.
 - On the home screen, the active configuration will be displayed near the top left



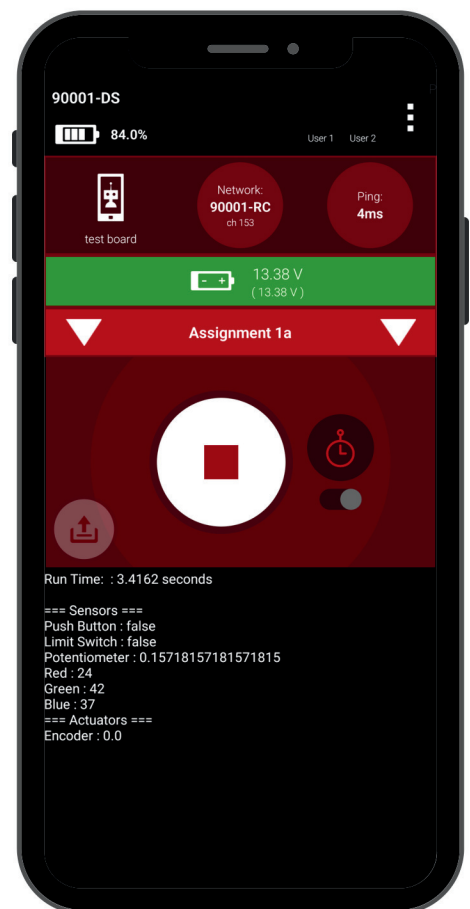
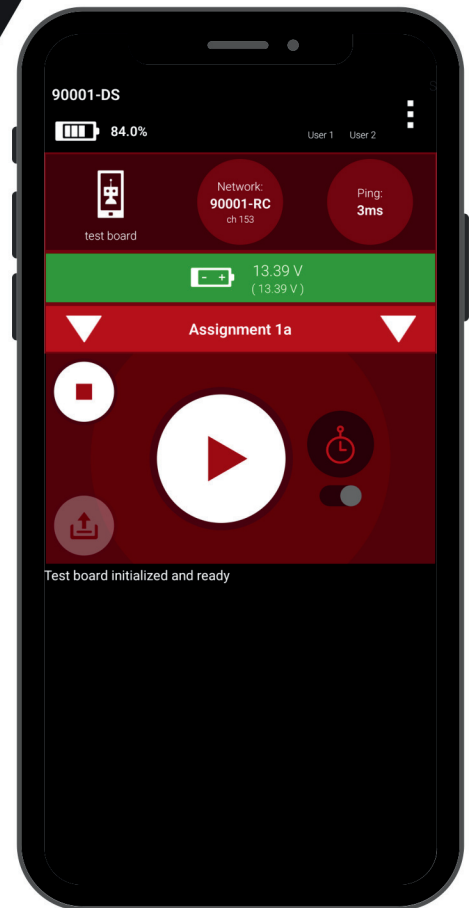
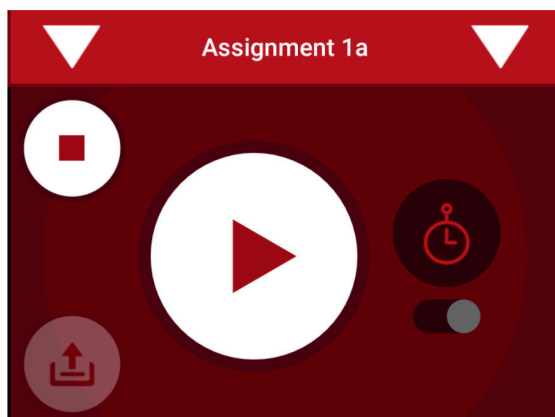
Hit the Android back arrow to return to the home screen

RUNNING PROGRAMS

- Now that you have an active configuration set for the testBoard, you can begin running programs

Assignment 1a

1. You will find the first program under the Autonomous Programs menu
 - a. This is the downward facing arrow on the lefthand side of your phone screen
2. Now select 'Assignment 1a'
3. When you have done so, you will see the home screen change to resemble the image to the right
4. Turn off the toggle for the timer
5. Click on the large white button that says 'INIT'
 - a. Short for 'Initialize'
6. Observe the text that appeared in the telemetry window
7. Click the play button
8. Depending on the phone size, you may need to scroll to see all the telemetry data



ASSIGNMENT #1A

- While the program is running, use your hands to interact with the objects on the testBoard to discover the answers to the questions below. Almost all items should produce a noticeable result in the telemetry window.
- Items can be:
 - Pressed
 - Spun
 - Hovered over

QUESTIONS

1. What are the possible values for the push button?
2. What are the possible values for the limit switch?
3. What is the range of possible values for the potentiometer?
4. What is the range of possible values for the color sensor with the light on? (Sensor Covered/Uncovered)
5. What do you believe is the range of possible values for the encoder?
6. What items on the test board did not cause any changes in the readout?