Cansat Task

Problem definition

There are two stages to this mission.

Stage 1:

Carrier: This is the carrier of the main payload which will be loaded in the sounding rocket provided by the competition.

This carrier has to perform multiple maneuvers:

The carrier will be released at the altitude of 2000 meters from the ground of the launch site.

The location of the launch site is 12°58'32.2"N 79°09'38.3"E

Once the carrier is released the carrier should perform a helical maneuver, the diameter of the helix should not exceed 1000 meters.

The carrier is supposed to perform the helical maneuver for 500 meters from the release point.

Once the carrier starts performing the helical maneuver, the carrier should transmit data to the ground station. Data should include mission time, altitude, orientation and GPS coordinates of the carrier.

Stage 2:

Once it attains 1500 meters of altitude the carrier will start a powered flight towards East maintaining the altitude at 1500 meters from the ground on the launch location, for 300 meters.

Stage 3:

Once it reaches the distance this carrier should drop the science payload which should be able to detect the local weather data. Weather data includes air

temperature, altitude and air speed. The data should be transmitted to the carrier which will relay it to the ground station.

This science payload will consist of a heat shield which will carry the probe with all the equipment and a hens egg.

The need for a heat shield is to reduce the velocity so that the probes sensors can record accurate values.

This heat shield should descend at a rate of 15 ms^{-1}and should maintain its

nadir.

Stage 4:

Once the heatshield attains an altitude of 500 meters from the ground of the launch site it should release the probe which also protects the egg.

The probe will have a controlled descent rate of 5 ms^{-1} using a parachute.

Stage 5:

The carrier should stop its powered flight and land being in its gliding state. The carrier should stop telemetry after landing. A buzzer in the carrier must start ringing after landing to identify where it landed.

The carrier, heat shield, the probe, the egg should be located and retrieved.

The data received should be plotted in real time and recorded in the ground

station.

Telemetry

There will be 2 sets of data packets relayed to the ground station. One relaying carrier data and another relaying science payload data.

Carrier data packet format:

<Mission_Time>, <Packet_Count>, <Packet_Type>, <Altitude>, <Latitude>,<Longitude>,<Pitch>,<Roll>,<Yaw>

Science payload data relayed by carrier data packet format:

<Packet_Count>,<Packet_Type>,<Altitude>,<Temperature>,<Air_Speed>

All data should be in engineering units. Data packet format of science payload to the carrier is up to the team to decide.

Packet Type = 'C' for carrier
            'SP' for science payload

Use only 1 XBee each in carrier and science payload.

Ground station

Display plots for carrier and science payload data in real time. Save both the data packets in 2 separate CSV files. Name them "Carrier.csv" and "Science_payload.csv".

Mass constraints

Carrier: 600 g ± 20 g.

Heatshield: 100 ± 5 g.

Probe + Egg: 400g ± 15 g.

Egg: 68g – 70g.

Dimensional constraints

Rocket bay dimensions: Diameter: 400 mm.

Length: 600 mm.

Heatshield dimensions: Diameter: 125 mm.

Length: 300 mm.

Use of flammable materials is strictly prohibited.

Use of Pyrotechnics is prohibited.

A preliminary design should be prepared with all the required specifications.

Regards,

Sammard.