



HASP 2018 Monthly Status Report

Report Month:	January, 2018
Submitted by:	Iakov Bobrov
Submit Date:	31 / 01 / 2018
Institution:	The University of Sheffield
Payload Number:	2018-09
Payload Name:	Sheffield University Nova Balloon Lifted Telescope

I) Activities During Previous Month:

After the launch of our experiment in October of 2017 as a part of the BEXUS-25 programme run in collaboration with ESA, scientific data was evaluated and recently finalised. Our HASP application was evaluated and major areas of improvements were identified. The following are five major updates from our team:

- The connection between E-box (Electrical box) to the motor was separated from a single large cable to three smaller cables. Before, the control signal from the E-box to the pitch motor was connected through the yaw motor housing. This was not convenient during testing as it was hard to access and diagnose connections on a pin by pin basis. Three smaller cables now provide an easier access in case of a failure.
- The output of the in-flight camera was changed from an HDMI to a serial port. This provides a simpler mechanism for capturing images.
- A preliminary wiring diagram was designed and soldered. The sensing system has been tested and programmed, data now can be recorded on an SD card.
- Communication protocol for the motor and Arduino has been developed.
- The supporting structure and gimbal were assembled together in a lab for the spinning test. E-box was redesigned.

In summary, fundamental functionality has been installed and tested, new sensors for further integration have been ordered.

II) Issues Encountered:

Finding the correct protocol of the motors was a challenge as the type of data can affect the serial string between Arduino and Raspberry Pi. In particular, the string or a character can be confusing. It took a lot of attempts and errors to find the correct type of protocol.

In the sensing system, the data reading was not accurate, we needed to terminate the I2C bus by pulling up the voltage with a resistor and provide the correct voltage level for the signal.

The current sensor will be damaged if the input pin of it is incorrectly connected. This led to the short circuits in the previous flight campaign preparation. Solution to this problem could be a resettable fuse installed between the chip and the data line. This can prevent the short circuit between the data line and DC/DC converter.

III) Milestones Achieved:

Testing new tracking system using new tracking software and newly installed hardware system.
(Please find video attached)

IV) Plans for Coming Month:

A more practical and detailed plan is needed for this year, this will be reviewed by a weekly meeting. A current version of the plan is shown below in Table 1. The plan includes tasks for Electrical, Software and Mechanical sub-teams.

In the Electronic system, there are three major tasks. Firstly, to design the wiring of electronic and communication link from the balloon and Ebox in order to finish project application review. Secondly, testing and calibrating the sensors. Finally, developing a software solution to protect the motor.

The Mechanical team needs to do more research in order to choose the correct telescope. The team also needs a CAD design of the gondola including a design of the E-box, socket allocation. CAD of the gimbal and supporting structure needs to be finalised.

Outreach team is responsible for finding at least two sponsors in order to get a funding for the new telescope.

Table 1: Monthly targets and goals.

Sub Team	Targets	Details	Deadlines	Person in Charge
Electronic: design a system that can track the sun and collect datas.	Motor:	A stoppable telescope protection system and find a lighter motor	March	Gianni
	Soldering:	Connect all parts together	March	Iakov
	Data logging:	Using sensor to collect data	Feb	Gianni
	Updown/ Download cable	Research for upload and download method	Feb	Gianni
	Sponsor: SendintoSpace	Helping Sendintospace finding a stable platform for camera, finding a fast speed antenna.	Feb	Gianni

Mech : produce a movable platform to support the telescope movement and a accessible Ebox with cables socket hole in it.	New Telescope support:	With gears for rotational sensor	March	Joyce
	New Ebox:	1.Plastic tray Ebox with 5 holes for cable 2.The yaw motor allocation	March	Joyce
	New Telescope:		Feb	Yun/ Alex
Software goal: develop 3 software from control to integrate to system	Tracking:	Design a fast enough software to track the sun	Feb	Alex
	Ground station:	Design a ground station that collect all real time data and display.	March	Gianni/ Alex
	Operation mode:	Possible serial control to change operation mode	Feb	Gianni/ Alex
Outreach	Money	Finding enough money for the project.	Ongoing	Gianni/ Yun / Iakov

V) Other Comments: N/A

VI) Team Composition and Organization:

Name	Start Date	End Date	Role	Student Status	Race	Nationality	Gender	Disabled
Iakov Bobrov	April 2017	Present	Overall Team leader	Undergrad	-	Russia	Male	No
Gianni Heung	August 2017	Present	Electronic Team leader	Graduate	-	Hong Kong	Female	No
Yun Hang Cho	September 2016	Present	Mentor	Graduate	-	United Kingdom	Male	No
Joycelyn Fontanilla	March 2017	Present	Mechanical Team leader	Undergraduate	-	Philippines	Female	No
Alex Hamilton	September 2016	Present	Software Team leader	Graduate	-	United Kingdom	Male	No
Alex Menzies	February 2017	Present	Mechanical Team member	Undergraduate	-	United Kingdom	Male	No
George Robinson	Dec 2017	Present	Mechanical Team member	Undergraduate	-	United Kingdom	Male	No