ChatterBox Custom Communicator Assembly

Based on Lilygo T-Deck

WARNING: Do not attempt unless you have a good understanding of electricity, wiring, and batteries. LiPo batteries can be dangerous and cause fires!

This can be a fun project but be aware you will have to so some simple soldering, and there's really no way around it. ChatterBox firmware requires GPS/GNSS, and the bare T-Deck does not come with GPS unfortunately. Other than the soldering and carefully packing components into a tight-fit case, this is fairly simple if you are somewhat comfortable with electronics. Be aware that when you purchase components from Amazon, it's not terribly uncommon to receive defective parts. Digikey and Mouser are very high-quality sources.

Components You Need

3.7v LiPo Battery
5 mAh recommended

SD Card
Check list on site for compatibility. It's picky.

Antenna Connector
I use pigtail to SMA

Antenna
Experiment with different options

T-Deck

Other
Wire, solder, tools

See website for where to buy each component:
https://chatters.io

GNSS
DFR Gravity 1103
-or-
DFR TEL0157

M3 Knurled Nuts
and bolts

Realtime Clock
Adafruit DS3231

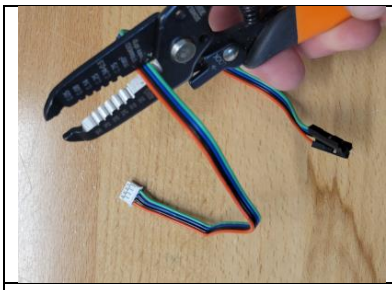
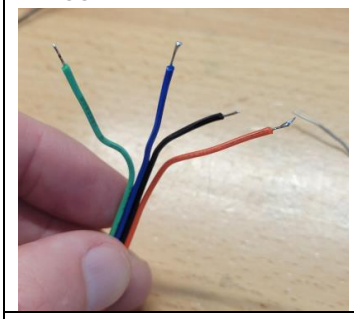
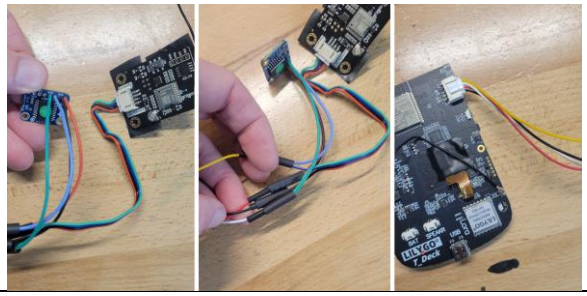
Grove Wiring
(seeed studio here)

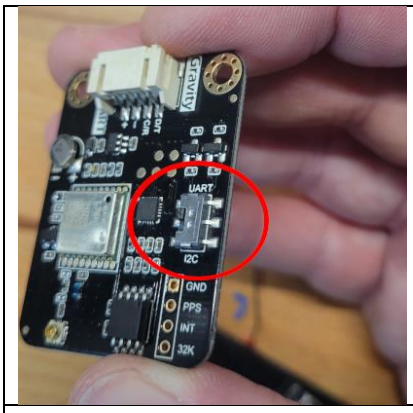
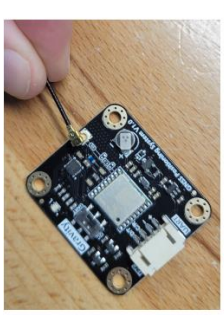
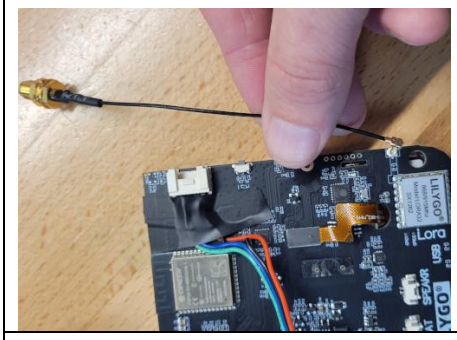
Battery Adapter
Micro JST 1.25 Female to JST-PH 2.0 Male

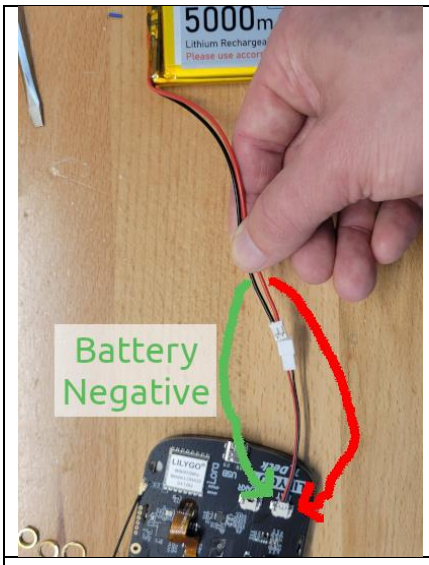
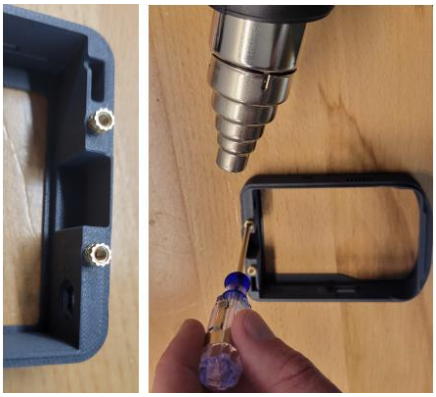
3D Printed Enclosure
Design by AlleyCat

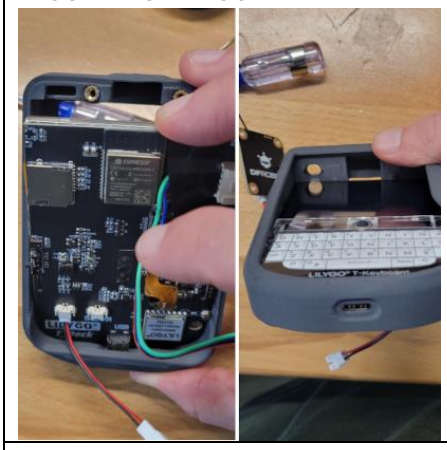
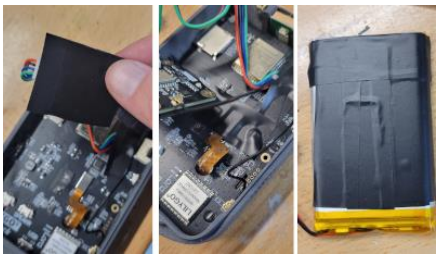
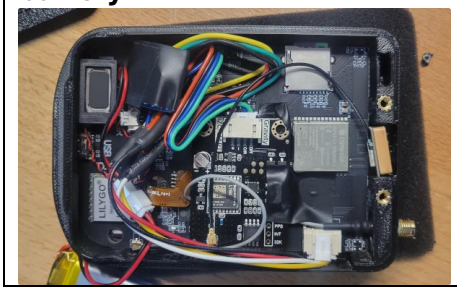
3D Print or Acquire a Case 	You may design or acquire your own enclosure of course, but I suggest using the TS-2 case designed by Alley Cat. They are excellent enclosures and print very well on my Bambu Labs P1S using PLA CF and standard PLA. I have recently switched to Bambu Labs ABS with good results. If you purchase an enclosure from Etsy (just search etsy for "T-Deck Case" for options) or another site, make sure the SD card slot is exposed. You will need to be able to insert and remove an SD card, and I've found that not all sellers of these cases have that slot exposed. **Note:** The reset button is tiny, and it tends to hold the actual reset button when you don't want it to (making the device appear to be bricked). So, I generally don't install the reset button.
	In addition to soldering tools and supplies, you will need the components listed on the right. You should be able to experiment with different batteries (HAS to be **3.7v rechargeable LiPo** of at least 2500 mAh). Experimenting with different antennas is also fun. Once you have an SMA connector, you can easily swap antennas on your finished ChatterBox at any time. You will want to stick with antennas that are centered around 915 or 868, depending on your chosen (and legally required) frequency ranges. At this time, I am only providing instructions for the DFRobot GPS module listed in the links. However, ChatterBox can work with other UART GPS units, like the M100 mini. If you go that route, keep in mind that RX of the GPS goes to TX of the T-Deck. If you stick with the DFR option listed here, you can just follow the wire colors later in these instructions. There are currently 2 DFRobot GPS options. The preferred is the GPS + RTC option, as it contains a dedicated realtime clock. This makes startup much quicker, allows for more efficient GPS usage (coming in future firmware release). Unfortunately, the DFR1103 doesn't seem to be available on Amazon yet, so if you go that preferred route, you'll need to

	purchase it from a different source. A couple are listed below. T-Deck Battery DFRobot GPS Module Realtime Clock (DS3231) Adafruit Breakout Antenna + Wire SD Card M3 Screws Heat Inset Nuts Battery Connector Adapter Grove Connector(s) **Preferred** (GPS + RTC) DFR1103: Buy from DFRobot or Buy from Digikey Alternative (no RTC): Buy from Amazon *Since Altware Development LLC is an Amazon affiliate, purchasing your items using the links here will support further development of ChatterBox.*
Move the Speaker 	If you really don't want to move with the speaker, you can leave it as long as it doesn't block your battery. If you are sure you don't want sound alerts, you can safely take the speaker out entirely. I move it because it fits better away from the center. The speaker is just glued on with some type of rubber cement, and you can just wiggle it off. However…see the next step.
Don't Dislodge this Connector! 	The little connector next to the speaker comes off very easily and it's hard to put back on. Be very careful when you remove the speaker, not to dislodge this thing. If you do dislodge it, all is not lost. It's just tricky to get back in place because it's so tiny.
Cut the DFRobot Cable	From the DFRobot cable, we are only going to use the end with the white plug, which connects directly to the DFR module. Cut the cable so the length of cable from

	that white plug to the end of your newly cut cable is about 3.5 inches.
Separate, Strip, and Tin the wires 	Separate the wire ends, so each wire is free for around 1.5 inches. Twist and “tin” the end of each wire with a little solder. This will help you place the wire a little easier and keep it from fraying/separating while you’re trying to delicately place each wire.
Connect the wires as shown 	
The above connections are (as shown): DFR + (red) : RTC VIN (red) : T-Deck VCC (red) DFR – (black) : RTC GND (black) : T-Deck GND (black) DFR C/R (blue) : RTC SCL (blue) : T-Deck RX (yellow) DFR D/D (green) : RTC SDA (green) : T-Deck TX (white) * Do not rely on wire colors, as adapters could have different colors in different orders. Use your own skills to determine. If you don’t know, don’t do this project!	
Switch the DFR to *I2C* (NOT UART)	** **Select I2C** ** Also, trim that plastic switch to be shorter. If it remains long (as it comes), it will be pressing into the battery and also would be easy to bump back to the incorrect setting, which would cause your GPS/clock/etc to quit working.

	
Install the GPS antenna  	Press the GPS antenna onto the DFRobot GPS unit. It should snap into place.
Trim the Reset Button [no image]	The Reset button on the T-Deck is too long for the case. If you press the T-deck into the case with that long reset button sticking out, the device will not power on and will apear dead. You don't really need the reset button, but trimming it down by about half will help to ensure the case doesn't hold the reset button down.
Plug in the LoRa Antenna Connector 	Press the LoRa antenna plug onto the T-Deck's connector. It should snap into place and remain firmly in place. * Ignore the portion of the image to the left showing wires soldered onto the back side of the grove plug. We don't do that anymore.
Connect Battery Cable Adapter	This part is a little confusing, and if you get it wrong, you will probably fry your T-Deck and possibly worse. What makes this confusing is that depending on where you purchase your battery, the plug it has may be reversed in polarity (+/-) with what any connector

	expects. So, you really assume any plugs will line up with proper polarity. Here, I am using a battery cable adapter, listed earlier in the parts list. The important thing to notice is that whatever adapter or connector you are using to connect your battery to your T-Deck, the battery's negative (-) *must* line up with the T-Deck's negative. The T-Deck may not be labeled, so you may need to use a multimeter to check.
Double-Check Polarity 	I used a multimeter to check the polarity of the plug connector on this T-Deck by touching one probe to the plug's negative (-) and touching the ESP32 metal, which is grounded. Since my multimeter said there's continuity (it beeped), I know the side of the plug closest to the speaker is the negative. Hopefully Lilygo will add a +/- label in the future, so you don't have to check like this, but for now I'd check with a multimeter before connecting a battery.
Install Heat-Inset Nuts 	Place the knurled nuts so the smaller end is sitting in the hole on the case, and carefully heat the nut using a heat gun, until you're able to gently press the nut flush with the case using a phillips screwdriver. If you apply too much heat or for too long, you'll warp the case. There is a version of the same case (available from Alley Cat) that just uses regular nuts, but I personally find these easier. If you don't have a heat gun, there's probably another way to do this, but I'm not aware of how one would do that. Note, a soldering iron plus special bit to help seat knurled nuts is what I use now. It's cheap, much faster, and less error-prone than a heat gun
Press Buttons Into Place	Place the sliding power switch into the case. The reset button is optional. About half the time, something about the way the case prints causes the

	tiny reset button to continually press the T-Deck's reset button. That's bad, because the T-Deck will not power on. If that happens to you, you may want to just remove the case's reset button. Honestly, I don't even usually add the reset button.
Insert the T-Deck 	This requires a little finesse, but first align the bottom of the T-Deck inside the case so you can see the USB micro port is aligned as shown in the picture. Once you're sure that's aligned, you should be able to work the rest of the T-Deck into place by carefully applying outward pressure to the sides and top of the case. The T-Deck will snap into place.
Apply Electrical Tape To Surfaces 	Now, to prevent any shorts, apply electrical tape to the entire backside of the GPS unit, over that delicate metal plug that gets easily dislodged, and really any surface that looks like it should be covered to prevent shorts. I do not place tape over the ESP32, as it needs to be able to dissipate heat. I apply electrical tape to the back side of the LiPo battery as well. I have had a similar LiPo battery itself cause a short on a component before (not ChatterBox), so now I just cover with a layer of electrical tape to be safe
Insert all components except battery 	Use a little bit of adhesive or rubber cement to stick the GPS antenna into place in the top of the case. Place the GPS unit flat in the location and orientation shown here. Also make sure there are no wires or plugs that are going to be in the way when you place the battery. You may orient things differently, with varying results, but this is what works for me.

Connect and Insert Battery 	Place the battery in, being careful not to put too much pressure on the battery, your newly soldered GPS connection, or anything else. Batteries come in different shapes and sizes. There are batteries that are 3.7 LiPo 5000 mAh, same as shown here, that are taller, wider, but thinner, and they also work fine. If you decide you want to go with a larger capacity battery, Alley Cat has alternate case backs that have more room specifically to allow larger capacity batteries.
Install the Case Back 	Place the back of the case on and install the screws. This looks like a simple step, but it can be tricky to get wires out of the way and the components into the right place. If you find the back of the case is putting pressure on the battery (like the case squeeks when you squeeze it), you probably need to rearrange the components, because you don't want unwanted pressure on any components.
Install an SD Card 	WARNING: Only use a compatible SD card, or you will waste a lot of time! Seriously, SD cards are cheap. When you have the ChatterBox firmware installed, if it gets stuck on the "Mounting/Decrypting" step, it usually means the SD card is not properly formatted, and you may need to delete the card's partitions and add a new single FAT partition. Sometimes, due to variances in the print, variances in t-deck batches, the SD port may be a little misaligned. If that happens, don't force the SD card in, but you might need to use a file or knife to make the opening a little larger in the printed enclosure. If you do have to widen the enclosure hole, you will probably want to remove the tdeck first, as it is very easy to damage the SD components. Or, you may get better results by designing or finding a different enclosure to print.

Install the ChatterBox Firmware 	Instructions for flashing the firmware are available on the ChatterBox Firmware Flasher page. ChatterBox Firmware Flasher