

# Internal Environment Board



**Subteam:** Electrical

**Date:** 2023/08/28

Arctos Autonomous  
Robot 2023

## Description

It is essential to have an understanding of the internal conditions of our AUV. The internal environment PCBA is able to monitor the air temperature, pressure, and humidity inside our AUV. These are important parameters since we must monitor the temperature of the components to ensure damage doesn't occur due to overheating components such as Orin or our PCBA's. Good temperature sensors such as ours also have humidity detection but that is not important for us as pressure is the metric we use to ensure there is no moisture entering the bot.

Secondly, pressure is an essential metric since we pressurize our vehicle before entering the water to ensure it is airtight. If this function is not working then we may risk damage to the AUV. In the past we did not have this capability which meant the AUV required someone to constantly watch it to ensure no water was leaking in.

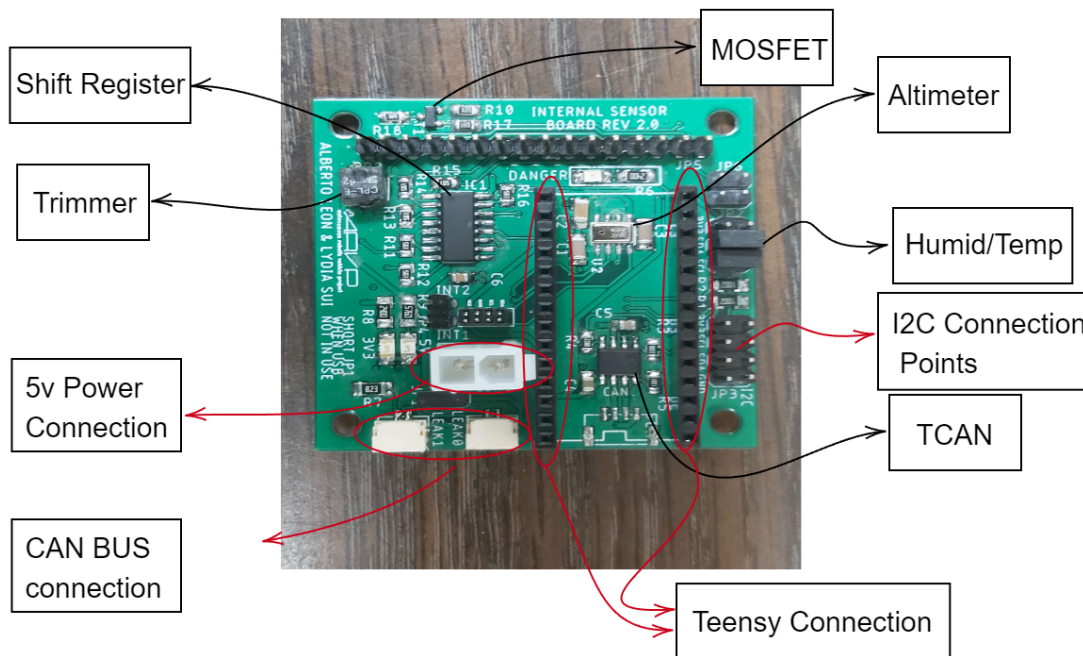


Fig 1 - Arctos Internal Environment PCBA and its connections

# Internal Environment Board



**Subteam:** Electrical

**Date:** 2023/08/28

Arctos Autonomous  
Robot 2023

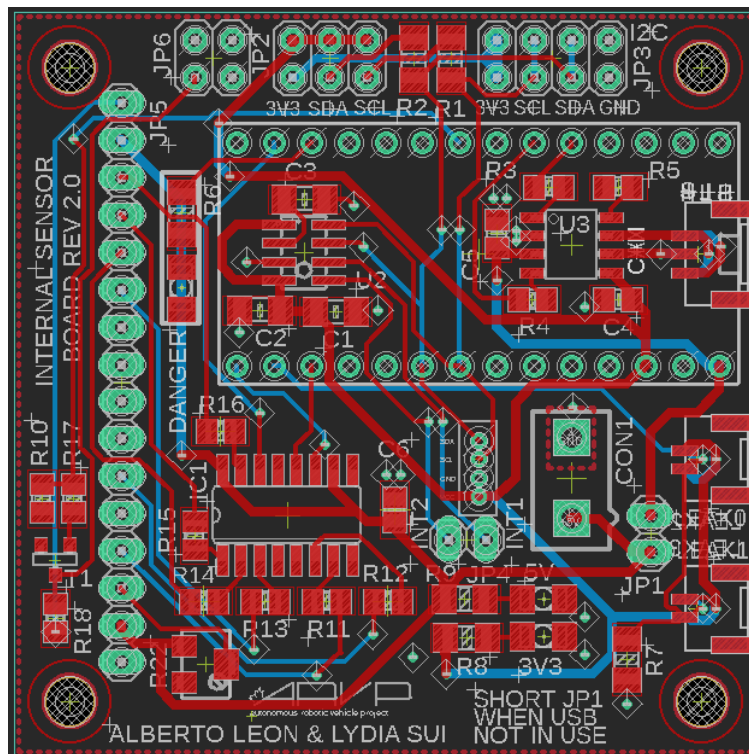


Fig 2 - PCB design of the Internal Environment PCBA

## Design Explanations

HIH7120-021-001 chip for temperature monitoring was chosen (at U4) as it has good temperature performance of  $\pm 0.5$  C and a range from -40 C to 100 C. When we are looking at temperature we are concerned with extreme values and the rate at which temperature is increasing. Therefore, we do not require extreme accuracy for our purposes. It can take a supply voltage from 2.3 V to 5.5 V DC, which we have supply rails for. The good thing about this chip is that we are able to remove the components associated with signal conditioning from the PCBA which allows us to reduce our PCBA size as it is already accounted for in the chip. This

# Internal Environment Board



**Subteam:** Electrical

**Date:** 2023/08/28

Arctos Autonomous  
Robot 2023

negates the need to recalibrate the sensor constantly and the need for us to create a complex signal processing solution. Finally, this chip uses I2C for communication of the output.

MS561101BA03-50 (U3) pressure sensor was chosen as it is a high resolution altimeter with SPI (serial peripheral interface) sensor with an I2C bus interface. This makes interfacing easy with virtually any microcontroller and there is no need to program internal registers in the device. Also it operates in the ideal range for the pressures our bot will see from 0.01 bar to 1.2 bar and has high sensitivity.