V2 Stacking

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Alan Johnston edited this page on Mar 16 · 11 revisions

Stacking the Boards

If the V2 Flat Sat Testing has completed successfully, you can stack the boards.

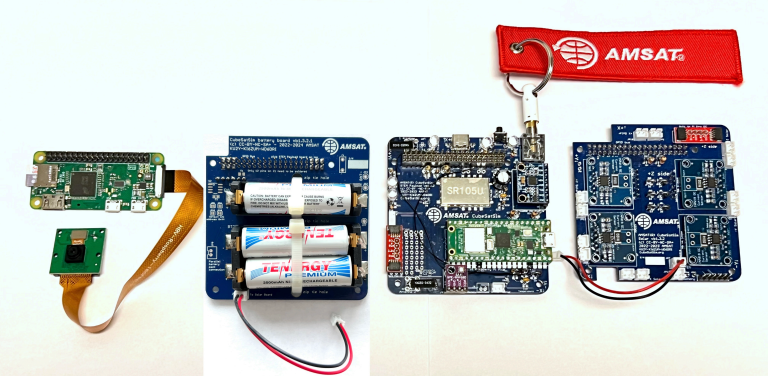
Video

Here is a video of this step.

You will need:

- STEM Payload Board with sensors and RBF plug inserted
- Solar Board
- Battery Board
- Pi Zero W
- two GPIO stacking headers (short version)
- two JST jumper cables
- various 2.5mm standoffs

The four boards in the board stack are shown here:



Pages 131

Find a page...

Home
1. Main Board 1
2. Software Install
3. Ground Station
4. Main Board 2
5. Battery Board
6. Solar Panel and Frame
7. Main Board 3
8. STEM Payload Board
9. Board Stack
9. Index
Creating the CubeSatSim Raspberr...
CubeSatSim Lite
CubeSatSim Loaner User Guide
CubeSatSim Mini

Show 116 more pages...

8.2 Stacking the Boards

This step will stack the three boards and the Pi Zero.

Video

Here is a video of stacking the boards

In order to stack the boards, we will need a set of 2.5mm steel, brass, or nylon spacers and two GPIO stacking headers.

Standoffs are described by the thread size (M2.5 in this case), length of the standoff (6, 10, and 15mm), and length of the standoff threads if any (+6mm). Also M2.5 screws and nuts are used. Here are the standoff pieces needed for the three board stack along with their names in their correct order and orientation. On the left is if you order the individual pieces using the BOM. On the right is if you buy a standoff set such as https://www.amazon.com/gp/product/B08HS7MFYZ/ and combine them. These instructions will describe the BOM parts with the kit combined parts in parentheses. The photos may show the combined parts.

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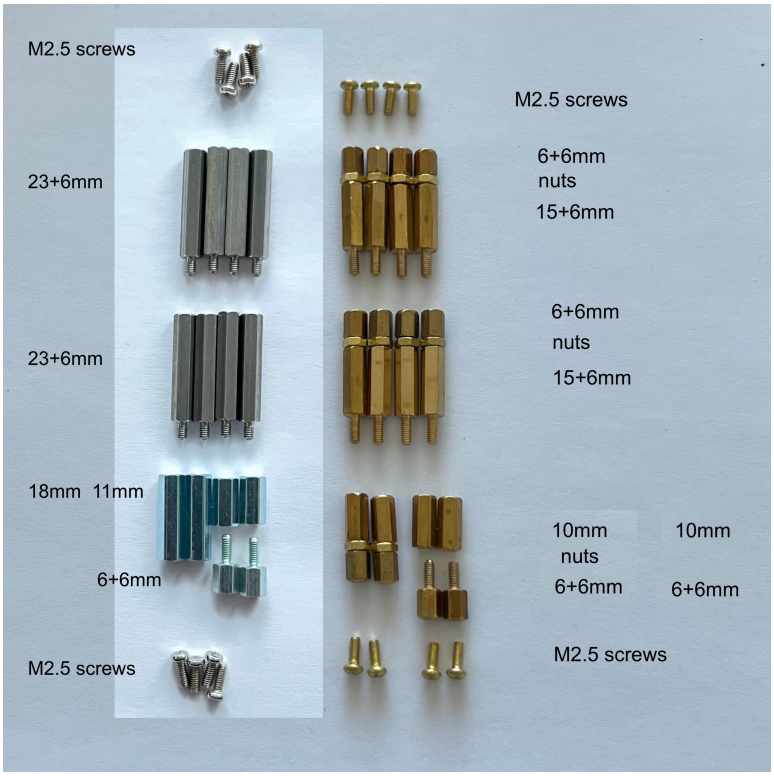
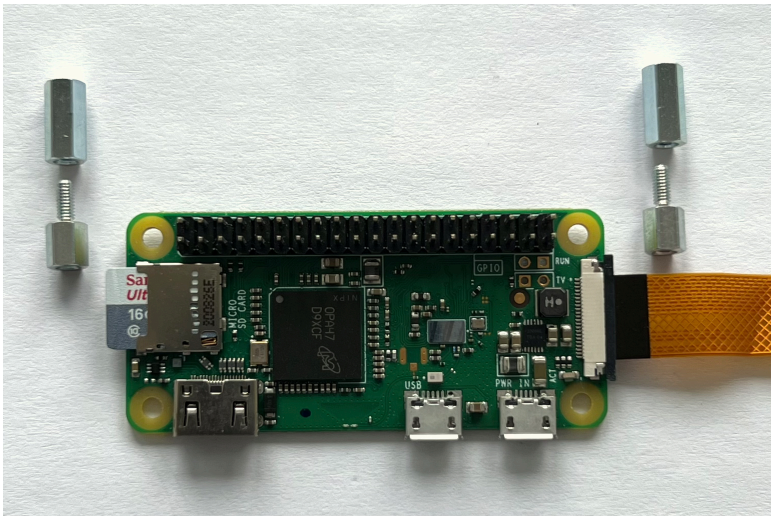


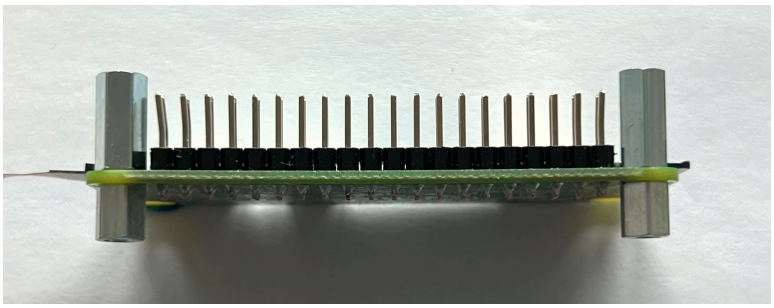
If you use the standoff kit, you will need 8x M2.5 screws, 10x M2.5 nuts, 12x 6+6mm, 8x 15+6mm, and 4x 10mm.

You will also need two stacking GPIO headers to give extra spacing between the boards. They are identical to the ones soldered onto the Battery and STEM Payload boards.

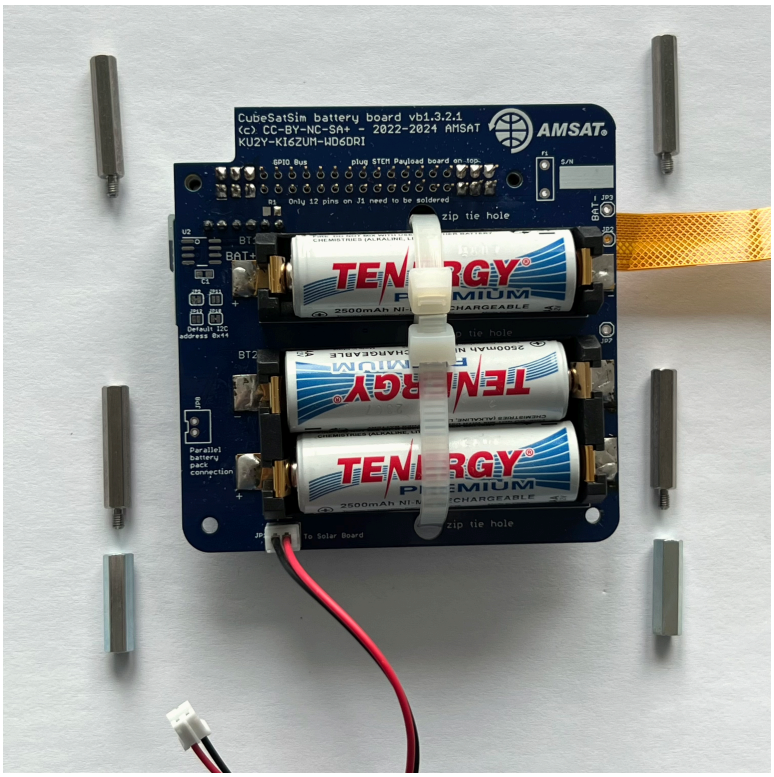
Start with the Pi Zero and two 11mm and 6+6mm standoffs (or wo 10mm and 6+6mm standoffs):



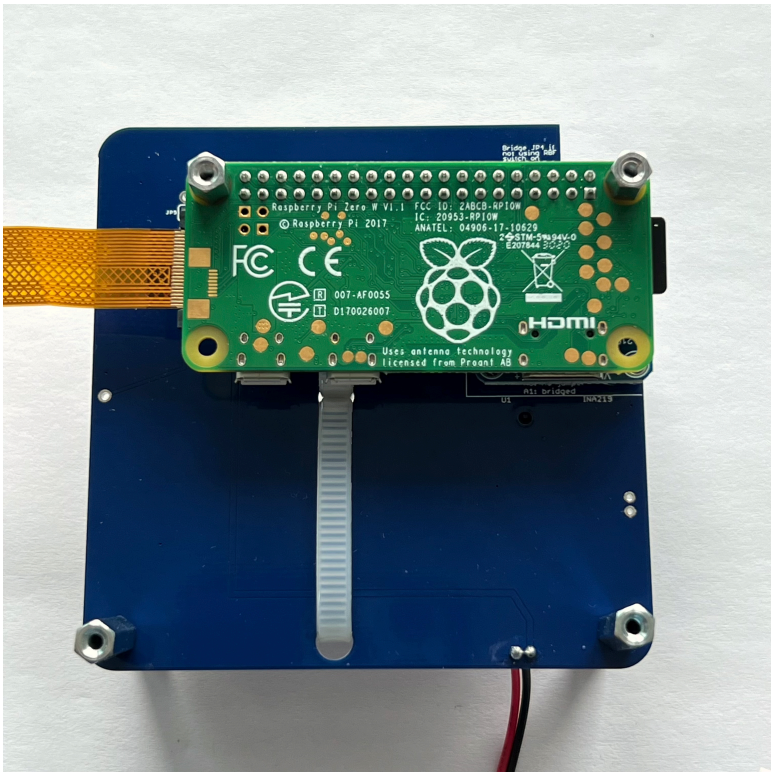
The 11mm goes on top, the 6+6mm goes on the bottom. They go in the holes closest to get GPIO header pins



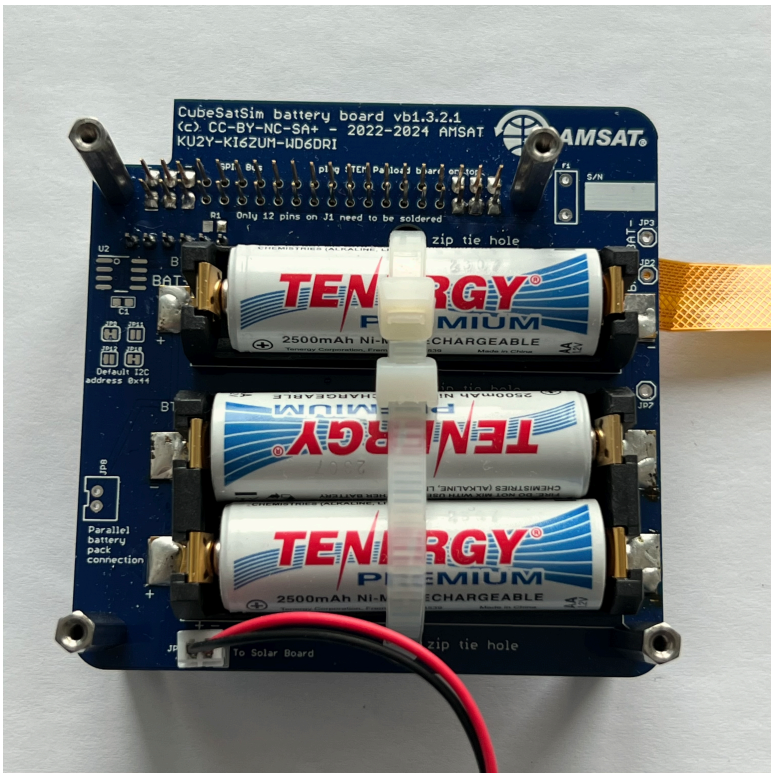
Next, take the Battery board. You will use 4x 23+6mm standoffs, and 2x 18mm standoffs (from the kit, make two sets of 10mm and a nut and a 6+6mm, and four sets of 6+6mm and a nut and a 15+6mm standoff).



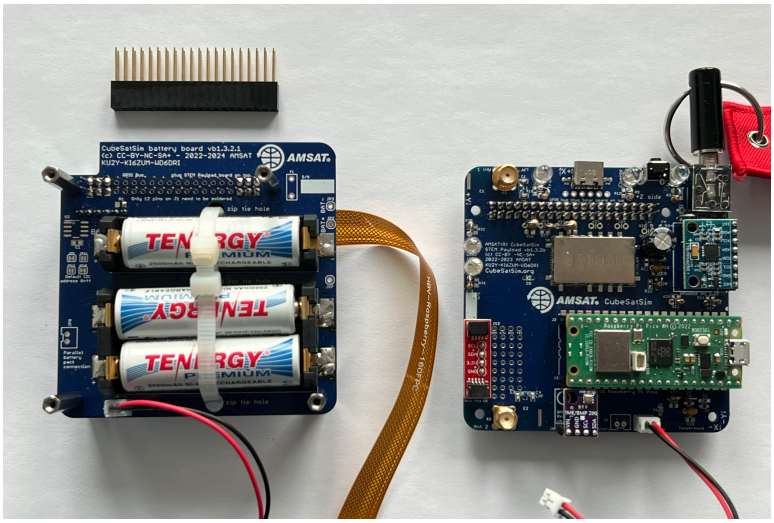
Plug the Pi Zero into the bottom of the Battery board. The two 18mm standoffs (10mm, nut, and 6+6mm standoffs) will go under the other two corners of the Battery board



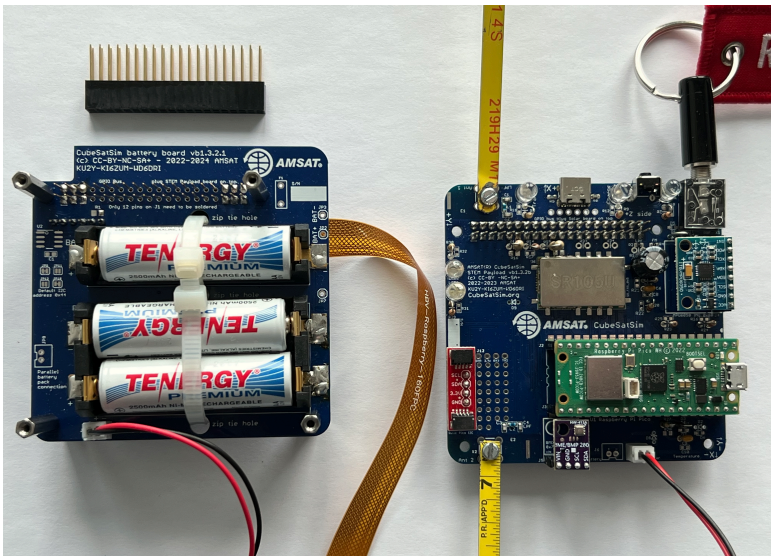
Screw the four 23+6mm standoffs (6+6mm, nut, and 15+6mm standoffs) into the top of the Battery board



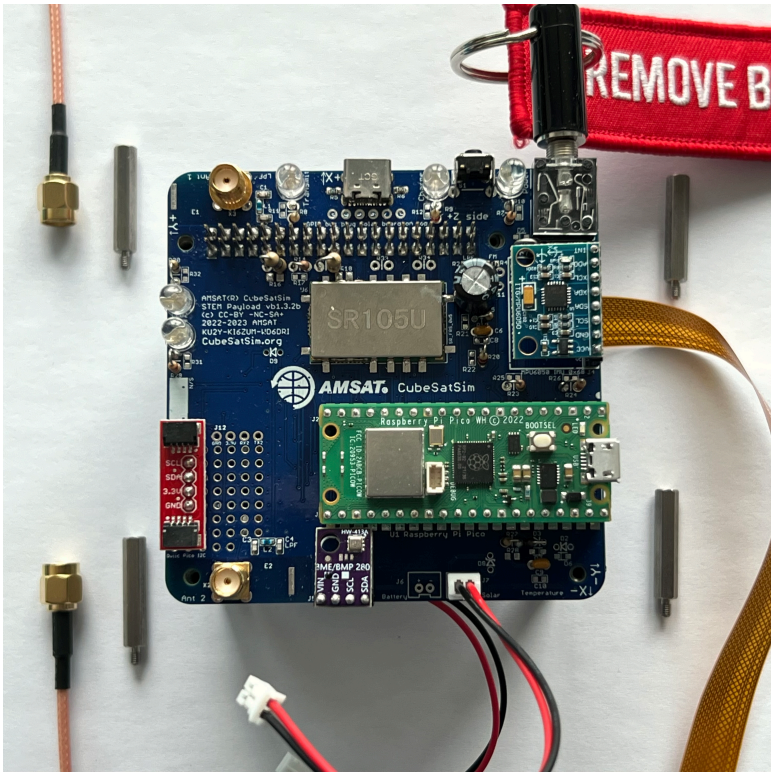
Next, put a stacking GPIO header onto the Battery board so the STEM Payload board can be plugged on top:



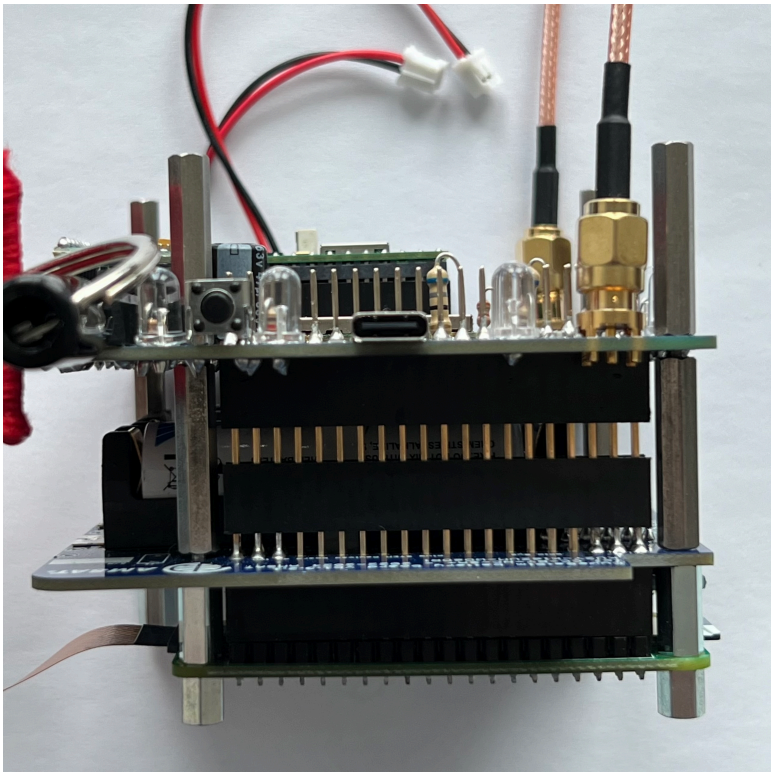
If you are building the tape measure antenna version, it will look like this:

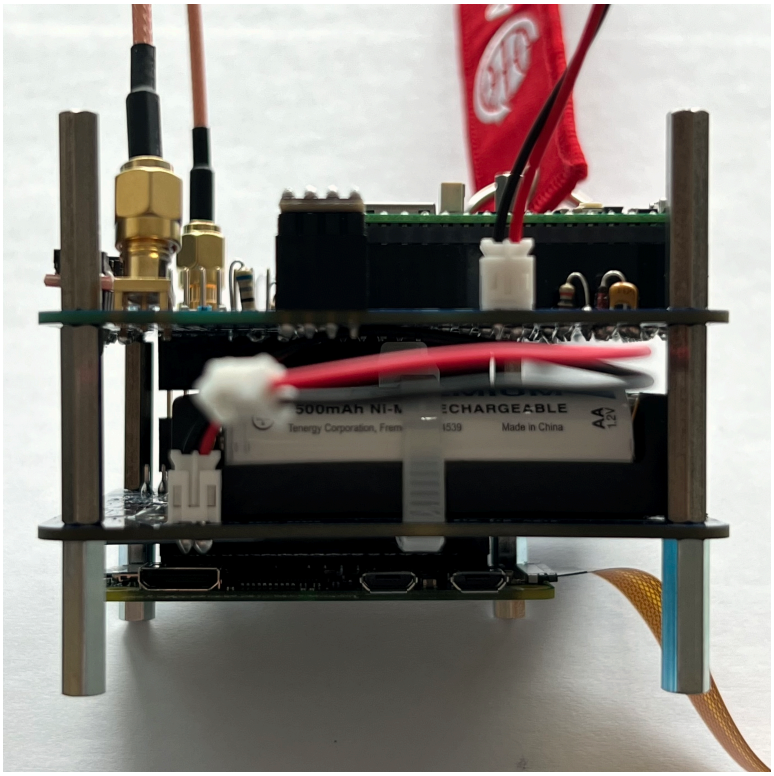


Next, use four 23+6mm standoffs (make up four more 6+6mm, nut, and 15+6mm standoffs) and screw them into the top of the STEM Payload board. If the SMA antenna is in use, make sure the coax cables are screwed in.

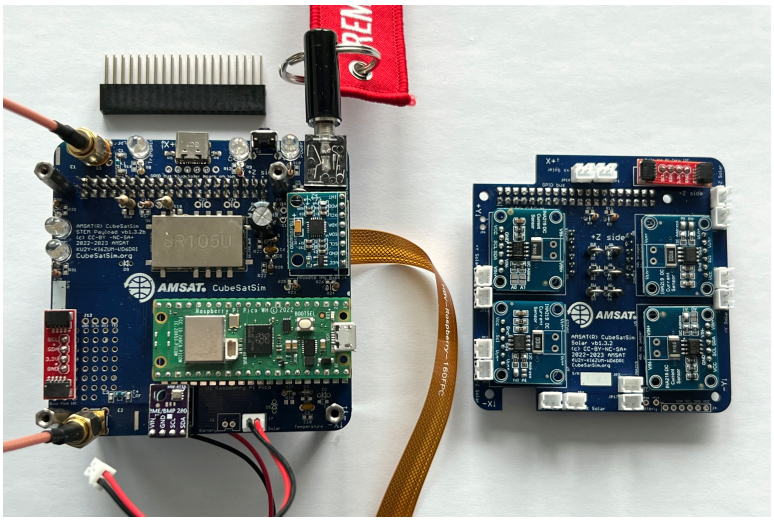


Here's how it looks from the sides:

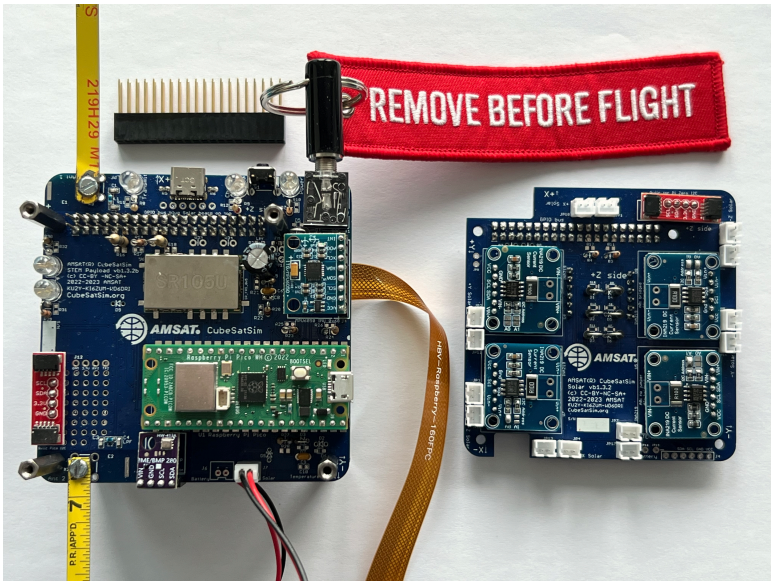




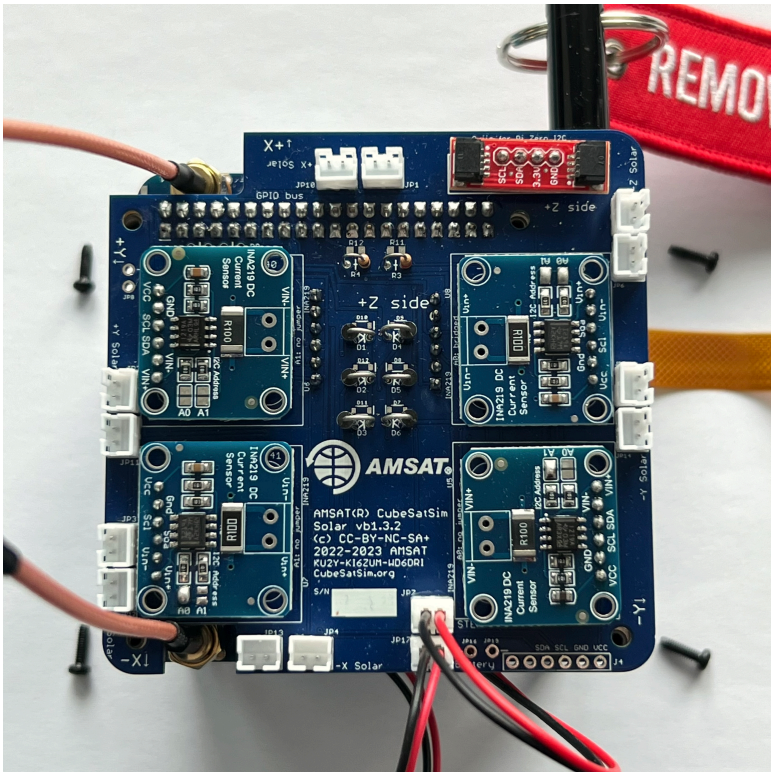
Another stacking GPIO header is plugged into the top of the STEM Payload board so that the Solar board can be plugged in on top



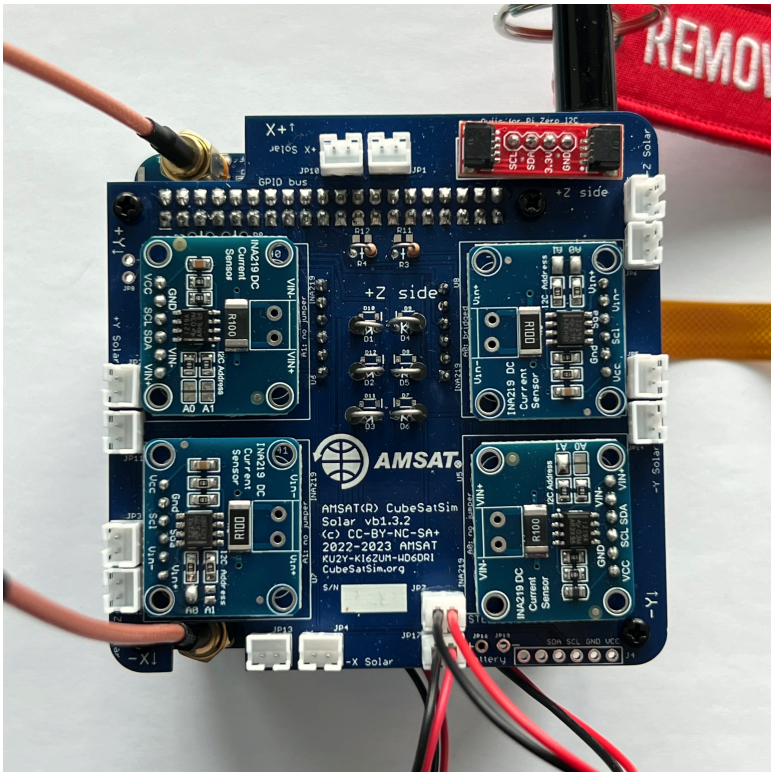
If you are building the tape measure antenna version, it will look like this:



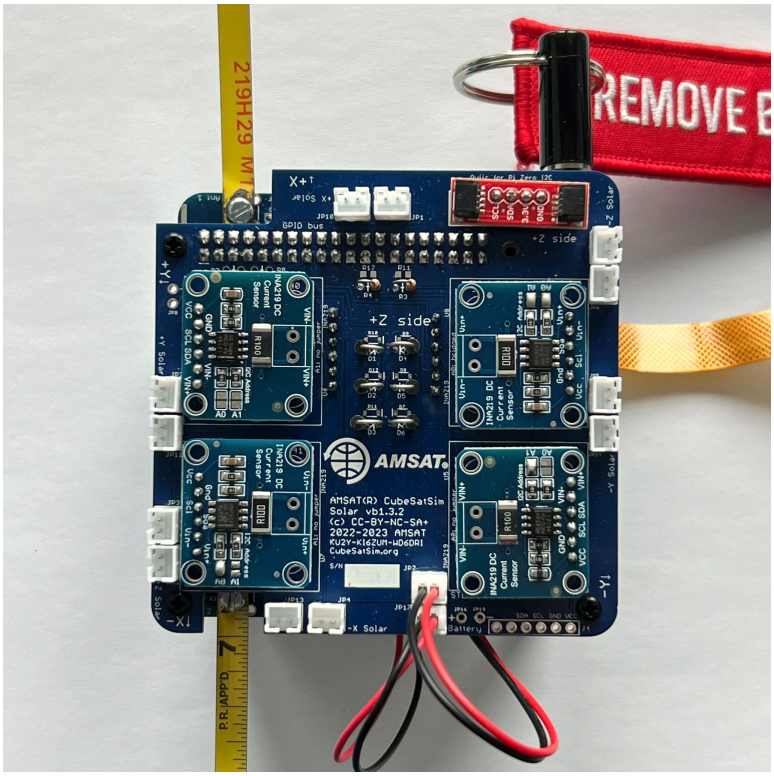
Now plug the Solar board on top. Connect the JST cable from the Battery board and the JST cable from the STEM Payload board. It doesn't matter which connector you use.



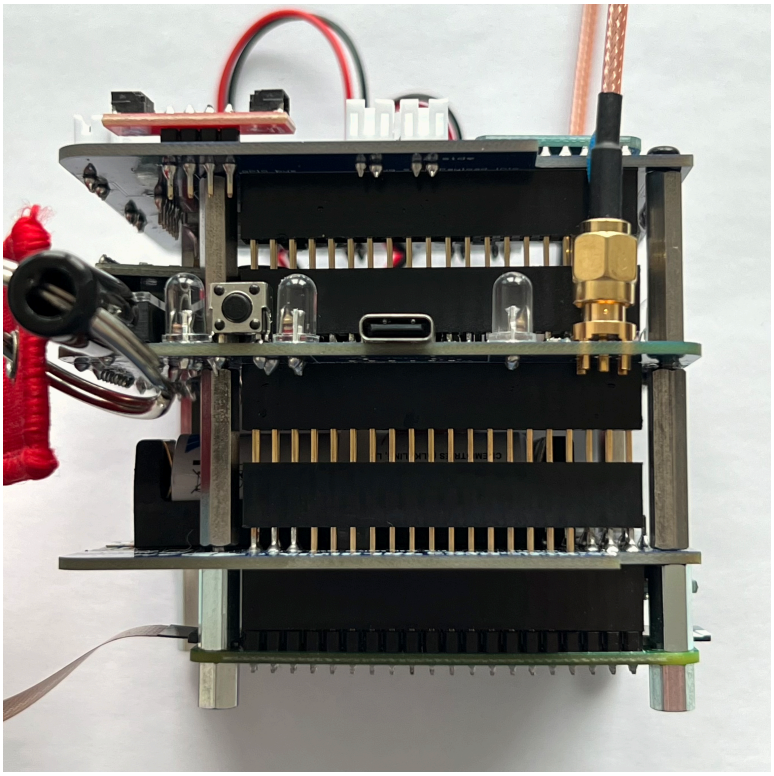
Use four M2.5 screws to secure the board

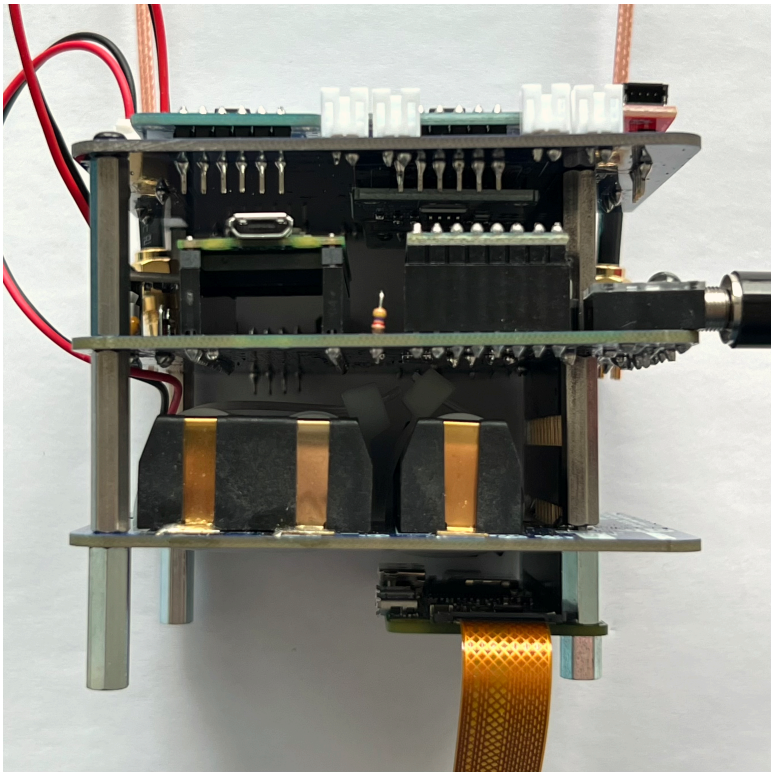


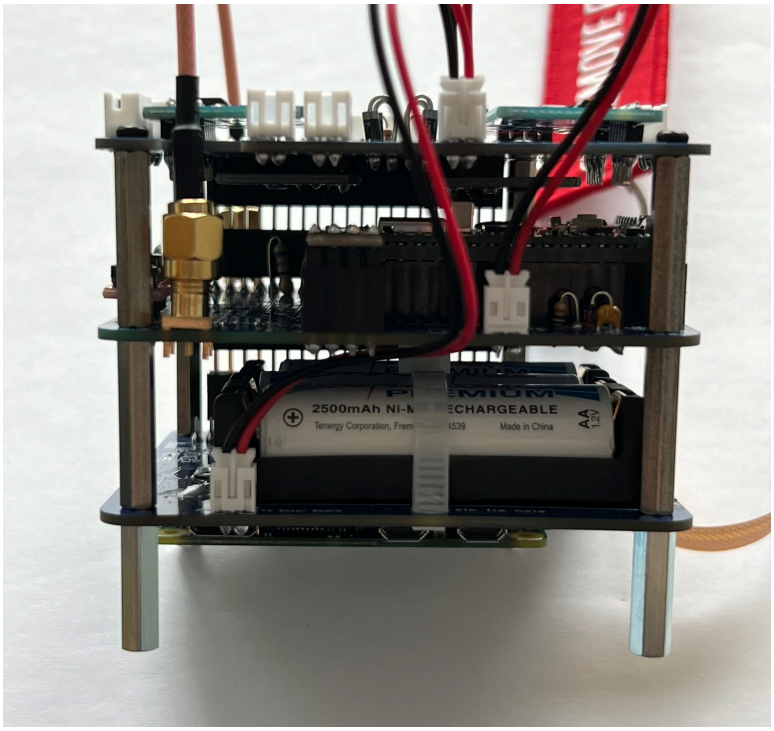
If you are building the tape measure antenna version, here's how it looks:



Here's how it looks from the side with the SMA antennas:







You can test the CubeSatSim by removing the RBF pin. Unless the batteries are fully depleted (NiMH batteries normally come charged up), the green light on the Pi will flicker and the CubeSatSim will boot up and start running.

The green LED on the Main Board will be lit up after booting is complete and the software is running. The blue LED on the Main Board will be lit up when the CubeSatSim is transmitting. The red LED on the Main Board will be lit up when the battery is being charged by either the micro USB power supply.

The pushbutton on the Main Board can be used to reboot or shutdown the CubeSatSim. Pressing and releasing the pushbutton will cause the green LED to turn off and the Pi to reboot. Pressing and holding the pushbutton until the green LED flashes three times slowly then releasing will shutdown the Pi. Once it has shutdown, it is safe to plug the RBF pin back in. Pressing the pushbutton with the RBF pin inserted will not turn on the Pi.

You should now test thoroughly the board stack by running these tests: V2 CubeSatSim Test Plan

The stack is now ready to be installed in the Frame in V2 Final Integration

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