HASP Payload Specification and Integration Plan

Payload Title: Student Payload Integrated First Flight (SPIFF)

Payload Class: [✓ Small] Large (circle one)

Payload ID: 2012-01

Institution: **Boston University / GA Tech / New Mexico Tech**

Contact Name: Nathan Darling

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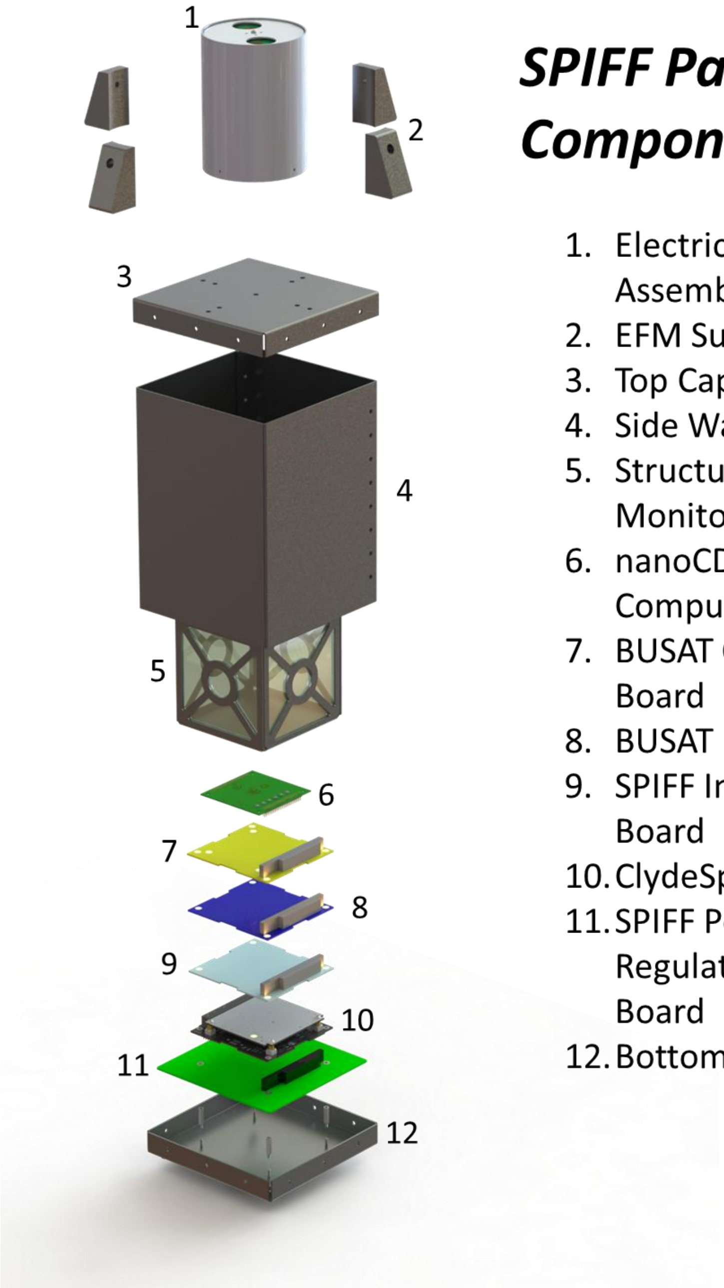
Contact E-mail: nathandarling@gmail.com

Submit Date: May 20, 2012

I. Mechanical Specifications:

A. Measured weight of the payload (not including payload plate): **2.3 kg (estimated)**

B. Mechanical drawing detailing the major components of SPIFF payload and mounting:



SPIFF Payload Components

1. Electric Field Mill Assembly (EFM)
2. EFM Supports
3. Top Cap
4. Side Walls
5. Structural Health Monitoring Assembly
6. nanoCDH Single Board Computer
7. BUSAT C&DH Circuit Board
8. BUSAT Magnetometer
9. SPIFF Interface Circuit Board
10. ClydeSpace EPS
11. SPIFF Power Regulation Circuit Board
12. Bottom Cap

Figure 1: Payload Components

C. **Other relevant mechanical information:**

   i. It should be noted that the electric field mill has a rotating part that could be damaged if stray wires or small components are dropped into the sensor.

II. Power Specifications:

A. Measured current draw at 30 VDC: **0.33 A (estimated)**

B. Power system wiring diagram starting from pins on the student payload interface plate EDAC 516 connector through SPIFF power conversion to the voltages required by C&DH and payload subsystems: (see Figure 2).

C. Other relevant power information:

   i. The ClydeSpace FlexUEPS (off-the-shelf) will provide power management for the SPIFF mission.

Downlink Telemetry Specifications:

D. Serial data downlink format: Stream [✓ Packetized] (circle one)

E. Approximate serial downlink rate (in bits per second): **0.58 bps**

F. Specify your serial data record including record length and information contained in each record byte:

Mode	Rate
Nominal telemetry rate	**277 bytes/min**

Description	Length
DOWNLINK PACKET	
Starting word	**1 byte**
System time	**4 bytes**
Packet ID	**2 bytes**
Number of payloads	**2 bytes**
System status	**2 bytes**
Number of payload packets	**2 bytes**
Payloads packets	**N packets**
Checksum	**8 bytes**
PAYLOAD PACKET	
Instrument code	**1 byte**
Instrument status	**1 byte**
Time of packet arrival	**4 bytes**
Packet length	**2 bytes**
Data	**N bytes**
HUB DATA (incl. mag.)	
Subsystem data	**N = 8 bytes**
EFM DATA	
Subsystem data	**N = 8 bytes**
SPH DATA	
Subsystem data	**N= 8 bytes**

G. Number of analog channels being used: **2 Analog Downlink Channels**

H. If analog channels are being used, what are they being used for:

Analog Channel	Description
Analog 1	**Temperature Data**
Analog 2	**Raw Electric Field Mill Data**

I. Number of discrete lines being used: **None**

J. If discrete lines are being used what are they being used for: **N/A**

K. Are there any on-board transmitters? If so, list the frequencies being used and the transmitted power: **N/A**

L. Other relevant downlink telemetry information: **N/A**

III. Uplink Commanding Specifications:

A. Command uplink capability required: [✓ Yes] No (circle one)

B. If so, will commands be uplinked in regular intervals: [✓ Yes] No (circle one)

C. How many commands do you expect to uplink during the flight (can be an absolute number or a rate, i.e. *n commands per hour*): Approximately 6 commands per hour

D. Provide a table of all of the commands that you will be uplinking to your payload:

Command bytes are chosen to minimize possibility of uplink errors. These commands correspond to transitions between three modes of operation.

Description	Command
Downlink (Send Data Packets)	**0x3C**
Diagnostic	**0xD6**
Off (Stop Taking Data)	**0x1F**
Resume	**0x95**
Reset	**0x48**

E. Are there any on-board receivers? **No.** If so, list the frequencies being used: **N/A**

F. Other relevant uplink commanding information: **N/A**

IV. Integration and Logistics

A. Date and Time of your arrival for integration: TBD

B. Approximate amount of time required for integration: 3 hours

C. Name of the integration team leader: Nathan Darling

D. Email address of the integration team leader: nathandarling@gmail.com

E. List **ALL** integration participants (first and last names) who will be present for integration with their email addresses:

Name	Email
Nathan Darling	**nathandarling@gmail.com**
Christopher Hoffman	**cman2790@bu.edu**
Joshua Mendez	**ub313@gatech.edu**
Jordan Klepper	**jaklepper@gmail.com**
Matthew Landavazo	**matthewlandavazo@gmail.com**

F. Define a successful integration of your payload:

   i. 10-minute “day in the life” test completed, associated data downloaded from nanoCDH / C&DH board

   ii. EFM and temperature data (analog channel) received during “day in the life” test.

G. List all expected integration steps:

   i. Mechanical interface (structural and electrical) via mounting plate completed

   ii. Functional tests (run C&DH diagnostics for payload and bus systems)

   iii. “Day in the life” test

   iv. De-bug and re-run if necessary

H. List all checks that will determine a successful integration:

   i. Data from “day in the life” test within expected parameters.

   ii. Analog downlink data within expected parameters.

I. List any additional LSU personnel support needed for a successful integration other than directly related to the HASP integration (i.e. lifting, moving equipment, hotel information/arrangements, any special delivery needs…):

   i. Hotel, rental car, public transportation and meals information would be greatly appreciated

   ii. No lifting or delivery needs.

J. List any LSU supplied equipment that may be needed for a successful integration:

   i. Possibility of needing simple lab instrumentation or supplies (soldering iron, multimeter, etc) exists.

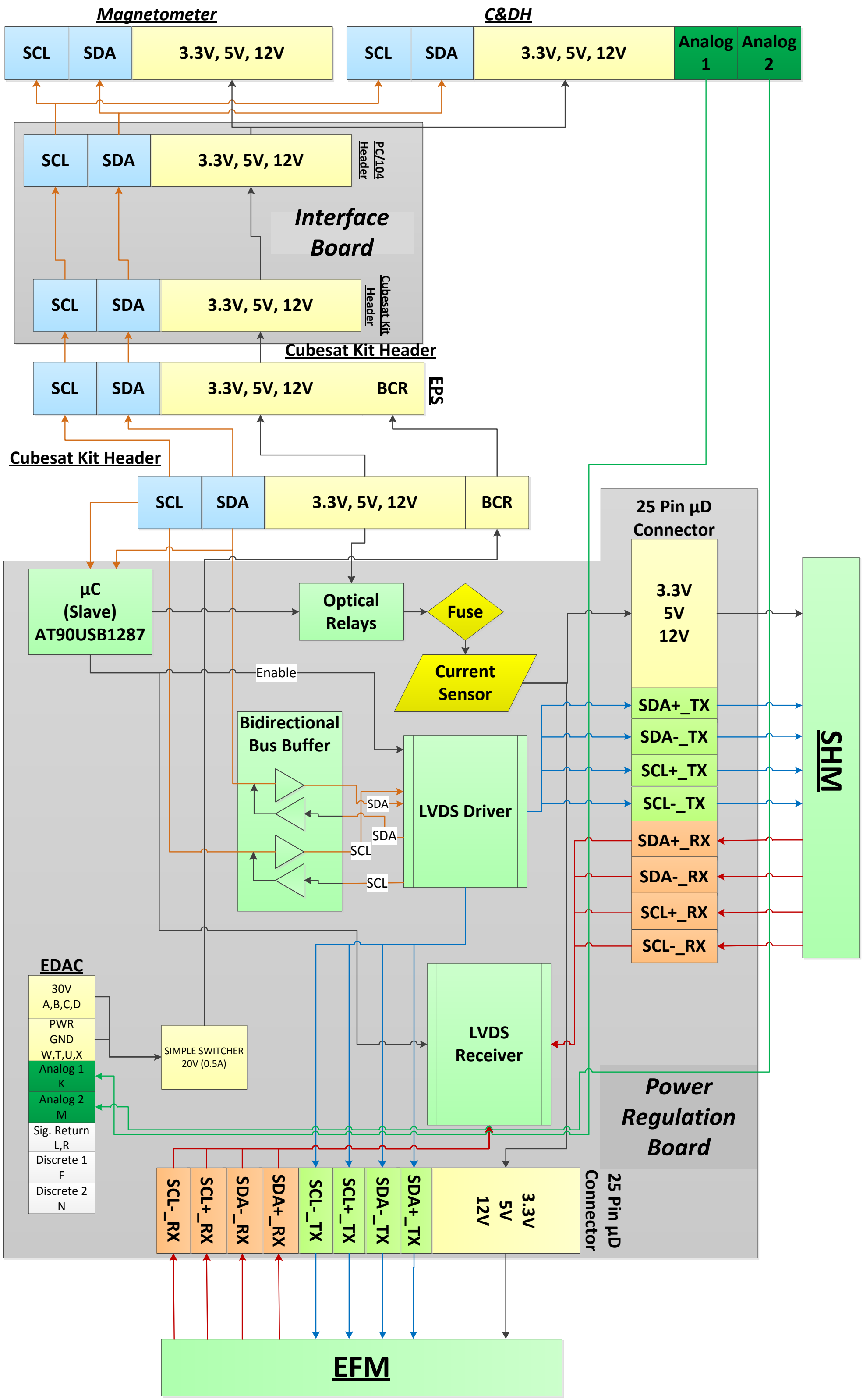


Figure 2: Wiring Diagram