HASP 2023 Monthly Status Report

Report Month:	May 2023
Submitted by:	Dr. Nirmal Patel and Lovely Ramos
Submit Date:	05 /24 /2023
Institution:	University of North Florida University of North Dakota
Payload Number:	2023-07
Payload Name:	Measurements of Ozone in the Troposphere and Stratosphere
Payload Short Name:	Ozone Sensors Payload – OSPrey

I) Activities during Previous Month:

(i) Preliminary Payload Specification and Integration Plan submitted (PSIP) and waiting for any comments

(ii) Design of new electronic circuit as a backup plan is completed and new circuit is under testing.

II) Issues Encountered:

None

III) Milestones Achieved:

(i) Cory made milling of two new aluminum payload bodies (Fig. 1 and 2).

(ii) Dustin and Colin developed the new microcontroller circuit board design and fabricated the circuit board with help of Miguel Bolante. This circuit is based on Arduino. This circuit board is as a backup circuit board. The Arduino circuit diagram and actual picture of the circuit board are given in **Appendix-A.** Data string code and data string on EXCEL table are same as current payload, which are also given in Appendix-A. We will test it during the thermal vacuum test.

(iii) Haris made redesign of circuit diagrams. The new diagrams are given in **Appendix-B**.

(iv) Aryan completed checking and minor changes in the java software program for converting raw files into EXCEL.

(v) Julian and Calla working on designing of new "Easy to Open" payload body. This design for the backup payload.

IV) Plans for Coming Month:

(i) Fabrication of new sensors boxes

(ii) Fabrication of ozone sensor PCB, testing and calibration.

(iii) Testing GPS.

V) Other Comments: None

VI) Team Composition and Organization:

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Name	**Start Date**	**End Date**	**Role**	**Student Status**	**Race**	**Ethnicity**	**Gender**	**Disabled**
Miguel Bolante	01/09/2023	04/30/23	Leader, EE, Communications Sensors	UG-EE	Caucasian/ White	Hispanic	Male	No
Diego Fontan-U	01/09/2023	04/30/23	Payload design and body	UG-Civil/ ME	Caucasian/ White	Hispanic	Male	No
David Medis	01/09/2023	04/30/23	EE Microcontroller Circuits and Data	UG-EE	Caucasian/ White	Non-Hispanic	Male	No
Lovely Ramos	01/09/2023	Present	EE Microcontroller Circuits and Data	UG-EE	Asian-Filipino	Non-Hispanic	Female	No
Dustin Leonard	02/01/2023	Present	EE-Circuit board and components	UG-EE	Caucasian/ White	Non-Hispanic	Male	Yes
Colin Ott	02/01/2023	Present	EE-Circuits, sensors, and integration	UG-EE	Caucasian/ White	Non-Hispanic	Male	No
Cory Pare	03/01/2023	Present	ME, Payload body design, Fabrication	UG-ME	Caucasian/ White	Non-Hispanic	Male	No
Haris Smajic	01/09/2023	Present	EE Microcontroller Circuits and	UG-EE	Caucasian/ White	Non-Hispanic	Male	No
Aryan Patel	02/01/2023	Present	Software - Programming	UG-Computer	Asian-America	Non-Hispanic	Male	No
Elric Burch	02/01/2023	Present	EE-Sensors and payload thermal budget	UG-EE	White-Cherokee	Non-Hispanic	Male	No
Cathryn Penn	04/15/2023	Present	EE-PCB, Circuit and Testing	UG-EE	African American	Non-Hispanic	Female	No
Julian Rowe	04/25/2023	Present	ME-Payload body Design	UG-ME	Caucasian-White	Non-Hispanic	Male	No
Calla Taylor	04/27/2023	Present	ME-Payload Body Fabrication	UG-ME	Caucasian/ White	Non-Hispanic	Female	No
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Sam Reams	01/09/2023	Present	Space Studies	Master-Space Studies	Caucasian/ White	Non-Hispanic	Male	No

Fig.1 Cory is working on payload body using a milling machine

Fig. 2 Fabrication of new payload body

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Appendix-A

New design of Circuit diagram-based on Arduino for backup PCB

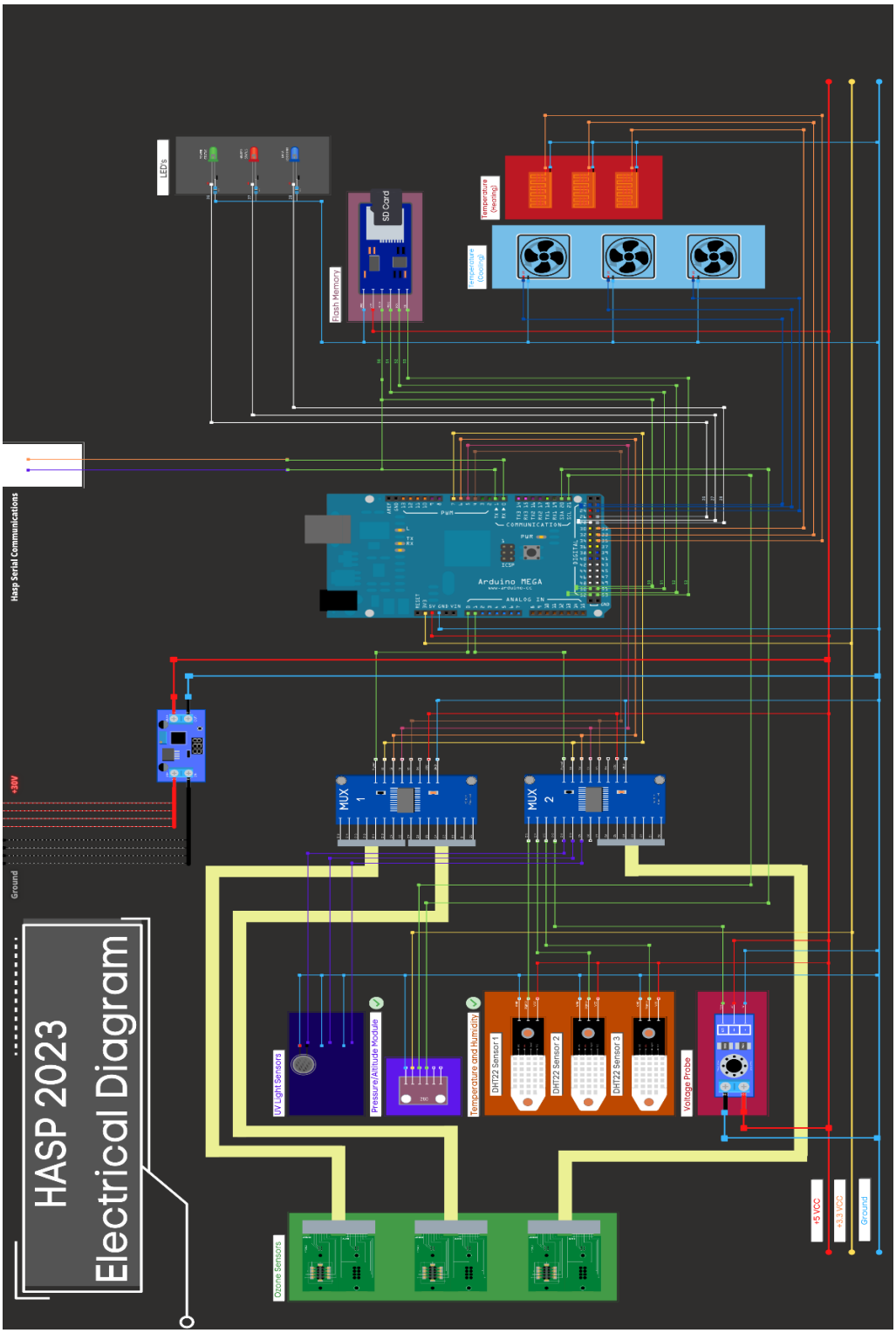

Fig. 3 "ARDUINO" microcontroller circuit design.

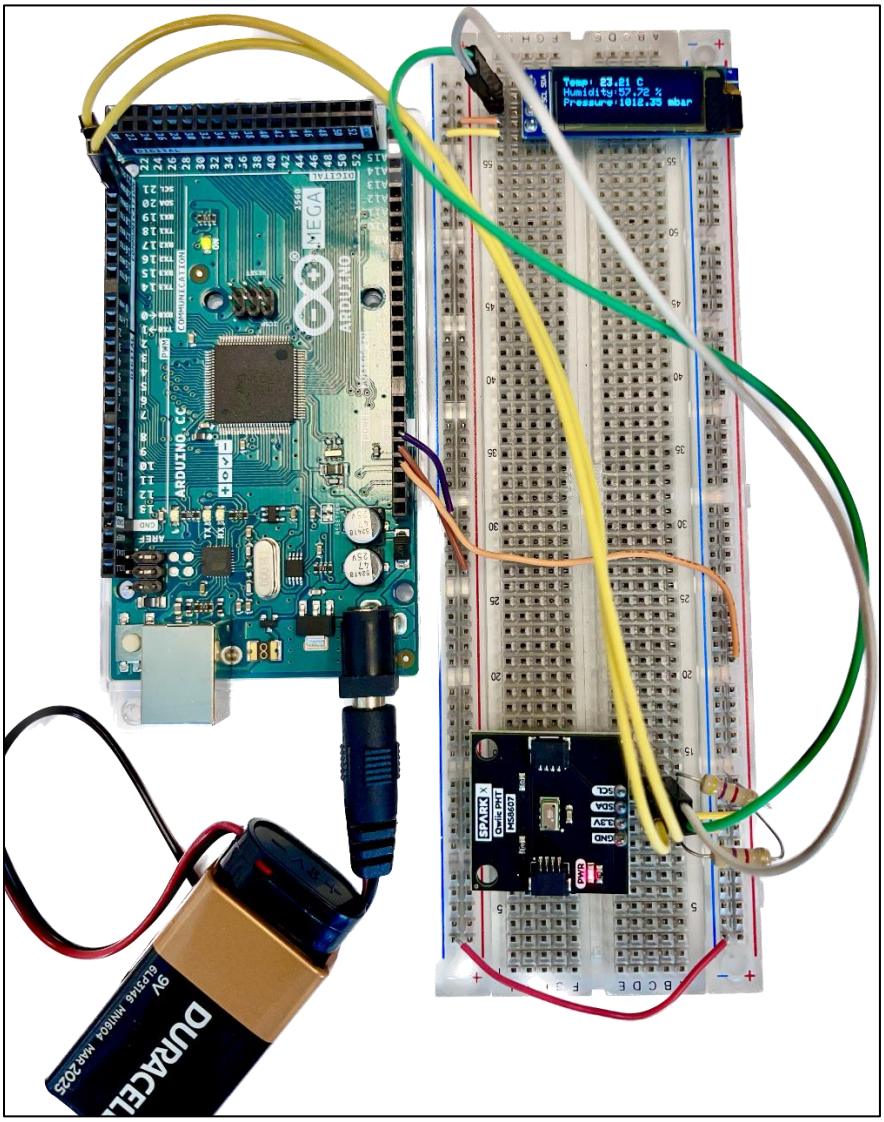

Fig. 4 New backup “ARDUINO” circuit board.

The code to implement that from the new “ARDUINO” microcontroller is given in fig.5.

```
  Serial.print("UNF");
  Serial.print(",");

  Serial.print(time);
  Serial.print(",");

  Serial.print(round(alt,2));
  Serial.print(",");

  Serial.print(round(sensor1_1,2));
  Serial.print(",");
  Serial.print(round(sensor1_2,2));
  Serial.print(",");
  Serial.print(round(sensor1_3,2));
  Serial.print(",");
  Serial.print(round(sensor1_4,2));
  Serial.print(",");
  Serial.print(round(sensor1_5,2));
  Serial.print(",");
  Serial.print(round(sensor1_6,2));
  Serial.print(",");
  Serial.print(round(sensor1_7,2));
  Serial.print(",");
  Serial.print(round(sensor1_8,2));
  Serial.print(",");

  Serial.print(round(sensor2_1,2));
  Serial.print(",");
  Serial.print(round(sensor2_2,2));
  Serial.print(",");
  Serial.print(round(sensor2_3,2));
  Serial.print(",");
  Serial.print(round(sensor2_4,2));
  Serial.print(",");
  Serial.print(round(sensor2_5,2));
  Serial.print(",");
  Serial.print(round(sensor2_6,2));
  Serial.print(",");
  Serial.print(round(sensor2_7,2));
  Serial.print(",");
```

```
Serial.print(round(sensor2_8,2));
Serial.print(",");

Serial.print(round(sensor3_1,2));
Serial.print(",");
Serial.print(round(sensor3_2,2));
Serial.print(",");
Serial.print(round(sensor3_3,2));
Serial.print(",");
Serial.print(round(sensor3_4,2));
Serial.print(",");
Serial.print(round(sensor3_5,2));
Serial.print(",");
Serial.print(round(sensor3_6,2));
Serial.print(",");
Serial.print(round(sensor3_7,2));
Serial.print(",");
Serial.print(round(sensor3_8,2));
Serial.print(",");

Serial.print(round(temp_1,2));
Serial.print(",");
Serial.print(round(temp_2,2));
Serial.print(",");
Serial.print(round(temp_3,2));
Serial.print(",");

Serial.print(round(photo_1,2));
Serial.print(",");
Serial.print(round(photo_2,2));
Serial.print(",");
Serial.print(round(photo_3,2));
Serial.print(",");

Serial.print(volt);
Serial.print(",");

Serial.print(current);
Serial.print(",");

Serial.print(pressure);
Serial.print(",");

Serial.println(status);
```

Fig. 5 Data string Code

ARDUINO -DATA String on EXCEL file

										UNF								
										ARDUINO- EXCEL Data Table								
			Ozone gas sensor array #1								Ozone gas sensor array # 2							
UNF	(UNIX) / GMT Time	ALTITUDE (m)	S1-1(Ohm)	S1-2(Ohm)	S1-3(Ohm)	S1-4(Ohm)	S1-5(Ohm)	S1-6(Ohm)	S1-7(Ohm)	S1-8(Ohm)	S2-1(Ohm)	S2-2(Ohm)	S2-3(Ohm)	S2-4(Ohm)	S2-5(Ohm)	S2-6(Ohm)	S2-7(Ohm)	S2-8(Ohm)

Ozone gas sensor array # 3																		
S3-1(Ohm)	S3-2(Ohm)	S3-3(Ohm)	S3-4(Ohm)	S3-5(Ohm)	S3-6(Ohm)	S3-7(Ohm)	S3-8(Ohm)	TEMP1 (K)	TEMP2 (K)	TEMP3 (K)	PHOTO1 (mV)	PHOTO2 (mV)	PHOTO3 (mV)	VOLT(mV)	CURRENT (mA)	PRESSURE (mBar)	Heater Status

Data string is same as current HASP payload.

Fig. 6 Data string on EXCEL

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Appendix-B

Redesigning of Circuit diagrams for HASP 2023