Metastatic Workshop

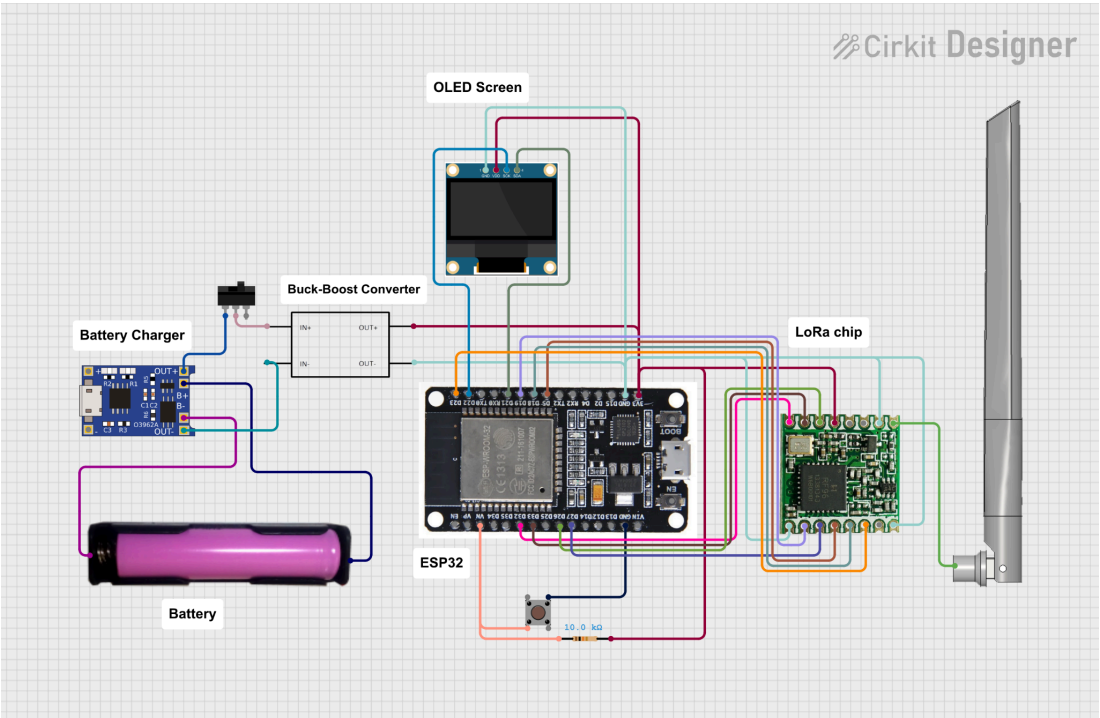
Spring 2025

The Meshtastic workshop is a hardware-based workshop that focuses on creating a Meshtastic nodes. A Meshtastic node sends packets of encrypted information over unregulated radio frequencies to designated recipients. These nodes create a larger network that allows relaying data packets off of nodes until the receiving node is reached.

Requirements:

This workshop requires a laptop a micro usb cable for flashing the device
Web flasher: https://flasher.meshtastic.org/

Wire Diagram:



[See the project!](#)

Building Instructions:

Component 1: LoRa Chip

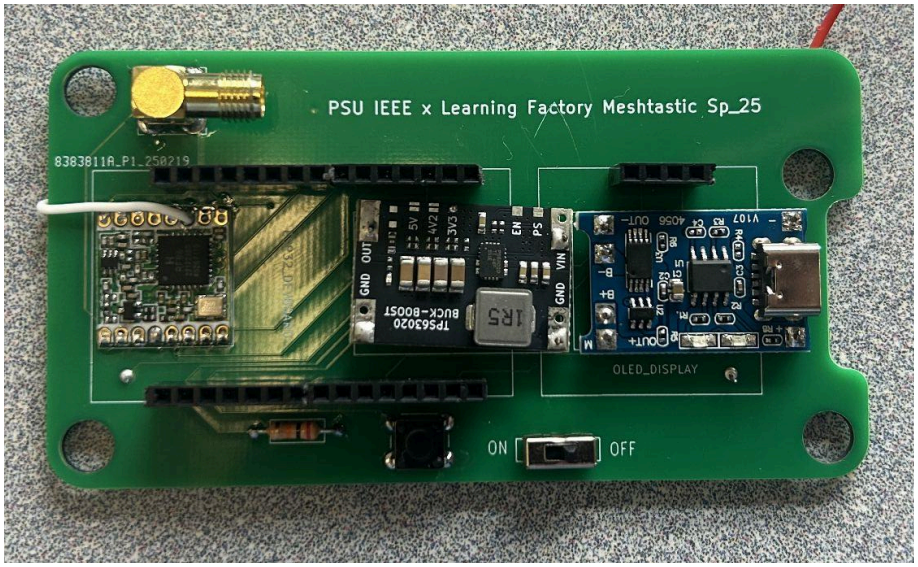
Purpose- This chip deals with transmitting and receiving data packets over RF

<u>This part can take a bit of time and will be more difficult than the rest of the soldering you do</u>

Important: Make sure the chip is oriented in the correct direction, as shown in the picture below. The black chip on the LoRa board should be on the inside of the pcb

How to start: Place a dab of solder on one pad in the corner. Place the chip on top of it and solder that pad only. Melt the solder on the pad and adjust the chip to line up with the rest of the pads

- Place the chip on the PCB and line it up with the picture. (Pay attention to orientation)
- Add solder to the pads to complete the connections from the chip to the board (Start with the corners)

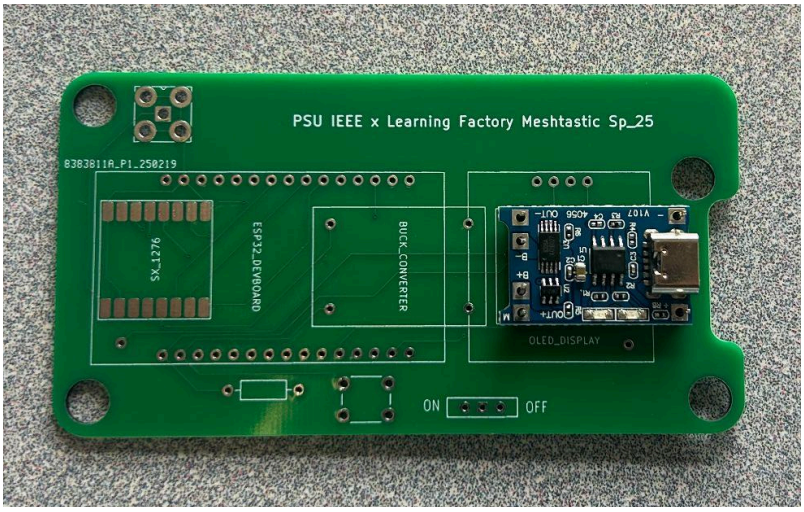


Component 2: Battery Charging circuit

Purpose- Charge the battery to a safe voltage and then stop charging once the battery is fully charged.

NOTE: This will require bending one or two pins to get the pins to fit into the holes of the charging circuit

- Cut 6 male to male pins
- Put pins into the battery charging slot on the PCB (raise the PCB off the table to fit pins all the way through)
- Fit the charging circuit onto the pins (Pay attention to orientation)
- Solder pins to the charging circuit
- Flip over the PCB and solder the pins to the board
- Cut the excess of the pins sticking out

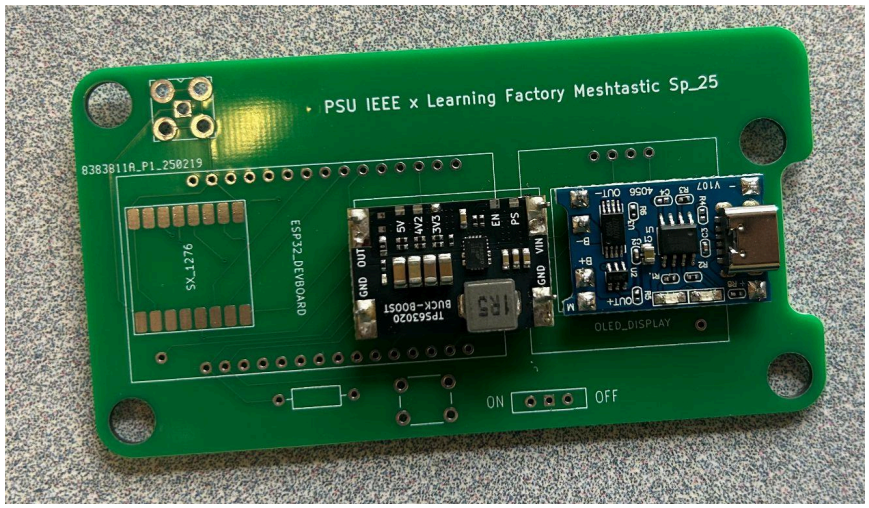


Component: 3 Buck-Boost Converter

Purpose- Regulate the voltage from the battery output to a constant 3.3 volts for components (ESP32 requires strict voltage input requirements)

NOTE: Refer to the picture below for the orientation of the charging circuit. The ground pins should appear to be on the bottom as in the picture.
Pins will need to be bent to fit this component into the PCB.
The gray box should be facing towards you when you are looking at it like in the picture below

- Cut 4 male to male pins
- Put pins into the buck converter slot on the PCB (raise the PCB off the table to fit pins all the way through)
- Bend pins to fit buck-boost converter (This will require some force)
- Place the buck-boost converter onto the pins (Pay attention to orientation)
- Solder pins to the charging circuit
- Flip over the PCB and solder the pins to the board
- Cut the excess of the pins sticking out

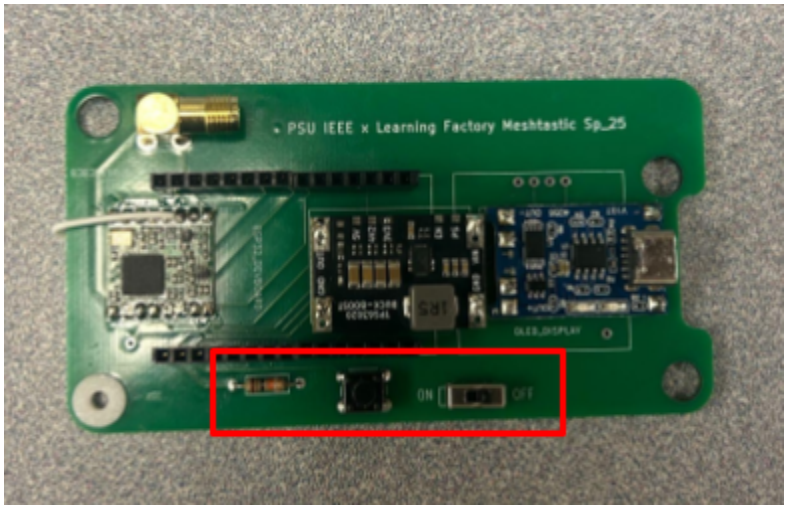


Components 4, 5, & 6: Button, Switch, and Resistor

Purpose- Switch between the menus in the program and power on and off the device

TIP: Bend the pins of the resistor and switch after placing them into the PCB to hold them in place when you flip over the board to solder

- Place the components into the board
- Apply solder to the pads of the pins
- Cut the excess of the pins sticking out



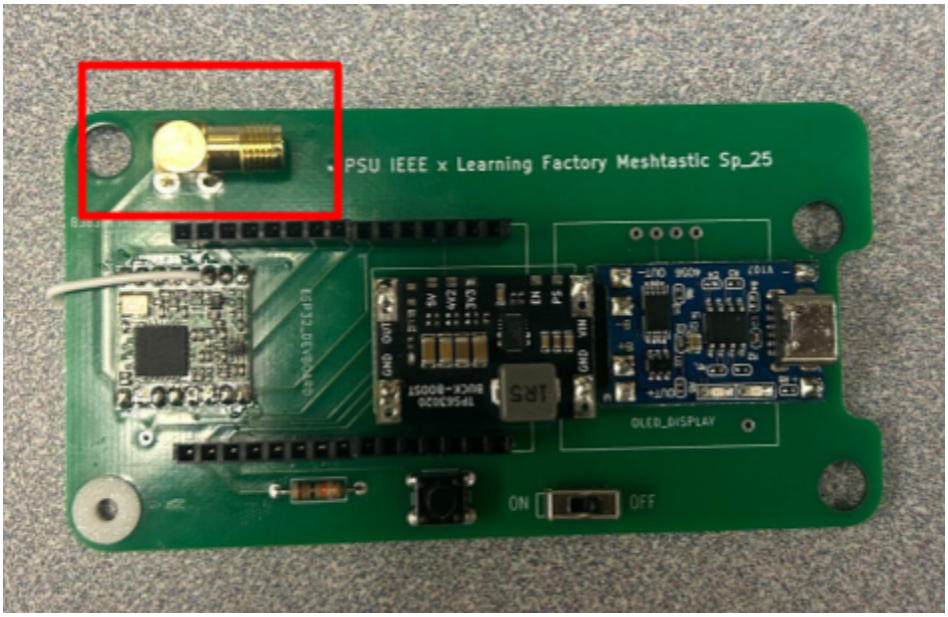
Component 7: SMA connector

Purpose- Connector for antenna and allows other antennas to be attached

<u>The provided antenna is tuned to the 915 MHz frequency and any other antenna used should also be tuned to the 915 MHz frequency</u>

TIP: Put solder on one of the corners of the connector and try putting on the antenna. If it doesn't fit then adjust the connector until the antenna fits onto the screw end

- Place the SMA connector into the slot (Pay attention to the orientation)
- Flip the board over and solder all the pins on the SMA connector



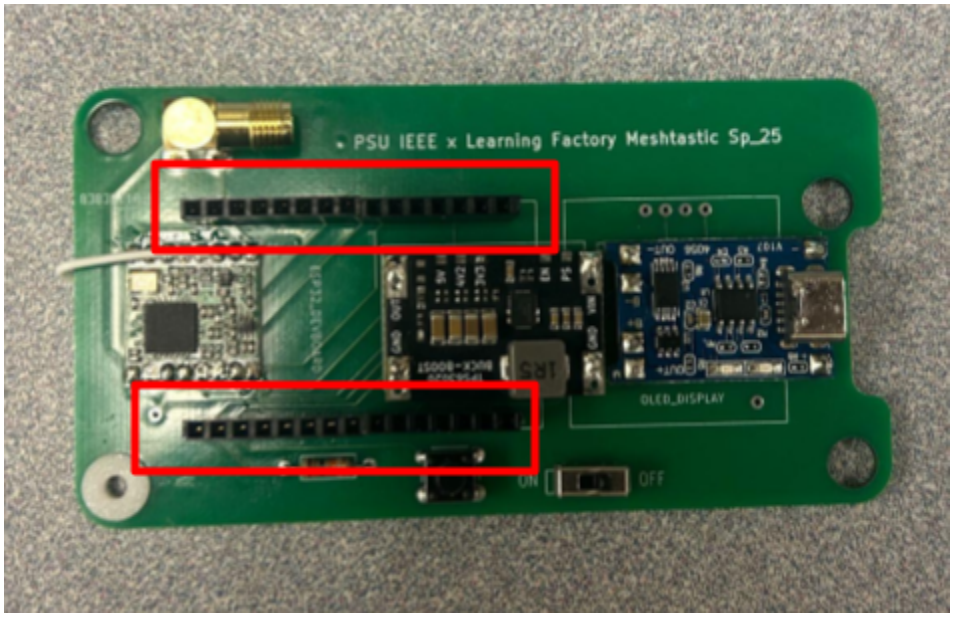
Component 8: ESP32 Socket

Purpose- This is a microcontroller that communicates with the other electronics to execute tasks and make Meshtastic work

IMPORTANT: Wait to put ESP32 and OLED into their sockets until everything has been soldered

NOTE: A wire will have to be soldered onto one of the pins of the bottom of the board and connected onto the LoRa chip

- Place pins into the board and flip the board over (Let the pins support the board)
- Solder the pins onto the board
- Cut the excess part of the pin sticking out if necessary

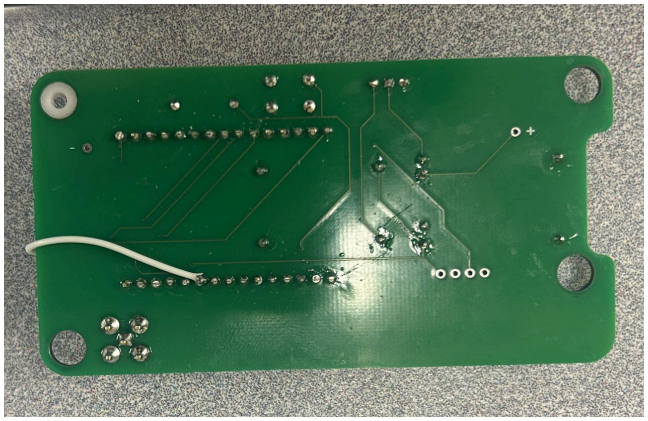


Adding the wire:

How to attach the wire

- Apply more solder to the pad where the wire will be placed
- Heat up the solder where the wire will go
- Place in the wire
- Take off the soldering iron and let the solder cool down

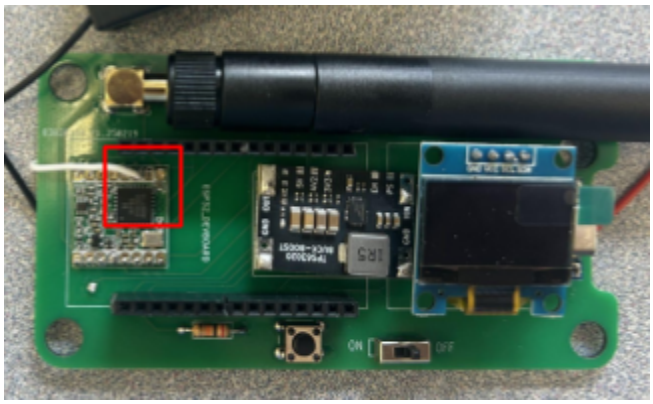
  This pin is the 6th pin from the left on the SMA connector side of the board



- Flip the board over and extend the wire until it's at the 3rd pin from the right on the top side of the LoRa chip (Reference picture below)

How to attach the wire

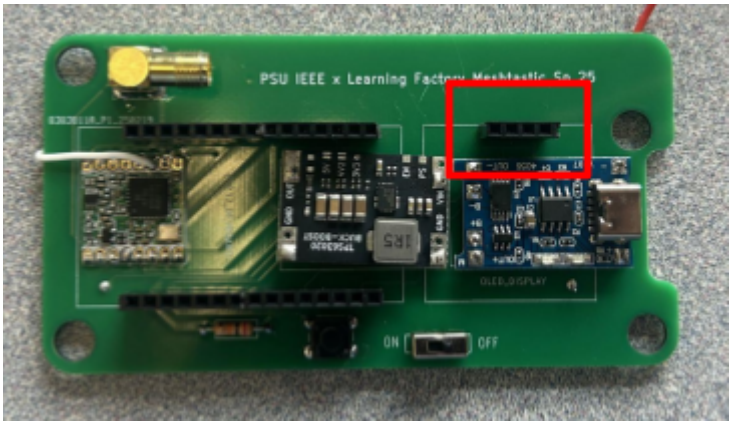
- Apply more solder to the pad where the wire will be placed
- Heat up the solder where the wire will go
- Place in the wire
- Take off the soldering iron and let the solder cool down



Component 9: OLED Screen Socket

Purpose- This will display information about your device with recent messages other important information

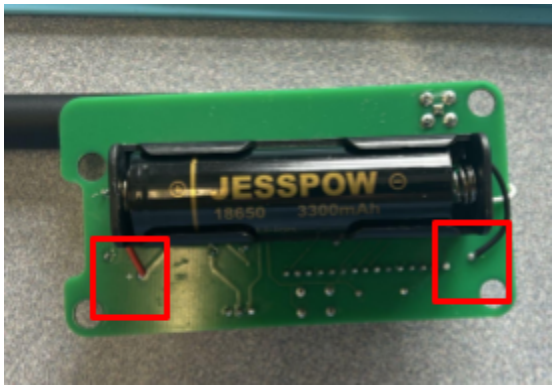
- Cut a 1x4 strip of male-to-male pins
- Place the end with the shorter metal part into the OLED display
- Solder the pins to the OLED screen
- Take 1x4 strip of male-to-female socket
- Insert into the board on the screen location and flip over the board
- Solder the pins to the board
- **Don’t put OLED screen into the slots yet**



Component 10: Battery Holder

Purpose- Secure the battery (duh)

- Strip the wire to bare metal (about ¼ inches)
- Place the red wire through the hole with the “+” sign and the black wire through the hole with the “-” sign
- Solder the bare metal sticking through the hole
- Cut off the extra wire sticking out



The Meshtastic is Complete! Insert ESP32 and OLED Screen now

Meshtastic flashing process:

- Go to https://flasher.meshtastic.org/
- Select DIY V1 as the targeted device
- Choose the latest stable firmware version
- Get a micro USB cable from an assistant
- Plug in the left side of the meshtastic and plug into your computer
- Click the “Flash” button and then the Update button

Important notes about the device:

- The device is charged through the USB-C port on the right side of the meshtastic device
- DO NOT plug in a cable to both the USB-C port and the micro USB port at the same time
- The device can be damaged if an antenna isn’t attached while the device is powered

Connecting to your device:

Once your device has been flashed, it is ready to be set up for use.

Using your phone:

- Download the Meshtastic app
- Go to the Bluetooth tab
- Click on the device with the same 4 digit code that is on the screen of your

meshtastic

- Wait for it to pair
- Enter the code that appears on the screen of your device
- Click on the Set LoRa Region
- Select United State for the Region
- Click the Save button

Your device is ready to use

Using your computer:

- Go to https://client.meshtastic.org/
- Click on “New Connection”
- Click on “Bluetooth”
- Click “New Device”
- Select the device with the same 4 digit code that is on the screen of your meshtastic
- Wait for it to pair
- Enter the code that appears on the screen of your device
- Click on the Set LoRa Region
- Select United State for the Region
- Click the Save button

Your device is ready to use