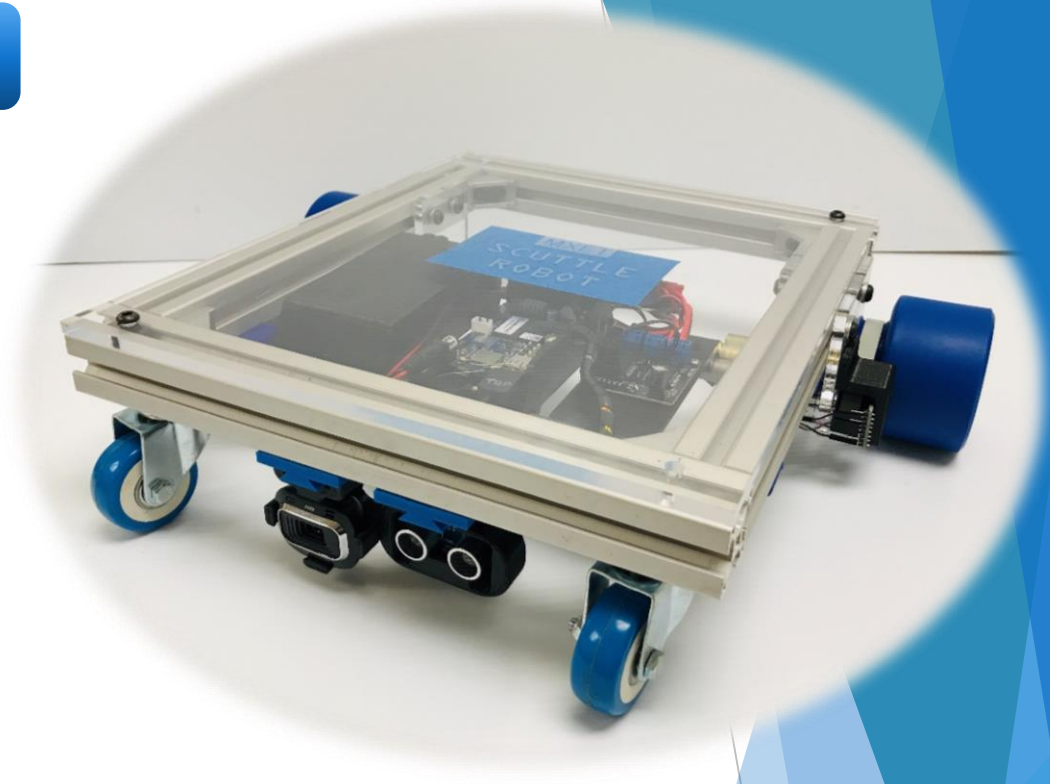
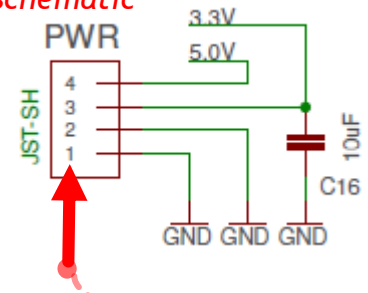
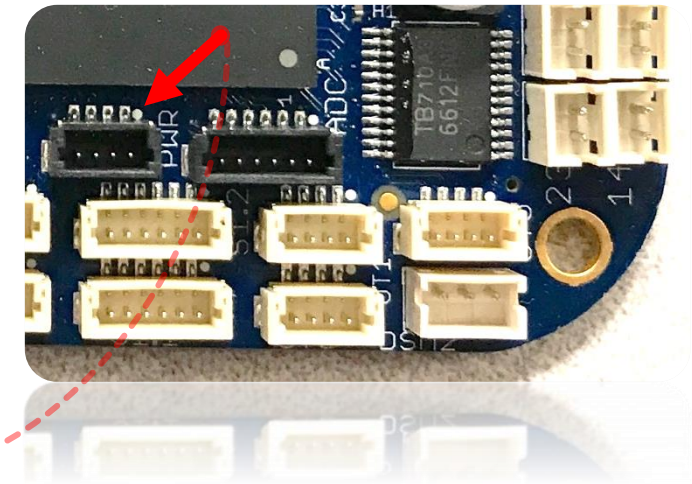
Scuttle robot Wiring Guide (rev 2019.11.20)



Important Info:
To match the beaglebone pins to the pin numbers on the diagram:
The tiny white circle on the silkscreen at each connector indicates “pin1”

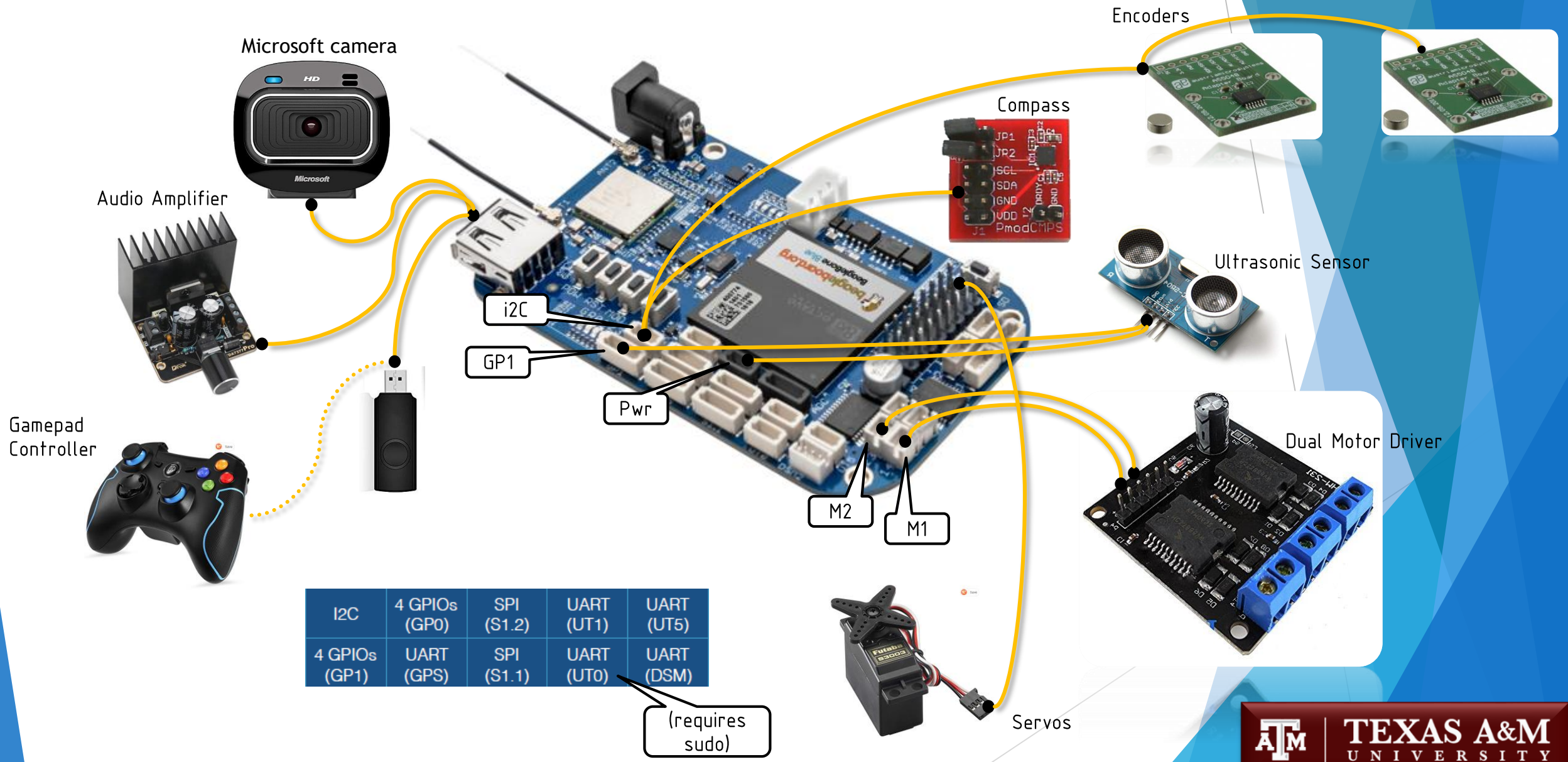
All images of this style are copied directly from the beaglebone schematic





TEXAS A&M UNIVERSITY

Available Sensors & Actuators

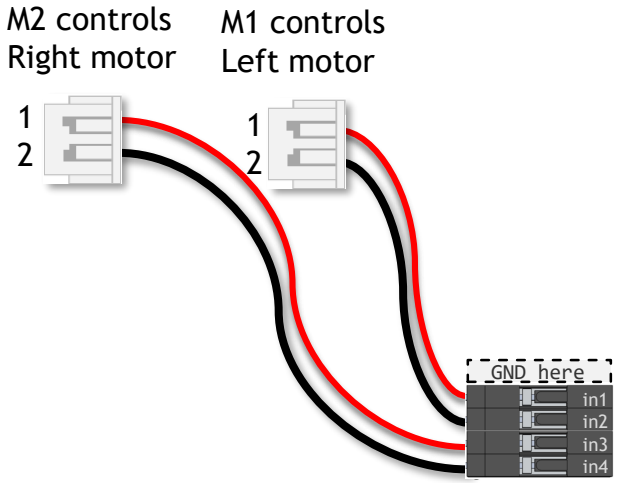


I2C	4 GPIOs (GP0)	SPI (S1.2)	UART (UT1)	UART (UT5)
4 GPIOs (GP1)	UART (GPS)	SPI (S1.1)	UART (UT0)	UART (DSM)

(requires sudo)

TEXAS A&M UNIVERSITY

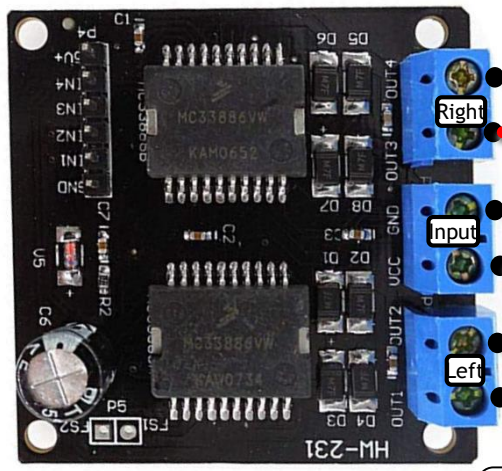
Motor Driver Signal Cables

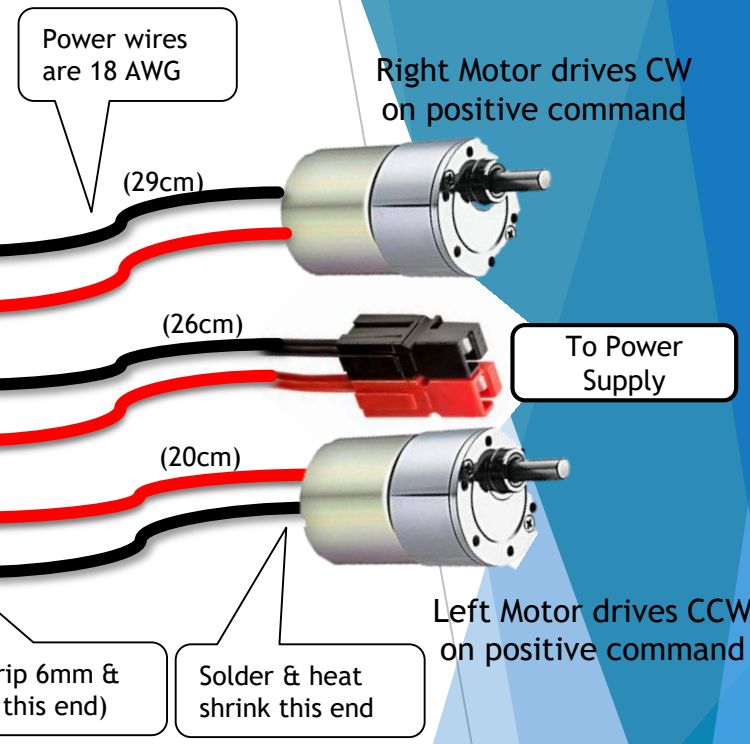


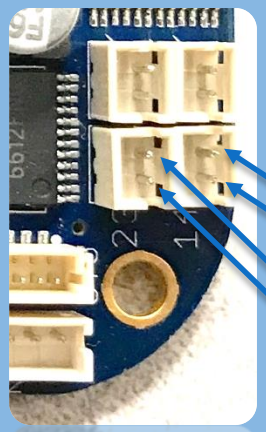
in1 on DuPont connector goes to in1 on driver

Ground is not connected because the BBB has a common ground to the battery pack.

Motor Driver Top View
HW-231 Motor Driver





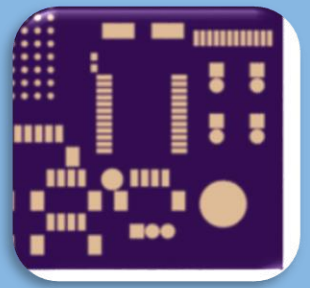


Pin 1 should be HIGH when motor is driven FORWARD

Motor1 Pin1
Motor1 Pin2

Motor2 Pin1
Motor2 Pin2

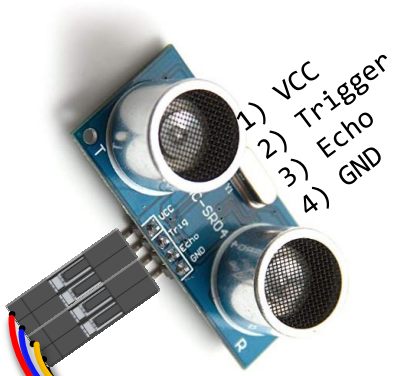
The hardware design convention is pin 1 gets the square solder pad.



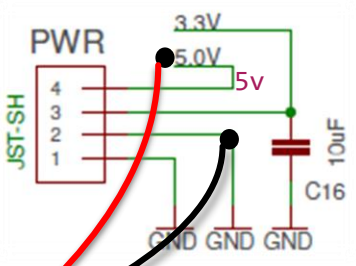
Connector vector image reserved.

TEXAS A&M UNIVERSITY

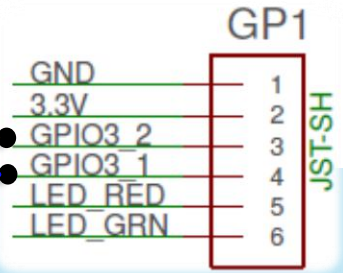
Ultrasonic Distance Sensor (GPIO)



Connector Style: JST-SH 4-pin



Connector Style: JST-SH 6-pin



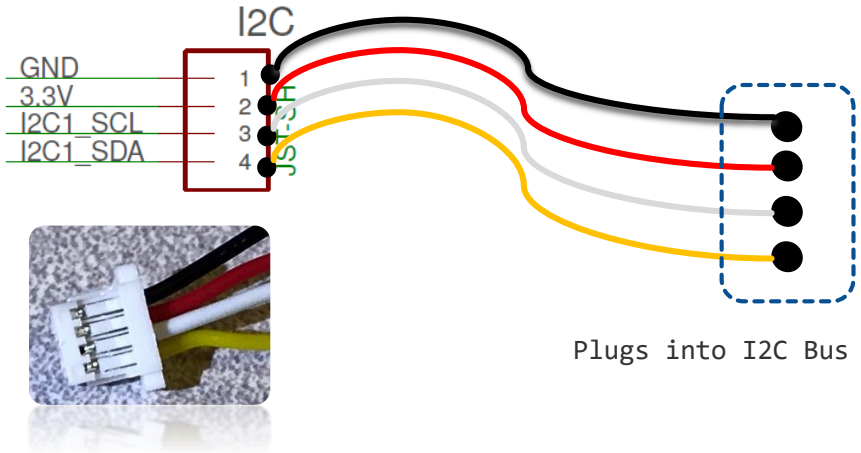
NOTE: For JST connectors out-of-box, the colors are not in the correct order. You need to rearrange them.

TEXAS A&M UNIVERSITY

Beaglebone to I2C bus cable

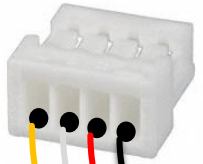
Diagram

BeagleBone I2C Connector
Style: JST-SH 4-pin

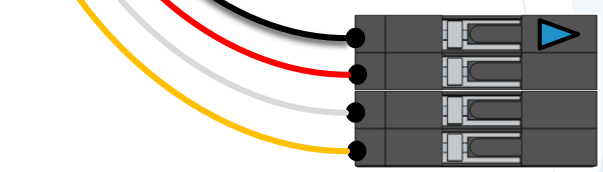


Plugs into I2C Bus PCB

Cable Design



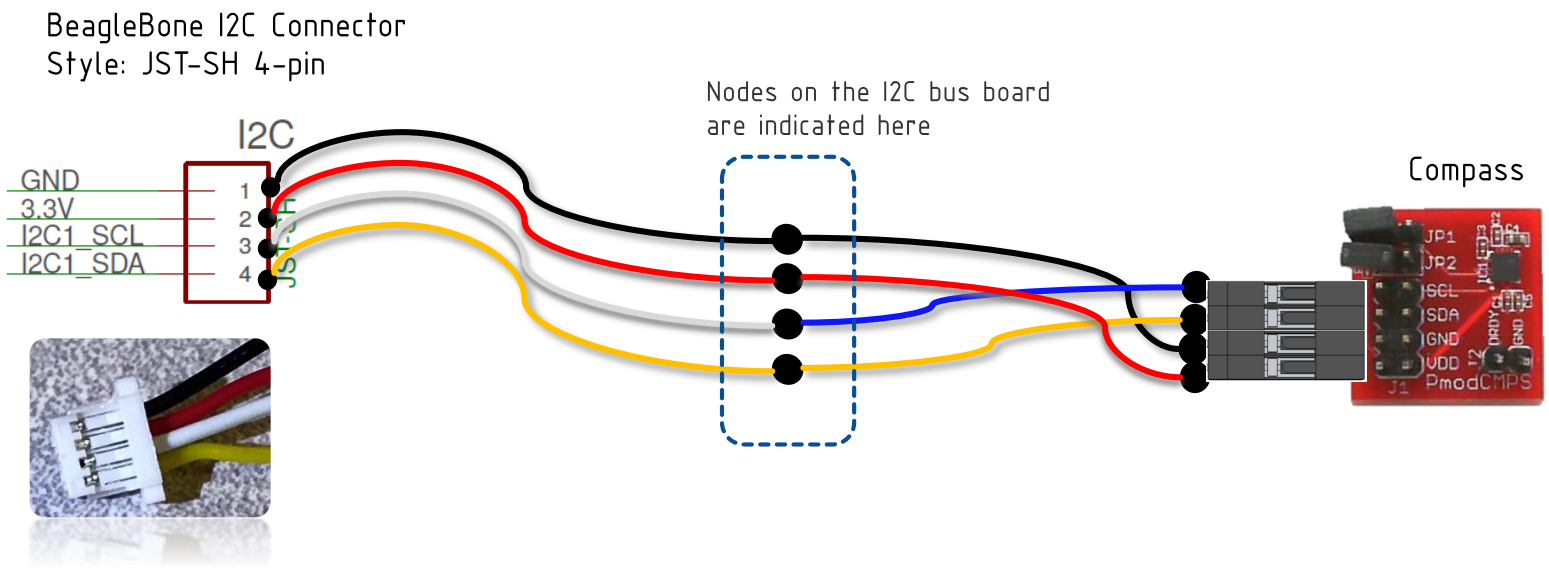
(I2C connector)
Style: JST-SH 4-pin



DuPont style
2.54mm female 4-pin

TEXAS A&M UNIVERSITY

Compass CMPS or CMPS2 (I2C)



This compass is not necessary since you can access the compass on the beaglebone blue. Be sure to calibrate the compass on the blue since it lies within close proximity of magnetic hardware on the robot.

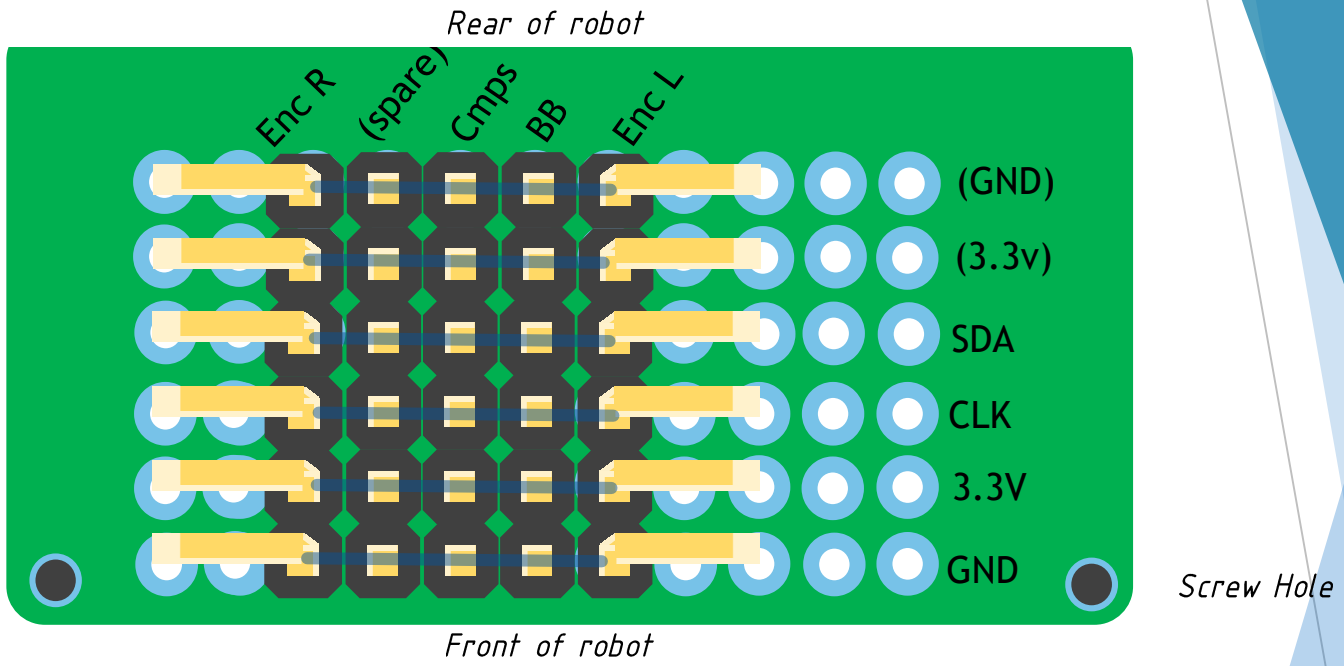
I2C Bus Board

straight pin

90 degree pin

solder connections (on bottom)

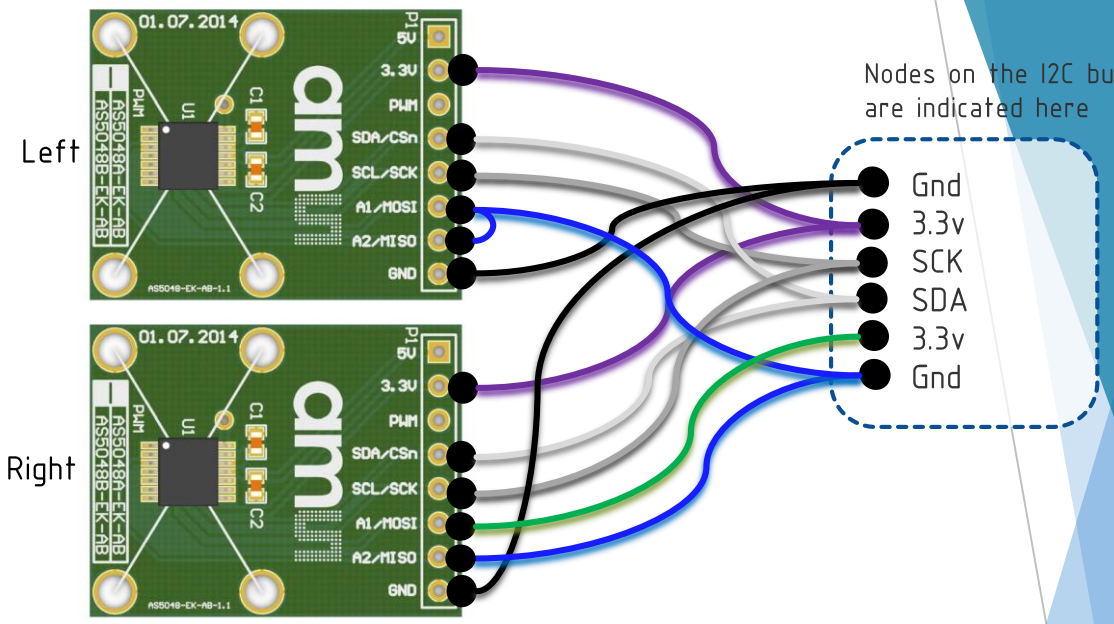
The board is made from a breadboard and soldered manually. The board can be cut between rows J & K. The solder bridges all pins from left to right.



Encoder AS5048 (I2C)

Left Hand Encoder
A1 is pulled **down** to GND
I2C address is 0x40

Right Hand Encoder
A1 is pulled **up** to 3.3v
I2C address is 0x41

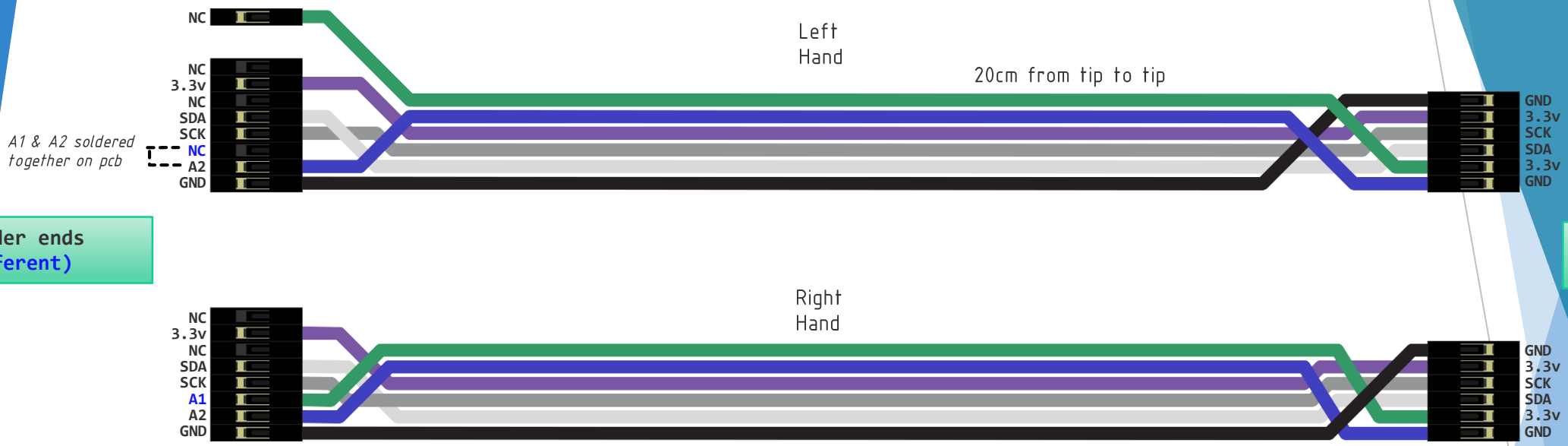


PIN	Left	Right
A1	0 (low)	1 (high)
A2	0 (low)	0 (low)
i2C Address	0x40	0x41

On the Left Hand Encoder PCB, bridge the pins A1 and A2 using solder, to each other.

TEXAS A&M UNIVERSITY

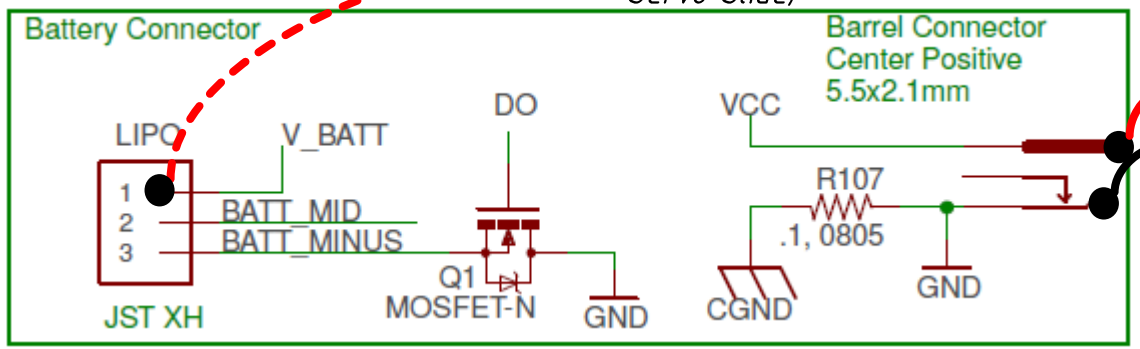
Encoder Cables

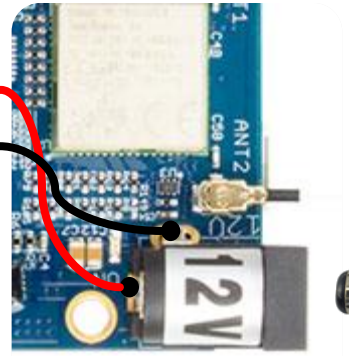


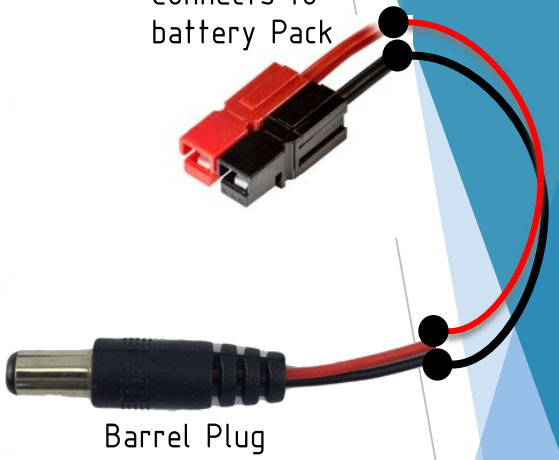
TEXAS A&M UNIVERSITY

Battery

As an option, bridge LiPo terminal to 12v positive terminal (see Servo Slide)





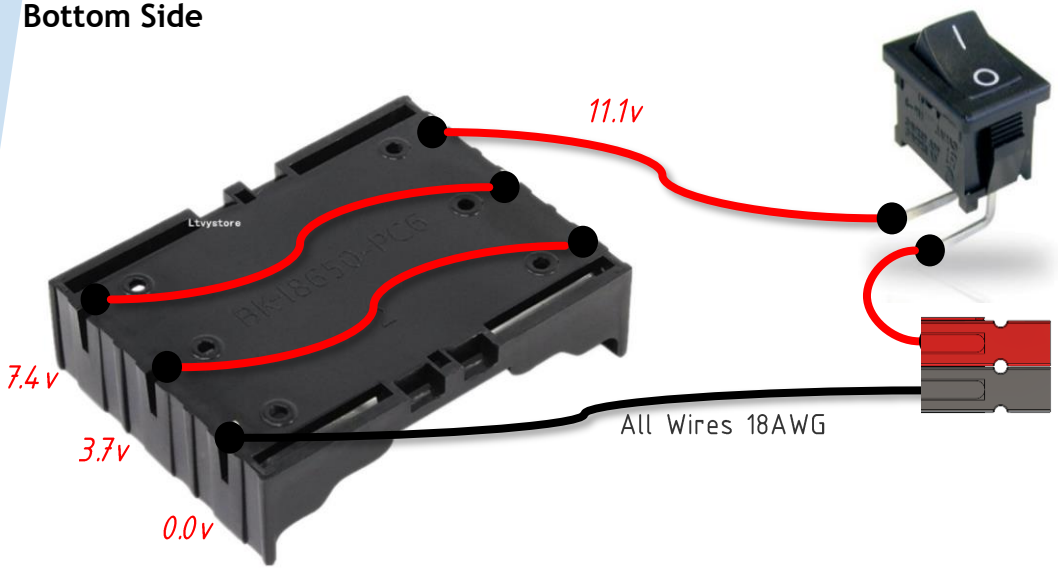


The "Battery Connector" is disconnected. Actual battery uses Barrel Connector.

TEXAS A&M UNIVERSITY

Battery Pack

Bottom Side



3-Cell 18650 holder

Switch PN:SRB22A2FBBNN
Carries 10A max

Two pairs of Anderson connectors are attached here.

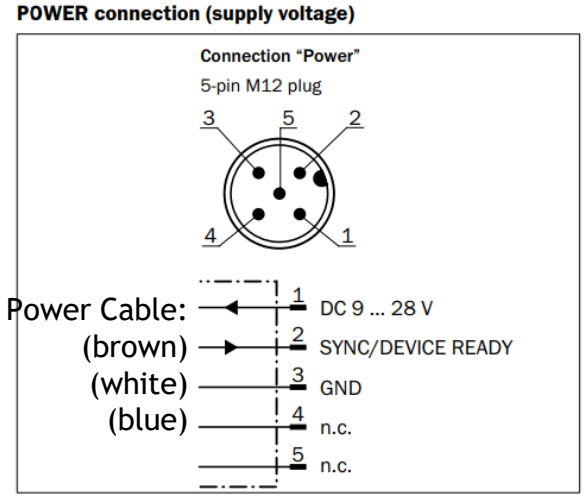
TEXAS A&M UNIVERSITY

LIDAR

Lidar Device

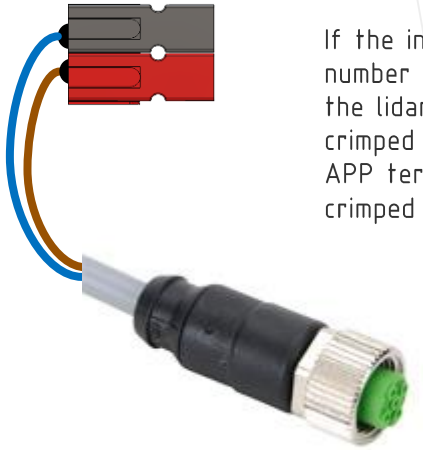
TiM 561

Power Connector Diagram (lidar side)



LIDAR-side connector (male pins)

Power Cable Diagram (plugs into lidar)



If the indicated cable part number is used for power to the lidar, brown will be crimped into the 12v positive APP terminal and blue is crimped into the negative.

Cable: 7000-12241-2150300

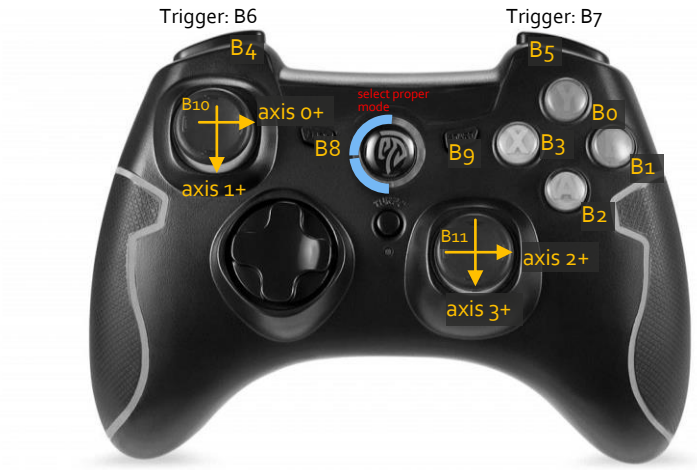
Cable-side connector (female pins)

Typical Lidar power consumption: 2.1w

TEXAS A&M UNIVERSITY

GamePad

Gamepad Controls Mapping



Button Behavior:

- not pressed: 0
- Pressed: 1

Axis behavior:

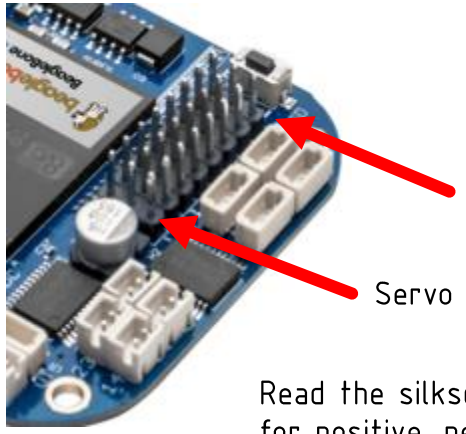
- Right returns positive values
- down returns positive values

Servos

Bridge Power to the liPo connector

Without a power source available at the positive (third pin) input of the liPo connector, the board has insufficient current available to the servos to drive servos at full torque or to drive multiple servos.

A safe fix is to solder the positive terminal of the DC jack to the third pin of the connector shown. When a battery is connected, the pins correspond to 0.0v, 3.7v, and 7.2v terminals of a 2-cell lipo.

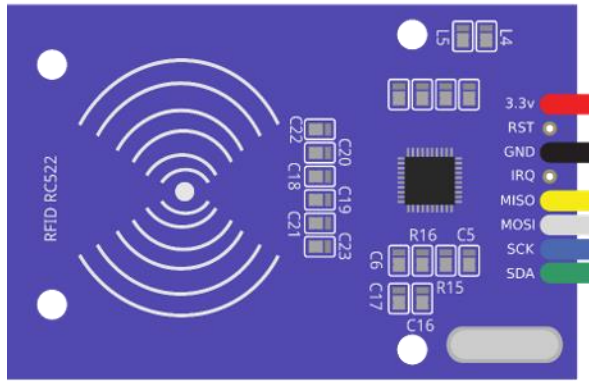


Read the silkscreen to see correct connector orientation for positive, negative, and signal.

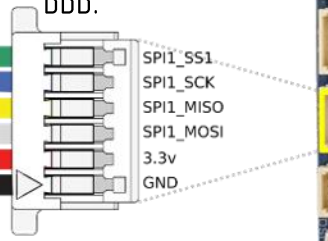
TEXAS A&M UNIVERSITY

RFID reader

RC522 low-cost
RFID Scanner

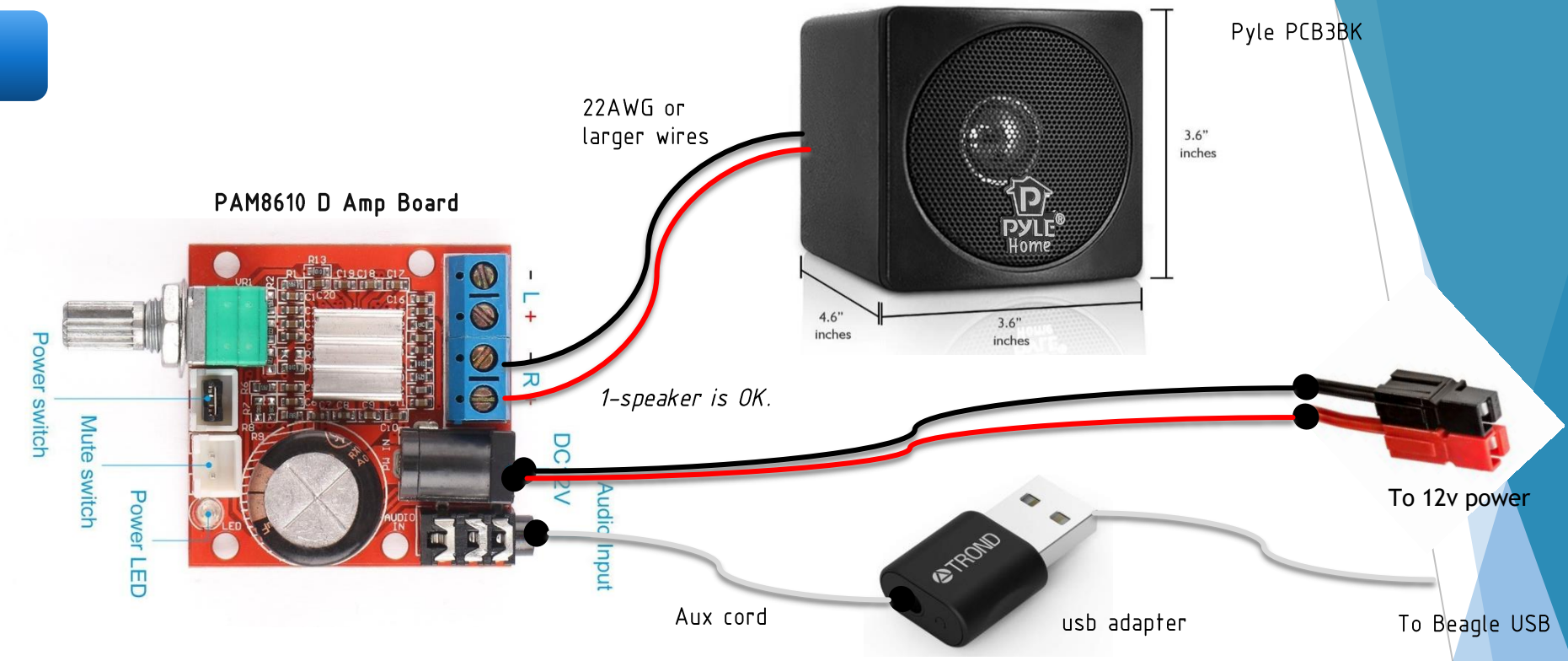


Plug into 6-pin
JST-SH port on
bbb.



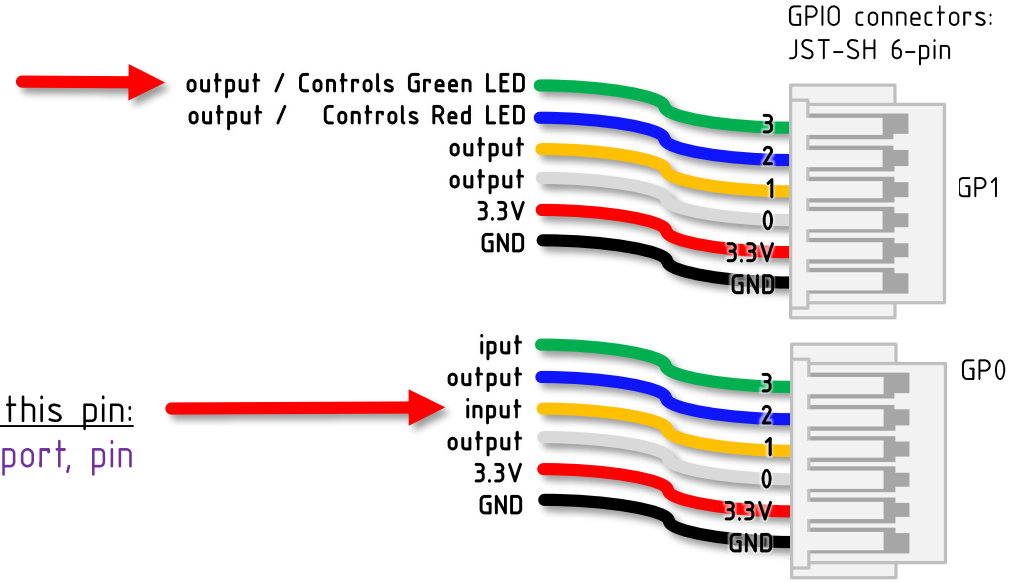
TEXAS A&M UNIVERSITY

Audio Amp


PAM8610 D Amp Board
22AWG or
larger wires
Pyle PCB3BK
3.6"
inches
4.6"
inches
3.6"
inches
- L + - R +
1-speaker is OK.
Power switch
Mute switch
Power LED
DC 12V
Audio Input
To 12v power
Aux cord
usb adapter
To Beagle USB

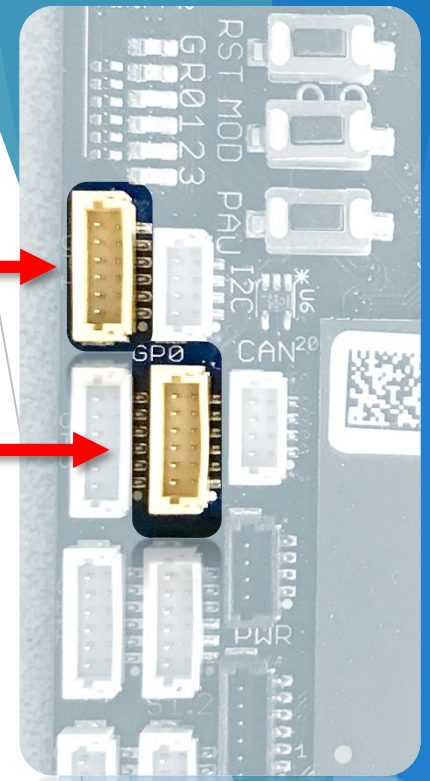
GPIO Connections

Example call for writing to this pin:
write(1,3,1) # arguments: port, pin, state



Example call for reading this pin:
read(0, 1) #arguments: port, pin

SCUTTLE naming convention (used in L1_gpio.py)

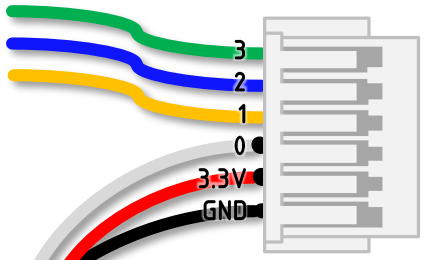


Connector vector image preserved for later use.

Note: JST wires don't come with the proper color sequence. They must be rearranged.

TEXAS A&M UNIVERSITY

GPIO Example - Relay



GP0 connector
JST-SH 6-pin on
Beagle

3v Relay with both Normally Open (NO)
contact and Normally Closed (NC) contact.

This kind of board usually includes an opto-coupler and your powered device does NOT need to share a ground with your microcomputer. There are two circuits here, isolated from each other.

Heavy Duty Pump

TEXAS A&M UNIVERSITY