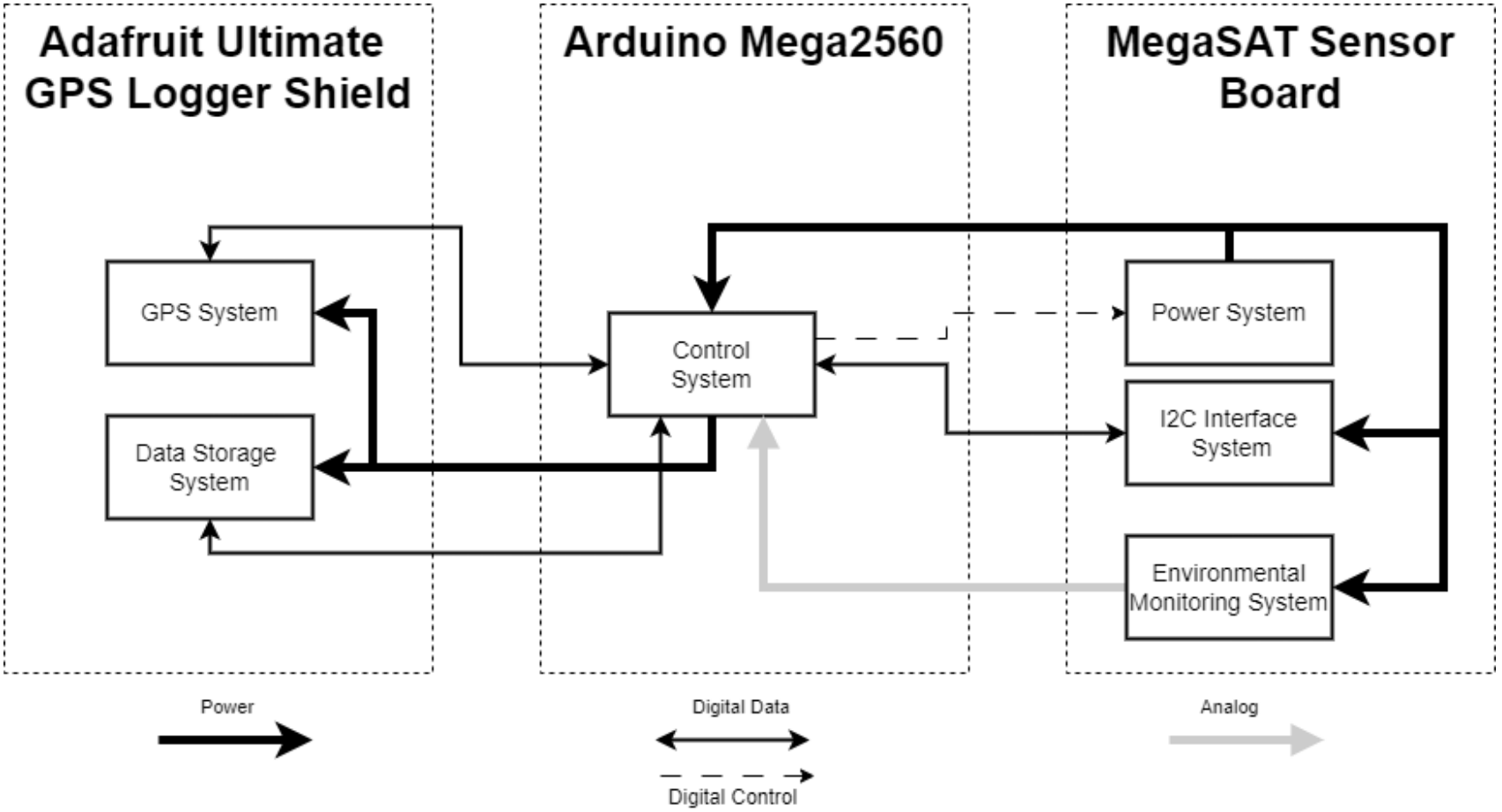
MegaSat Development Board

What is the MegaSAT?

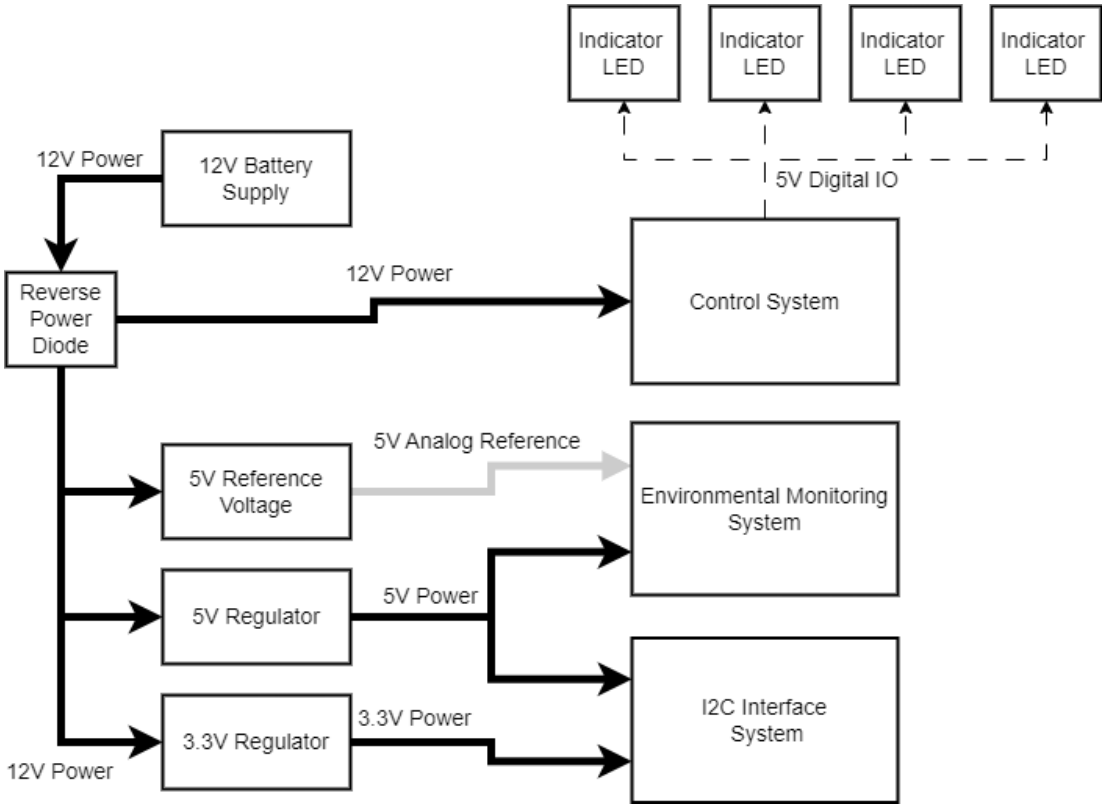
- The MegaSAT is a microprocessor sensor board designed to provide a set of commonly useful sensors and interfaces for a LaACES Payload
- By combining the MegaSAT, an Arduino Mega, and the Adafruit Ultimate GPS Logger Shield, teams build a solid baseline payload
- The baseline MegaSAT can be expanded to add additional sensors to meet the team's Science Goals
- The Arduino is the control system, and the GPS Shield provides the Data Storage System and GPS System

MegaSAT System Diagram

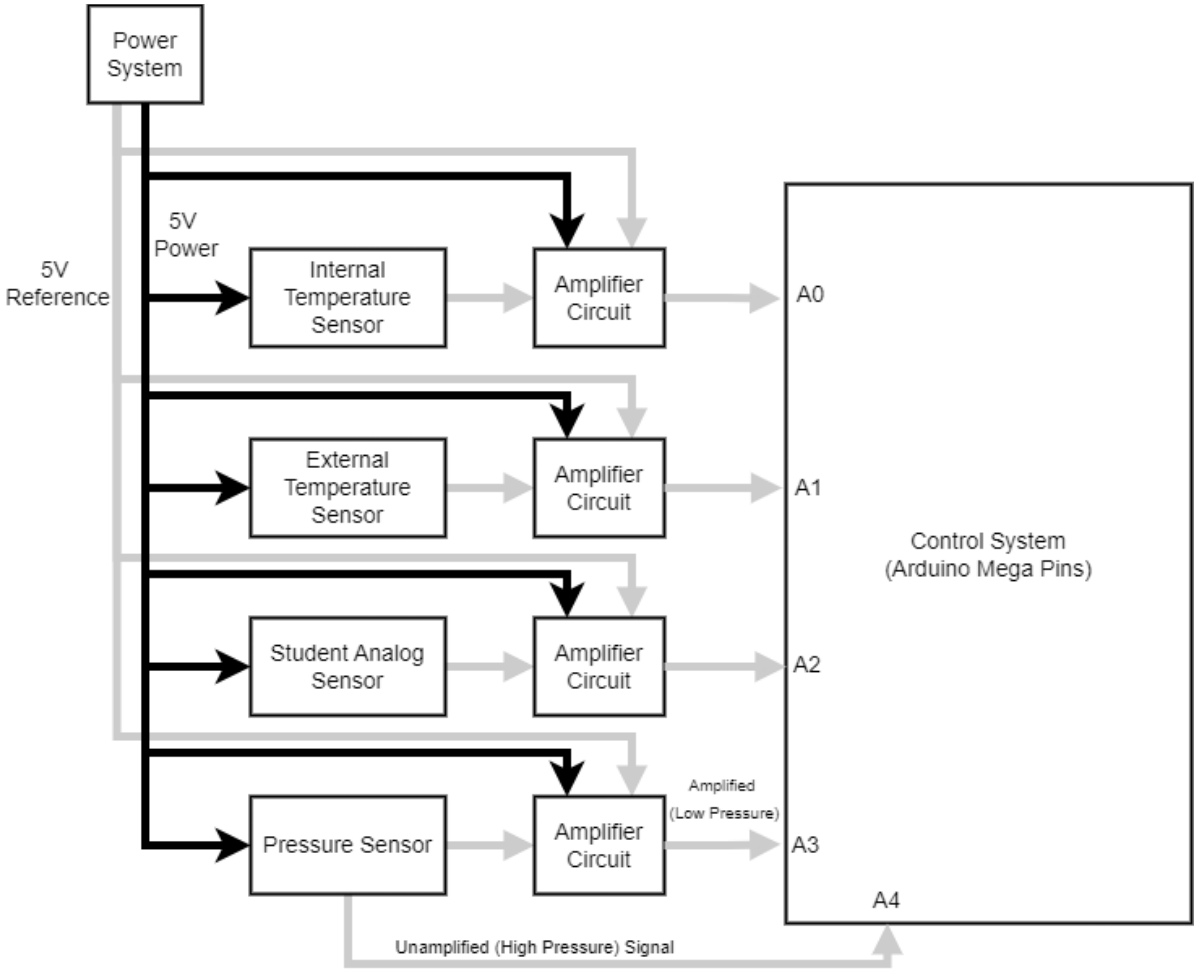


Power System

- Power System receives voltage from the battery (12V or 9V)
- Provides power to the Arduino
- Provides 5V or 3.3V to loads on the MegaSAT
- Also includes 4 LEDs connected to D2-D5 that teams can use as status indicators

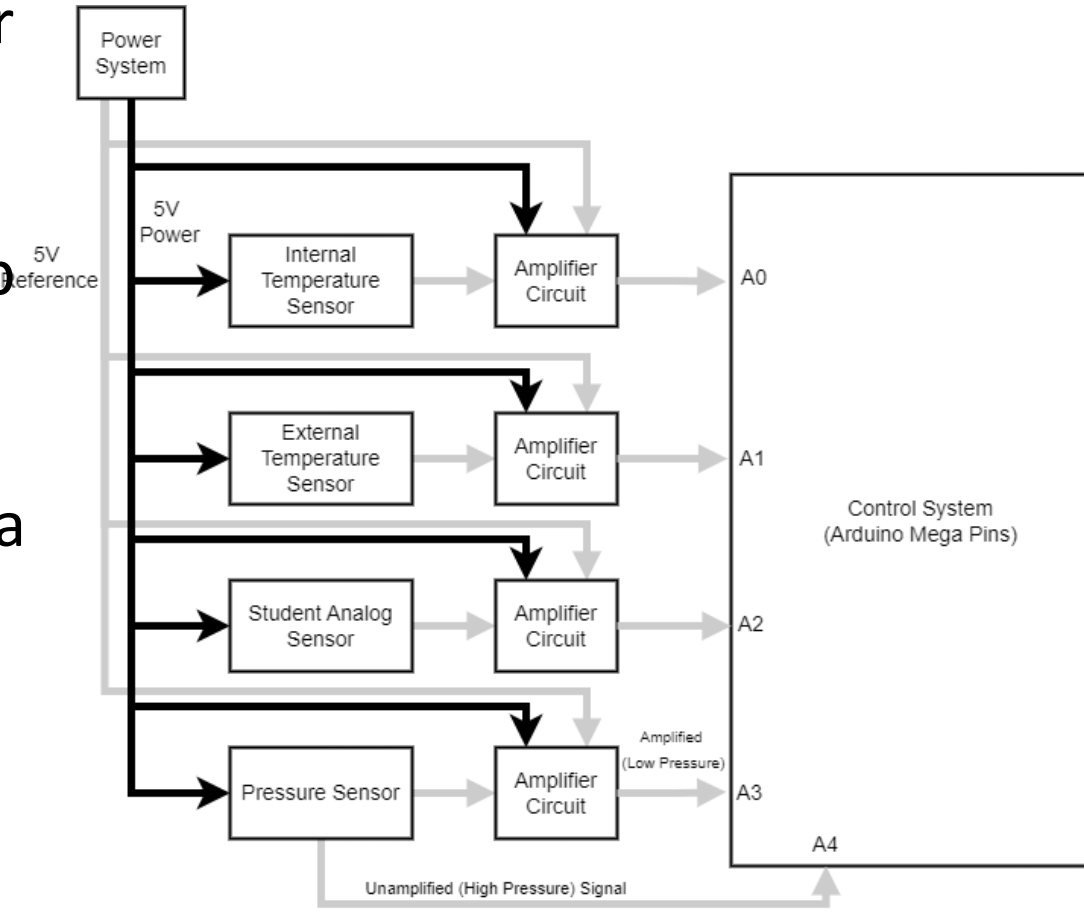


Environmental Monitoring System



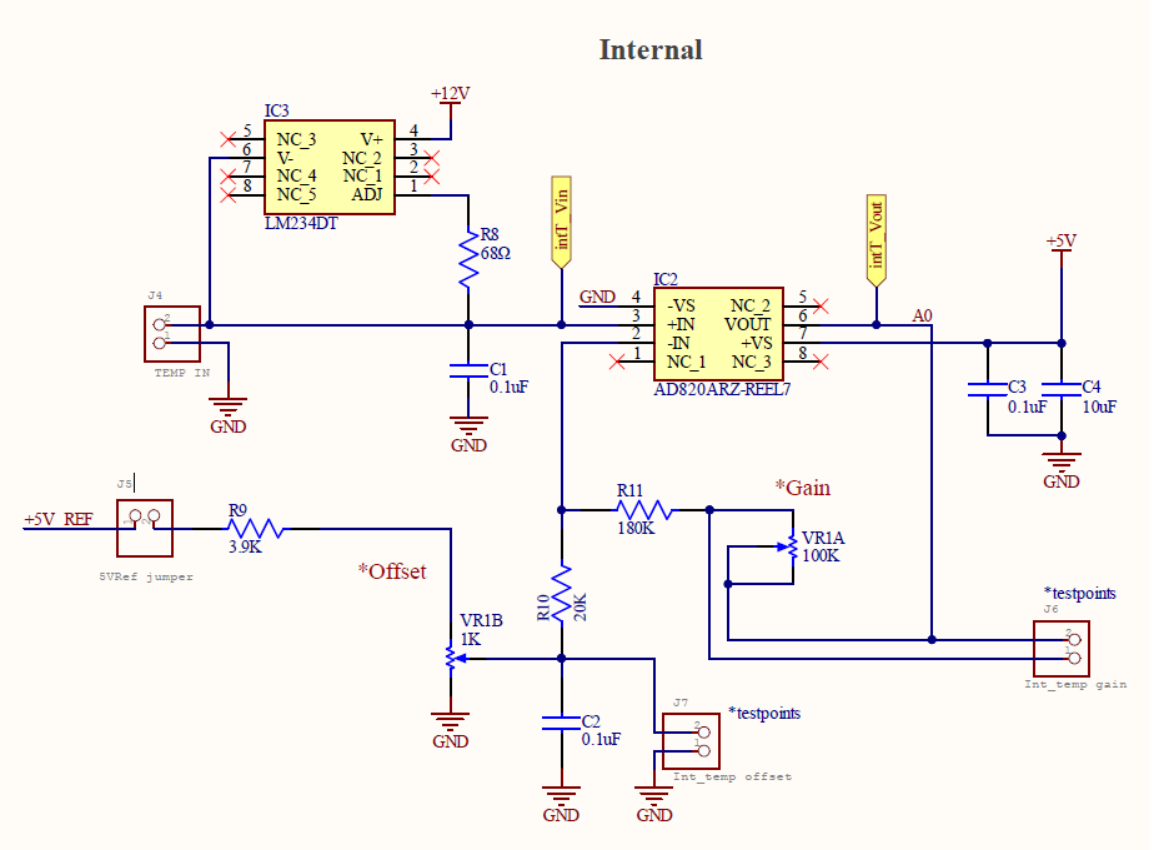
Environmental Monitor System

- Contains Analog Sensors for pressure and temperature
- Each sensor includes an adjustable non-inverting Op Amp circuit to adjust range and resolution
- Also includes a circuit with a 3 Pin connector (Power, Signal, Ground) and amplifier for connecting an additional analog sensor if needed



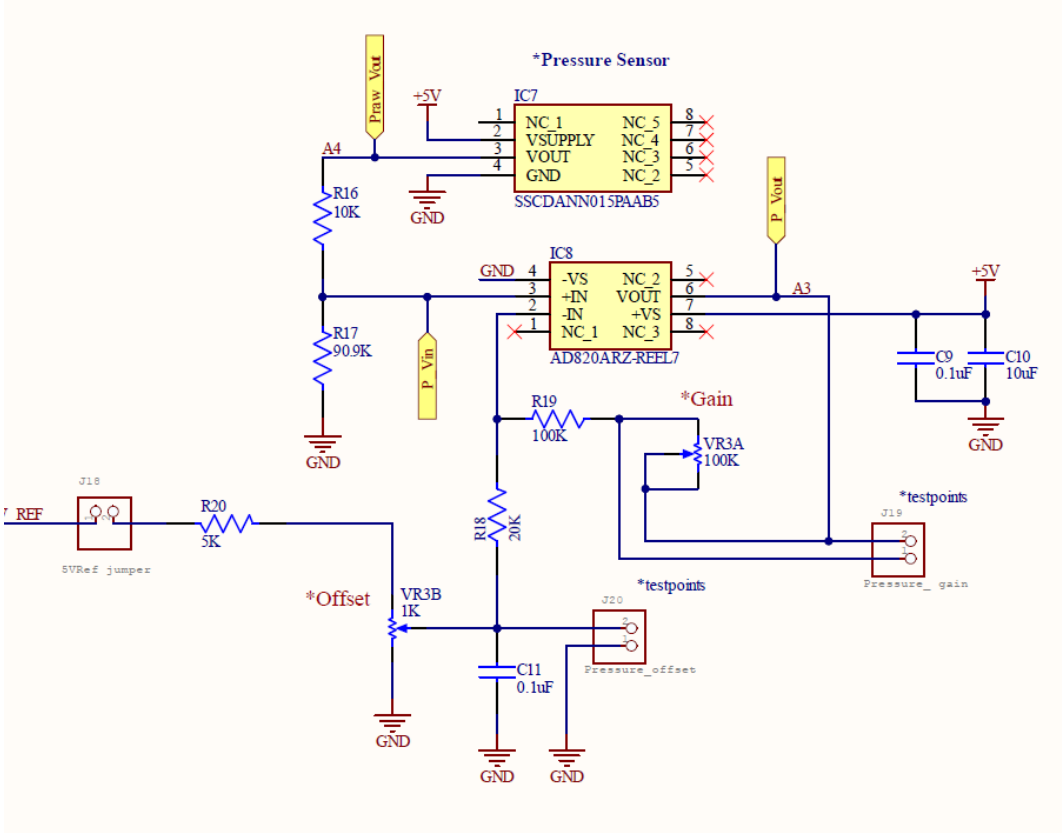
Temperature Circuits

- 1N457 diodes temperature with a constant current source for the temperature sensor
  - Improved version of the circuit used in fall calibration
- Includes test points for setting the potentiometers
- Two identical circuits
  - Typical use is one internal and one external



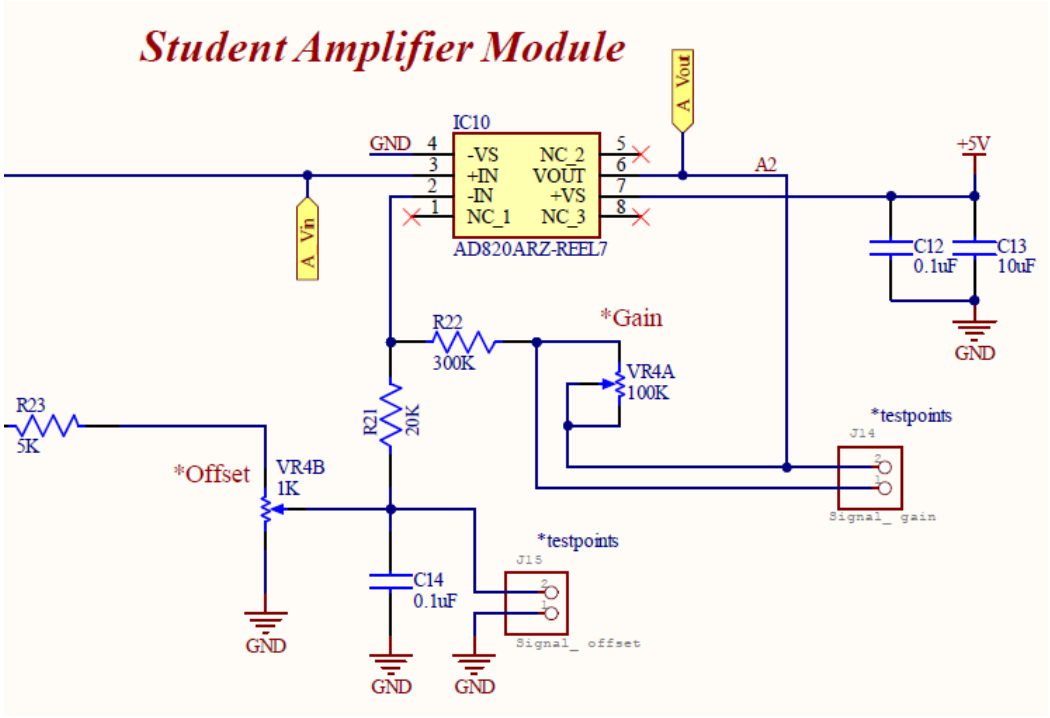
Pressure Sensor

- Honeywell SSC series pressure transducer
- 0-15 psia range
- 0-5V unamplified output analog pin (A4) give coarse pressure reading
- Amplified output to give increased sensitivity at low pressure (A3)



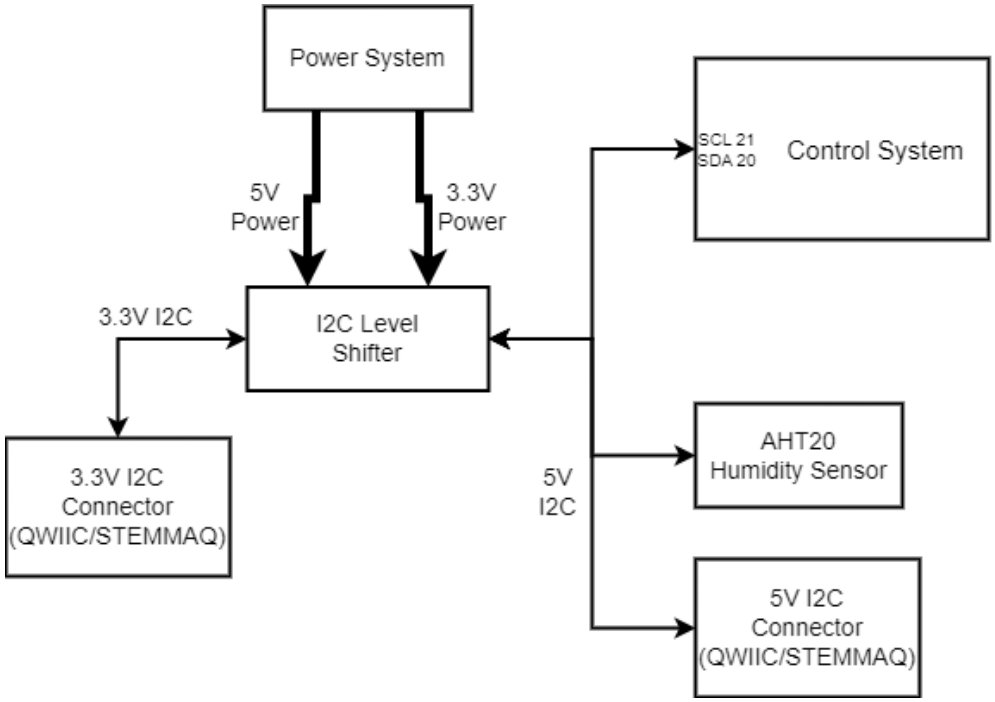
Student Sensor

- Intended to provide amplification and power in case a team wants to add an additional analog sensor
- Can provide power to a sensor (5V)



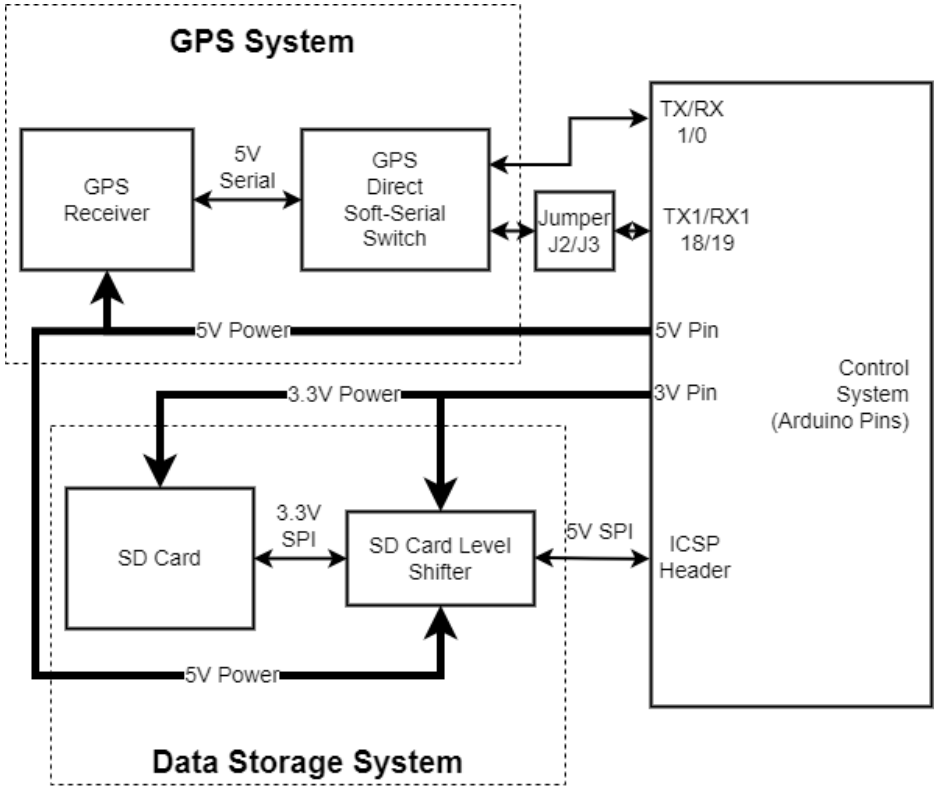
I2C Interface System

- Provides an I2C connection from the Arduino at both 5V and 3.3V logic levels
- AHT20 I2C Humidity Sensor
  - Kit includes a version for mounting on board or a version with longer leads for external mounting
- Connectors used are compatible with QWIIC and STEMMAQ products from Adafruit and Sparkfun

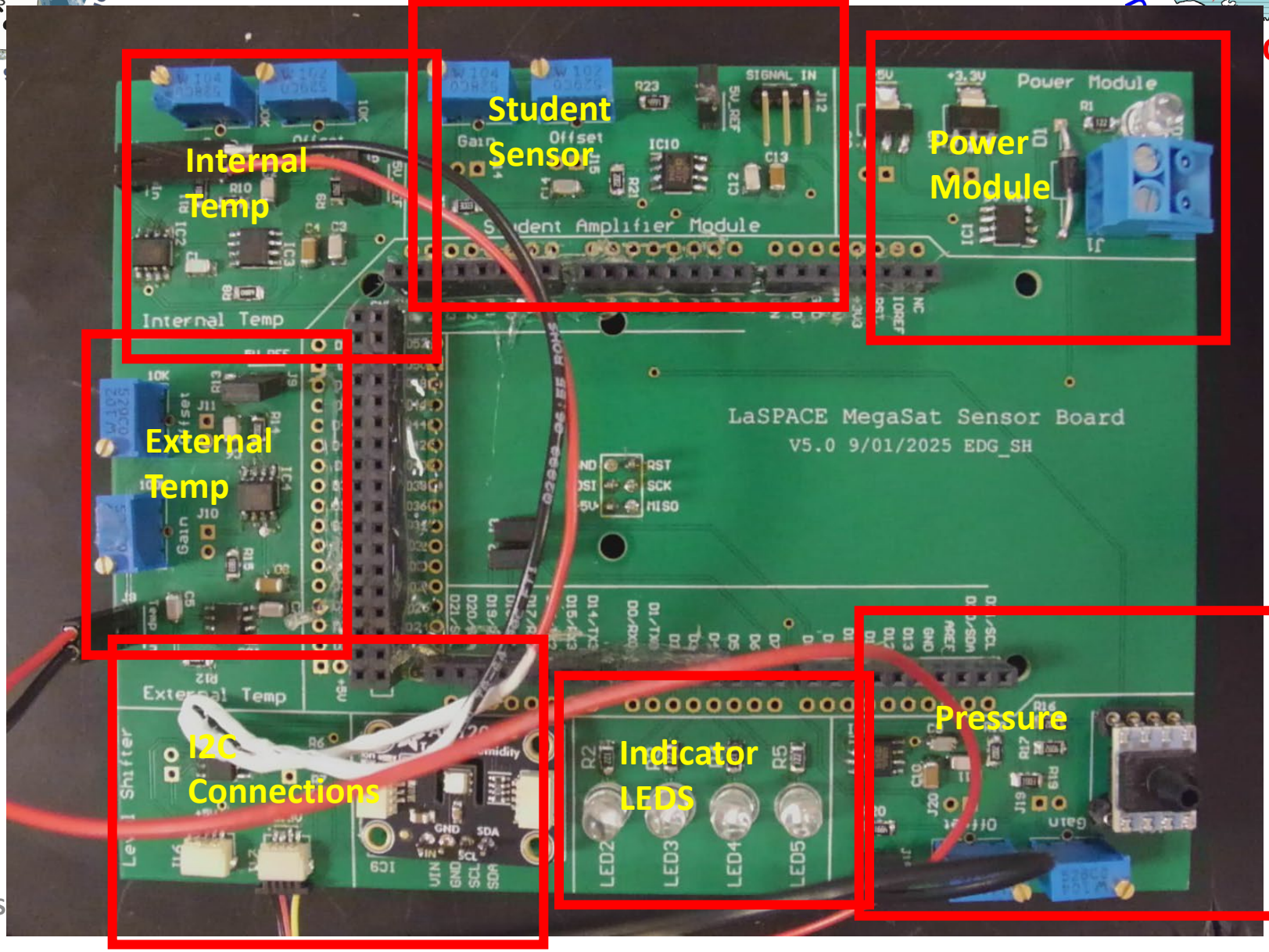


GPS and Data Storage Systems

- GPS Shield provides GPS and Data storage
- Pulls power from the Arduino voltage regulators, not the MegaSAT ones
- Jumpers on the MegaSAT connect GPS to TX1/RX1 so wire jumpers used in the fall should not be required



MegaSAT Layout



MegaSAT Physical Dimensions

- The MegaSAT Shield 4.13 inches by 5.48 inches
- A fully assembled stack with GPS, MegaSAT, and Arduino is ~1.4 in from the bottom of the Arduino to the top of the GPS headers