Troubleshooting guide for the Soil Quality Pod V1

The first version of the Soil Quality pod is a prototype with a multitude of measurement capabilities. The following quantities are displayed by the pod:

- CO2 (in ppm)
- Light Intensity and UV index
- Temperature (Celsius)
- Soil Moisture (Percentage)
- SD card storage and LCD UI

The problems that can occur with the pod are divided into 5 categories:

1. SD card failure: The SD card is prone to failure in mobile devices. In order to overcome this issue, taking a regular backup of data stored in the SD card will prevent data losses. If the SD card has failed, the LCD will shut off as well. This can be used as an indication to try and replace the SD card. If the LCD starts working post this, the previous SD card has failed and will need to be disposed.
2. LCD failure: If the LCD component fails, there could be few reasons. First check would be to connect the LCD of the failed pod, to the other pod with a working LCD. If the LCD on the other pod works with the circuit of the pod with the failed LCD, this indicates that the issue is either with the LCD itself or with the SD card on the pod with the failed LCD. First, try and replace the SD card. If it still does not work, replace the LCD. One of these should solve the error. If not, it could be an issue with the wiring of the LCD circuit which will need to be debugged based on the circuit schematic. Visually inspect the LCD wires first to see if any of the wires have come loose.
3. Wiring / Pod damages: These issues typically need to be resolved with the help of a serial monitor and/or other hardware components. First, visually inspect the pod to verify if there are wires that are loose. If not, connect the pod to a laptop with the Arduino IDE and verify whether the data is being obtained appropriately. If not, there could be an issue with one of the sensors. If the data is obtained normally on the serial monitor, either the SD card or LCD needs replacement.
4. SD shield / Board issues: Since 3 boards are stacked one on top of the other, there is a possibility that one of the boards has either unfastened from the stack or that some of the pins are no longer connected in the stack. Visually inspect the boards to see if the stack is loose or if any of the pins are not fastened. Gently push the stack in if visual inspection does not show loose ends.

5. Sensor failures: These scenarios are rare and do not happen often. The best way to debug this issue is to check the data on the serial monitor and see if it corresponds to the expected sensor data.

Connection change guide:

- If the LCD needs to be replaced, just reconnect the two sets of wires in the exact same configuration as it is in the previous LCD.
- If the serial monitor needs to be accessed, connect the USB cable that will connect to the computer in the same spot that the battery bank is connected to.
- The probes for soil moisture and CO2 can only be connected in one way, with respect to the groove present in the connector. The CO2 sensor has a specific pod that it works with and is labelled accordingly.
- The Temperature probes can just be plugged into the sockets placed on the left side of the pod.
- The SD card can be plugged out and replaced by pressing it in, which will release it from the socket.