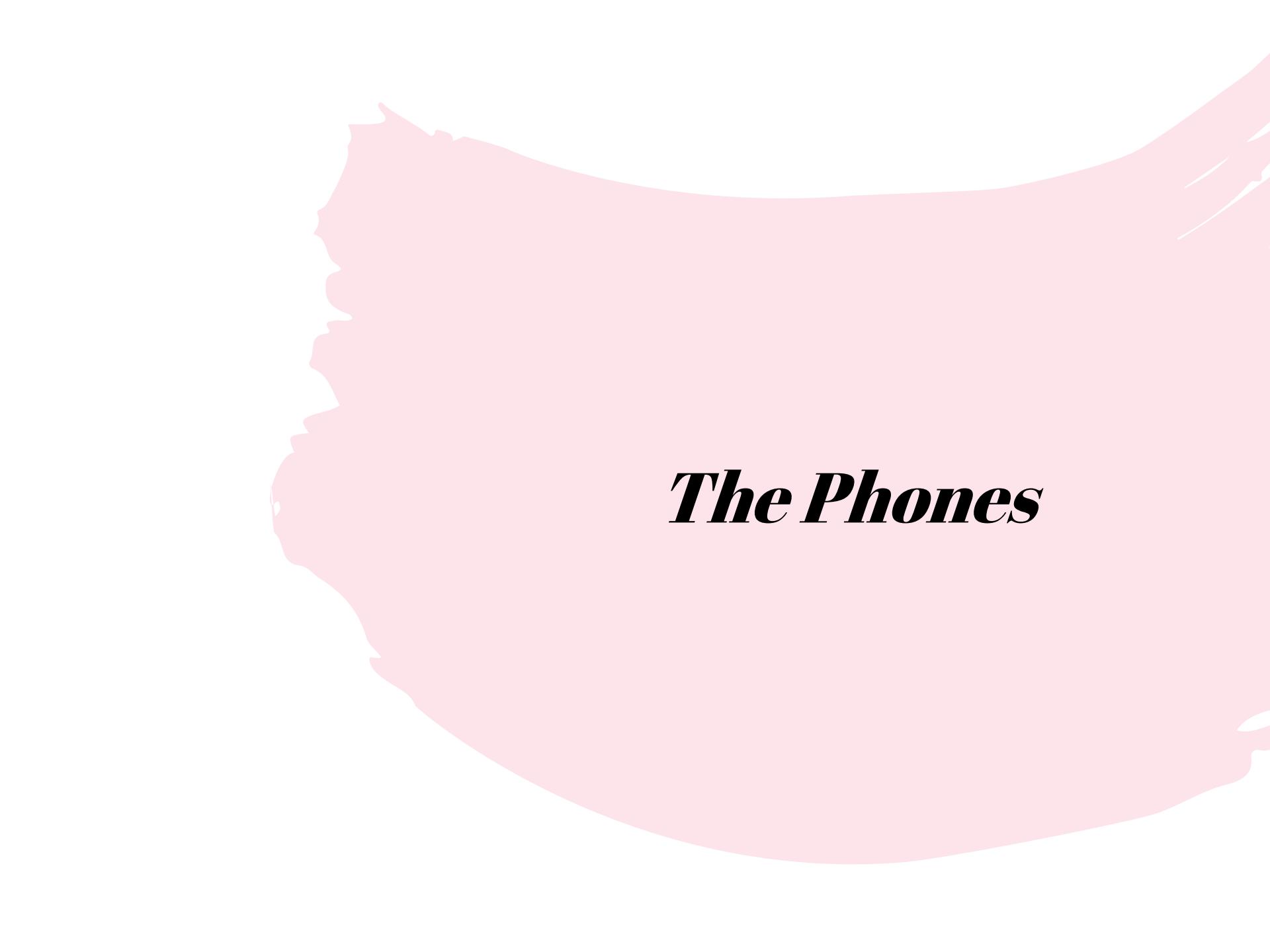


Initial Robot Configuration

Team 13380
QUANTUM STINGERS

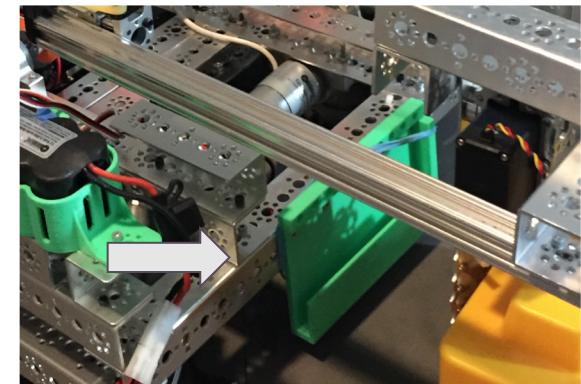




The Phones

Phones for FTC

- For FTC, every team/robot needs two Android phones
- Starting with the 2020-2021 FTC Season, only Motorola Phones will be allowed (see a specific list in FTC Game Manual 1, page 33)
- Two phones:
 - **Driver Station** Phone (DS)
 - Used by drivers/coach during robot game to start autonomous, etc.
 - **Robot Controller** Phone (RC)
 - Stays on robot, connected to Rev Hub (an alternative to this phone is using the Rev Control Hub)



Setting Up the Phones

➤ Steps to Setting Up

- Rename the phone using the following format: “**Team# - DS**” for Driver Station and “**Team# - RC**” for Robot Controller
 - You can do this by going to Settings → Wifi → Advanced Wifi → Wifi Direct → Configure Device
- Install the **FTC Driver Station App** on the DS phone, which can be found through the Google Play Store, on the Driver Station Phone.
- Similarly install the **FTC Robot Controller App** on the RC phone

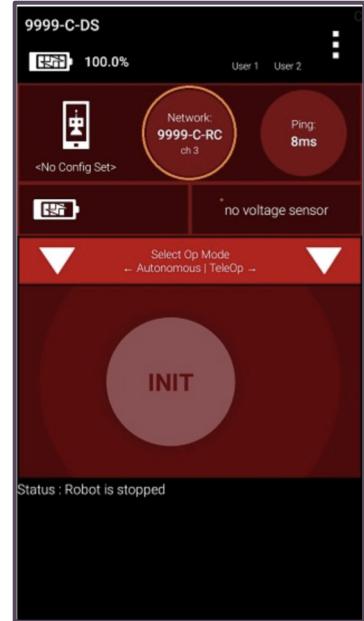


- For the next step, Pairing, make sure both phones are in Airplane mode but still keep the Wifi on

Pairing the Phones

- Pairing the DS and RC phones will allow flow of telemetry data between phones, gamepad input, and selection of operation modes.
- Steps to Pairing:
 - Verify that Robot Status is “Running” on the Robot Controller App on the RC phone
 - On the DS phone, **launch the pairing**: go to Driver Station App → the triple-dot pop-up menu → Settings → Pairing Method → Wifi Direct
 - Still under Settings → **Pair with Robot Controller**; then find and select your RC phone in the options (the name that you initially set the phone to should show up; if it doesn’t, check the wifi for the phones)
 - On the RC phone, accept the pairing in the Robot Controller App

This is how the DS app should look like →



This is how the RC app should ← look like



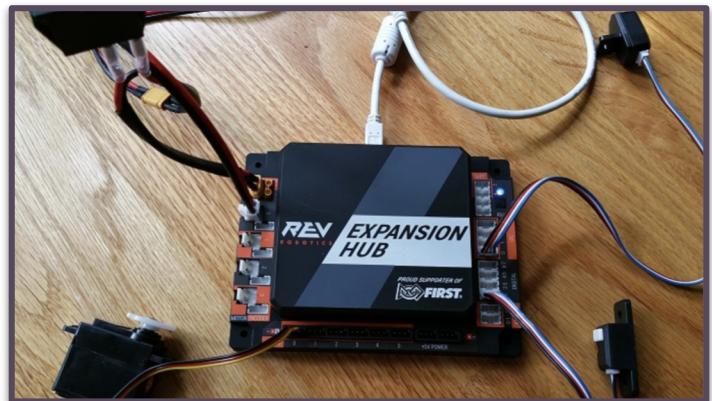
RevExpansion Hub:

What is the Rev Expansion Hub?

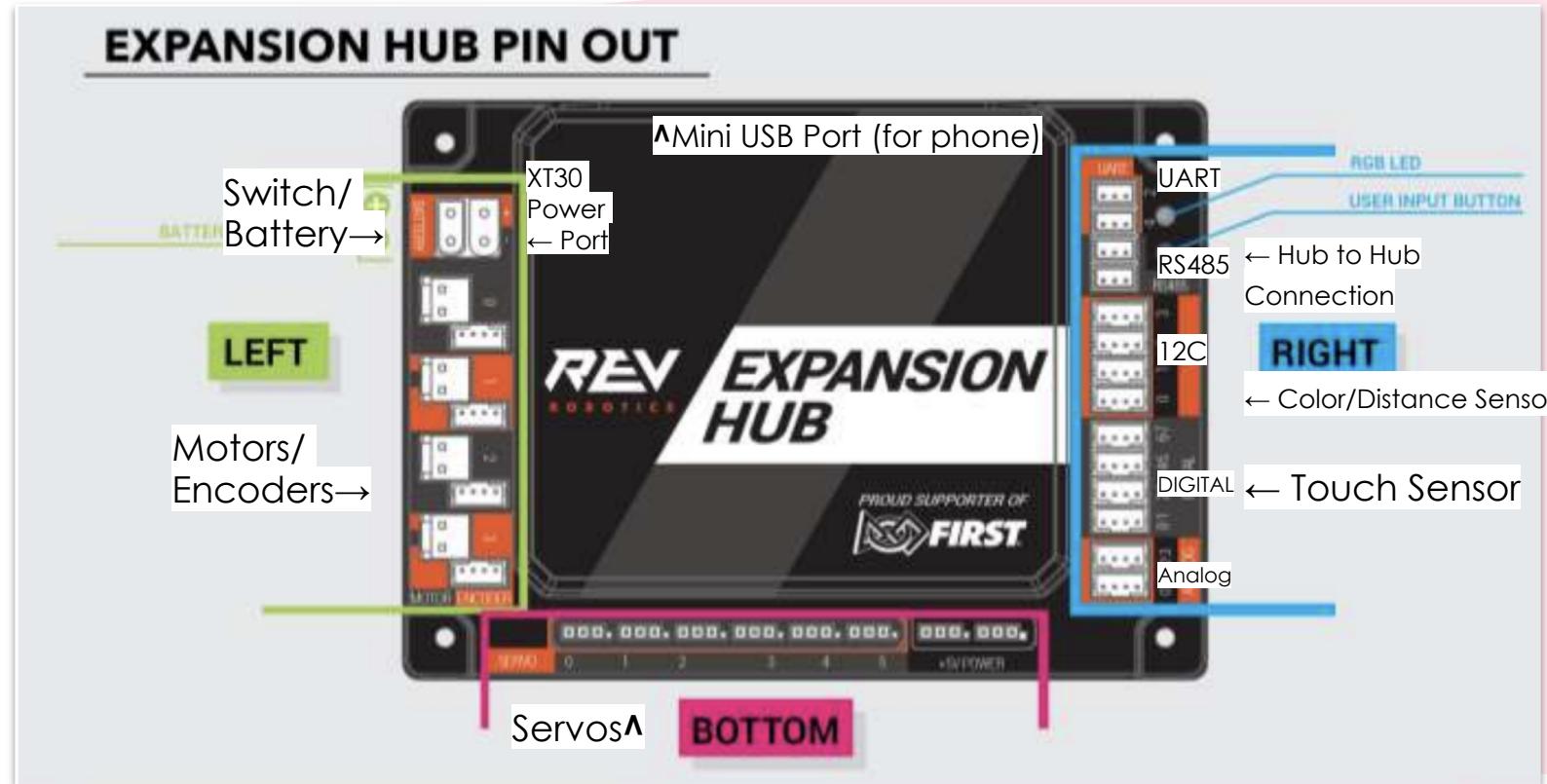
- A Rev Expansion Hub is the FIRST-approved control hub/port.
- It is a hardware controller and interface that communicates between all the robot's motors, servos, sensors, battery, robot switch, and the Robot Controller phone.
- It has various external ports that are used to make these connections
- The robot can have a maximum of 2 Rev Expansion Hubs



FTC Legal



Rev Hub External Ports



Making Connections

➤ Rev Hub to RC Phone

- USB Type A male to type B-mini male cable
- Micro USB OTG adapter
- Connect the USB type B-mini end to the Mini USB port on Rev Hub
- Plug in the Type A end into the OTG adapter
- Plug in the adapter to the RC phone



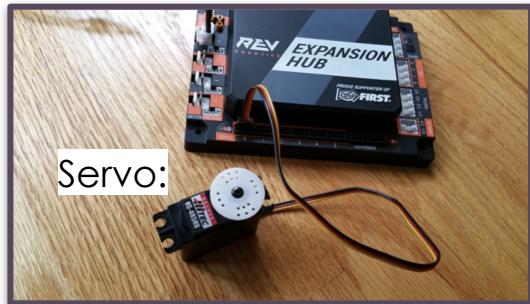
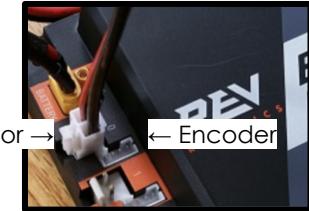
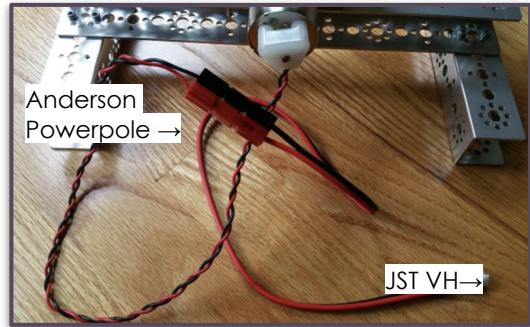
➤ Rev Hub to the Battery/Switch

- Rev Switch
- Rev Tamiya to XT30 Adapter
- 12V Battery
- Connect one of the Switch cables to the Adapter
- Connect the Tamiya Adapter to that of the Battery
- Connect the other end of the Switch to the top left battery port on the Rev Hub, as shown

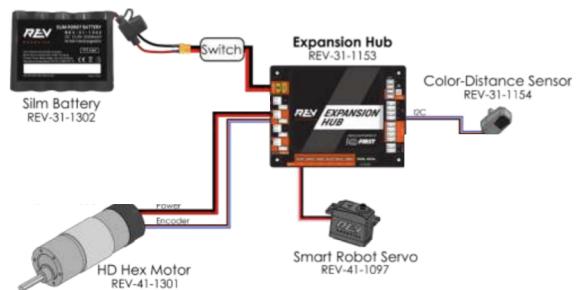


Connections Continued...

- Rev Hub to DC Motors
 - Anderson Powerpole to JST VH Adapter
 - Most of the DC motors should already have an Anderson Powerpole connector
 - Connect the motor's Anderson Powerpole to that of the adapter
 - Plug in the Adapter to a Motor Port on the left side of the Expansion Hub, under the battery/switch
 - Encoders are plugged in to the small port directly next to where the corresponding motor is plugged into
- Rev Hub to Servos
 - Just connect the 3-wire connector of the Servo to one of the Servo Ports at the bottom of the Rev Hub
- Rev Hub to Sensors
 - Color Distance Sensors have 4-wire connectors that plug into the Ports labeled "12C" on the right side of the Rev Hub
 - Touch Sensors have 4-wire connectors that plug into the Ports labeled "Digital" on the right side of the Rev Hub



A full layout:



Rev Hub to Rev Hub Connection

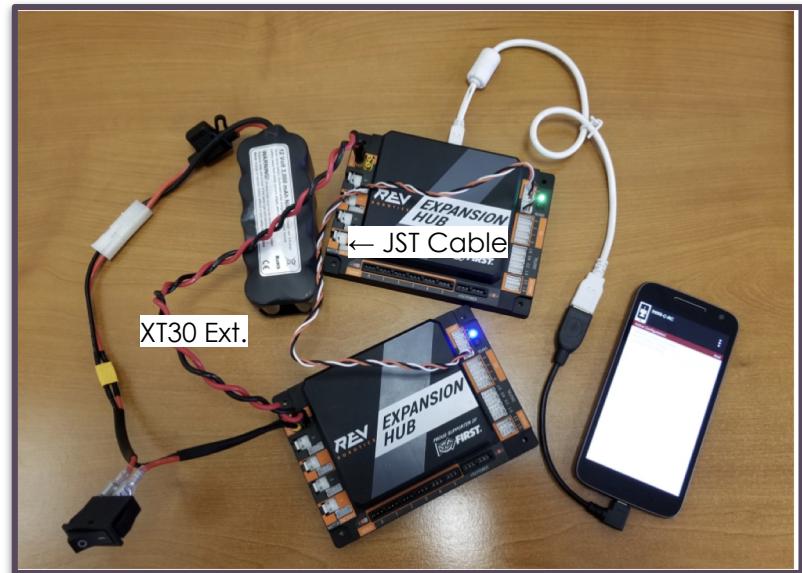
- One Rev Expansion Hub has 4 motor and 6 servo ports
- For teams that use **two Rev Hubs** to accommodate for all the robot hardware, both Rev Hubs must be connected. Only one of the Rev Hubs will be connected to the RC phone.
- Part 1
 - By default, all Rev Hubs have an equal, predefined **serial address** (2)
 - In order to connect two Rev Hubs, their addresses must be different, so one of them needs to be **reconfigured**
 - Connect one Rev Hub to the Robot Controller Phone and the Switch/Battery
 - Open RC App
 - Create a temporary configuration file
 - Go to Settings → Advanced Settings→ Expansion Hub Address Change
 - Now, change the current address from 2 to another value
 - Click Done
 - Delete the Temporary configuration file and create a new, permanent one

Rev Hub to Rev Hub Connection

➤ Part 2: Wire Connections

- Disconnect Rev Hub from phone and Battery/Switch
- Use a XT30 Extension Cable → Plug into the XT30 Power ports of both Rev Hubs
- Use a 3-pin JST PH Cable → Plug into RS485 Ports of both Rev Hubs
- Connect one of the Rev Hubs to the RC Phone, and the other Rev Hub to the Switch/Battery
- Make sure that both of these connections are made with only 1 continuous wire each (no extensions)

This is how it should look:



Robot Configuration

What is Robot Configuration?

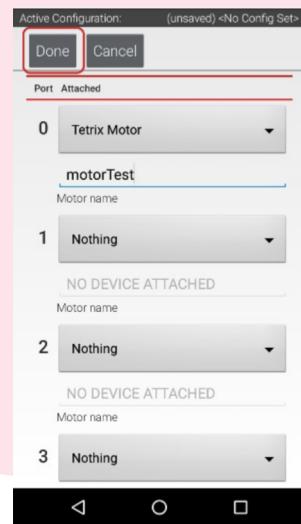
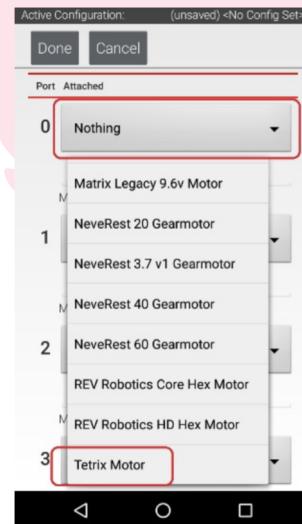
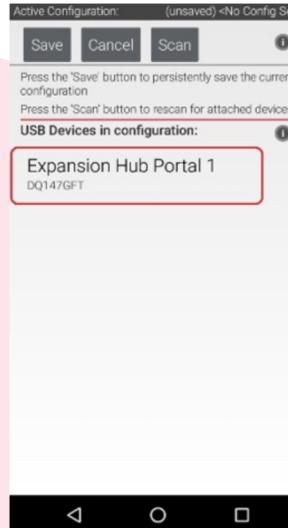
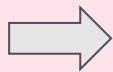
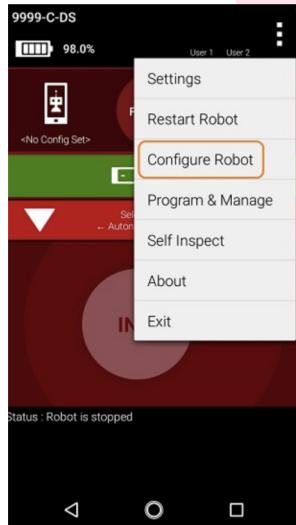
- To communicate with any motors, servos, or sensors wired to the Rev Hub's external ports, you must configure them in your Robot Controller Phone
- Configuration is based off of which hardware parts are connected to which Rev Hub Port
 - Every external port on the Rev Hub has a label (ex. Motor Port 1 or RS485 Port 2, etc.) This label is used to identify how the hardware is connected to the Rev Hub
 - The hardware parts (motors, servos, sensors) should also be named (ex. Back_Left_Motor); this name should be consistent with your code
- Configuration is done on the Robot Controller Phone
- The Phone must be physically connected to the Rev Expansion Hub(s)
- The robot must be configured in order to run any programs

Steps to Configuration

- Steps to Configuration:
 - Physically connect RC phone to the Rev Hub
 - Go to the Robot Controller App
 - Click on triple-dot for the drop down menu
 - Click “Configure Robot”
 - For the first-ever Configuration
 - Click New
 - Click Scan to find all connected Rev Hubs
 - Click on the Rev Hub that you want to configure
 - Now you should be able to a list of ports
 - Click on the one you want to configure (ex. motors)
 - Now you will see a list of ports (0,1,2,3...)
 - Under the corresponding port, click the drop-down menu and select the correct robot part type
 - Make sure that your configuration matches the actual connections on the Rev Hub
 - For example, if Back_Left_Motor is plugged into Motors Port 0 of Rev Hub1, type “Back_Left_Motor” in Rev Expansion Hub Portal 1 → Motors → Port 0
 - After configuring all hardware parts, click Done → Save



Steps to Configuration:



Credits

- This lesson was written by Vennela Jonnala of Team 13380 (Quantum Stinglers) for FTCTutorials.com
- You can contact the author at yennelashriya@gmail.com



Quantum
stinger

- More lessons for FIRST Tech Challenge are available at www.FTCtutorials.com



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