

Need	Requirement
Payload must be able to separate from balloon	Balloon must have cut down mechanism that severs the rope between the payload and the balloon
Balloon cut down mechanism must trigger if mission exceeds safety parameters, time, distance	Payload must be aware of current state, height, distance
User must be able to retrieve data from payload	Payload must store data from attached sensors
System must be able to transmit position for enough time for the user to retrieve it.	The payload must have enough power to run the GPS and transmit data for at least [flight time]
User must be able to track payload up to the maximum height	Payload must be able to track position up to 50km
User must be able to obtain reliable GPS data	The antenna GPS has to be positioned correctly in the CubeSat design to face far from the balloon
User must be able to preset customized mission parameter values	A file must exist that can be modified easily by the user and read by the microprocessor
System hardware must be controlled	A microprocessor must interface with the hardware components
User must be able to take proper photos or videos	A camera is required in the design
The video or photos have to be taken for the entire balloon flight	A battery able to resist at the operating temperature is required
The electronics have to be accommodate properly inside the frame	A proper box is required to contain the electronics
Considering the mass assigned to the cutdown and telemetry (built by Horus, 245g),extra payload (200g), the parachute mass (200g), each balloon has to weight less than 3 kg	Each CubeSat should have a mass < than 500g

<u>Solution</u>	<u>Comment</u>
NiChrome wire mechanism wired to relay triggered by microprocessor.	It will be provided by LaunchBox and Horus
code in microprocessor on payload	A BMP barometric pressure sensor is selected to give reliable pressure and temperature data.
Altimeter, GPS	
SD card	flash drive is more expensive and less resistant to extreme conditions; allows user to set their own cut down values and retrieve detailed sensor/GPS information
9Vbattery	Readily available from stores; surplus power requirements; potential sponsorship; easily replaceable, good for input power of the Arduino
U-Blox NEO 6m GPS tracks to 50km in flight mode	can be used up to 50km; will survive temperature conditions; used on many previous balloon launches; allows for tracking/recovery;
A hole in the box allows the GPS to be connected with the electronics inside. The GPS will be double taped outside the box facing on the other side of the camera	Between the balloon and the parachute there is a rad reflector in AI that might interfere with the GPS system
Code file on SD card	
Arduino Mini	easy to program; powerful enough
GOPro Camera is selected and some accessories are used to avoid the malfunctioning of the camera in extreme weather conditions (plastic frame and anti-fog inserts)	
The solution will be found by the students. Is the GOPRO LIPO battery enough or an external pack is required?	
All the components have been printed on a PCB and the PCB is placed inside a proper plastic box, screwed on the frame.	
The current design weight around 450 g	