Week 7 Progress Report

George Bange
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Tasks

- Measure Time taken to execute different tasks
- Implement Real Time OS
- Manual override for parachute ejection
- Launch Test

Measuring Time per Task

TASK	Frequency (Hz)	Time (ms)
BMP and MPU	13.88	72
Kalman Filter	53070	0.018
Check state	445570	0.00122
Format Data	550790	0.00118
LoRa	4	250
GPS	0.5	2000
SD Card	31.8	31

We timed the tasks and noticed that GPS takes the most amount of time (2 s) hence

To leverage the dual-core nature of ESP32-S, we decided to divide the tasks between the cores using FreeRTOS library in ESP-IDF
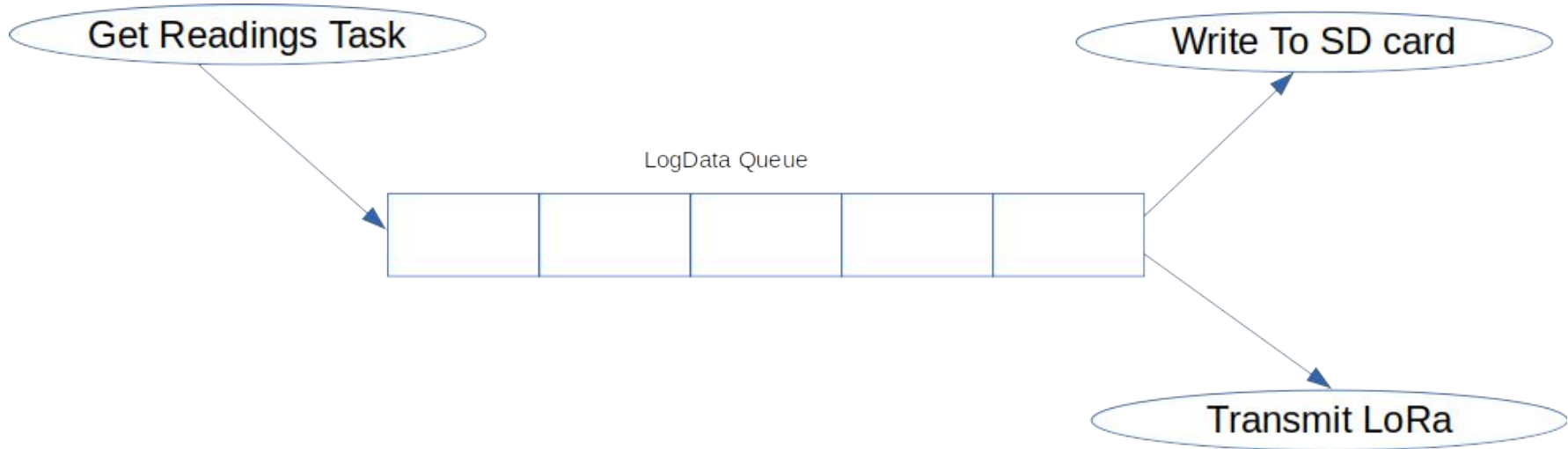
Core 0: Fetch Telemetry Data and Write to SD Card

Core 1: Transmit data using LoRa

ESP-IDF FreeRTOS Queue implementation

Manual Override for Parachute ejection

We implemented manual override for parachute ejection from ground station

A command is sent over LoRa from ground station to the rocket to deploy the parachute

Other commands also exist to change states from ground station

Test Launch

We carried out the first N2 test launch on 22nd April at the Rugby field

LoRa Transmit task worked but the connection was lost at some point. This was probably due to damage of flight computer

The highest recorded altitude was 1870m.

Rocket at take-off

Challenges and Lessons

- FreeRTOS: Corruption of heap, ESP kept resetting
- Manual override failed
- Parachute ejection code failed
- Damage of payload
- Queue kept filling up causing some readings to be dropped
- Some packets were corrupted

Photos of Recovered Rocket

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