The following is a detailed explanation of each major component of the SAS system and the particular advantages that qualified each particular component for selection.

ATMEGA328 - MAIN CONTROLLER:

We are using an Atmel Atmega328P AVR Microcontroller as the main system controller and the secondary system controller. The Atmega series microcontroller is a high performance, low power, 8 bit microcontroller using advanced RISC architecture. Each microcontrollers contains 32 kilobytes EEPROM, 2 kilobytes internal SRAM, Master/Slave SPI serial interface, I^2C serial communication, on chip analog comparator, reset and programmable brown out detection, 23 programmable I/O lines, and 20 MHz maximum operating frequency.

BMP085 - PRESSURE/TEMPERATURE/ALTITUDE SENSOR:

A Bosch BMP085 high precision digital pressure sensor will be used for measurement of pressure, temperature, and altitude. The LCC8 package is a robust, ceramic, leadless chip carrier package using an I^2C interface. The BMP085 has a faster I^2C data transfer rate of 3.4 MHz and a faster conversion time of 7.5 milliseconds. The main function of the BMP085 aside from data collection is determining apogee. The main controller will compare current altitude calculated from the BMP085 data to recent values to determine when and at what altitude apogee has been reached.

ADXL345 – ACCELERATION SENSOR:

The Analog Devices ADXL345 Digital Accelerometer will be used to monitor 3-axis acceleration. The ADXL345 is an ultra-low power 13 bit embedded accelerometer. This sensor will allow us to monitor 3-axis acceleration during flight using I^2C protocol. The ADXL345 is capable of measuring up to ± 16 g and withstanding up to 10,000 g shock. The main function of the ADXL345 besides data collection is to detect powered ascent. The ADXL345 will trigger the main control system to activate when it detects acceleration due to powered ascent.

HIH-6131 – HUMIDITY SENSOR:

A Honeywell HIH-6131 digital sensor will be used to measure relative humidity during flight. The device was chosen because it provides simple digital reading providing industry leading Total Error Band. This sensor will allow us to accurately and quickly measure relative humidity during flight without a high power cost. The main function of the HIH-6131 will be data collection.

TEMT6000 – AMBIENT LIGHT SENSOR:

To measure ambient light, we have chosen to use the Vishay Semiconductors TEMT6000 ambient light sensor. The TEMT6000 is a silicon NPN phototransistor housed in a miniature transparent mold. It provides a wide angle of up to ± 60 degrees of half sensitivity and provides analog output relative to ambient light. The main function of the TEMT6000 will be data collection.

LS-Y201 – REAL TIME IMAGE COLLECTION:

For real-time image collection we will be implementing the LinkSprite LS-Y201 serial port camera module. This camera module outputs high resolution JPEG images through UART communication. The LS-Y201 will capture images at 160 x 120 resolution.

LS20031 – GPS MODULE:

The Locosys LS20031 GPS Smart Antenna Module will provide us with accurate positioning information during flight. This module uses TTL communication at 9600 BPS. The system allows for 66 channels of connection at a time while updating position at a 5 Hz frequency. The position information collected from the GPS module will allow us to track the vehicles flight path using 3D mapping technology post-launch.

XBEE-PRO 900 – WIRELESS COMMUNICATION:

The SAS system will include a wireless communication protocol using the Digi XBee-Pro 900. The XBee-Pro 900 is an embedded RF module that combines fast point-to-multipoint networking. The Pro 900 delivers 900 MHz ISM extended range end-point connectivity. This system will allow communication of real-time data to the team's ground station for system monitoring.