EGYPTIAN UNIVERSITIES TRAINING SATELLITE

SUMMER TRAINING 2021

<< ON BOARD COMPUTER SW>>

<< OBC SW– T17_ENGINEERING_CAIRO UNIVERSITY>>

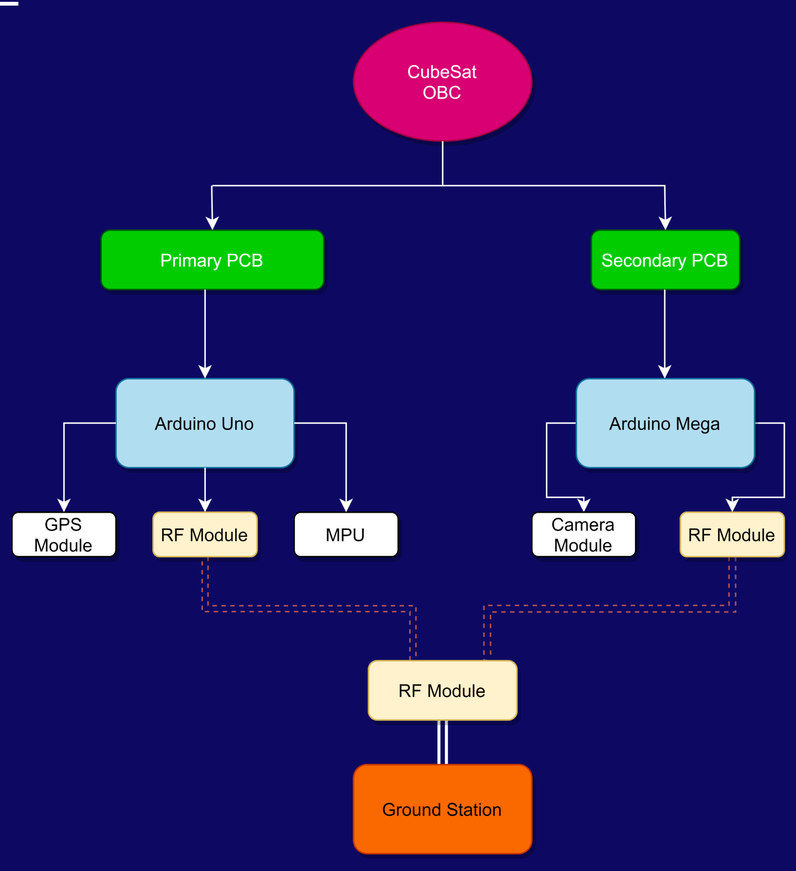
Introduction

What is OBC ?

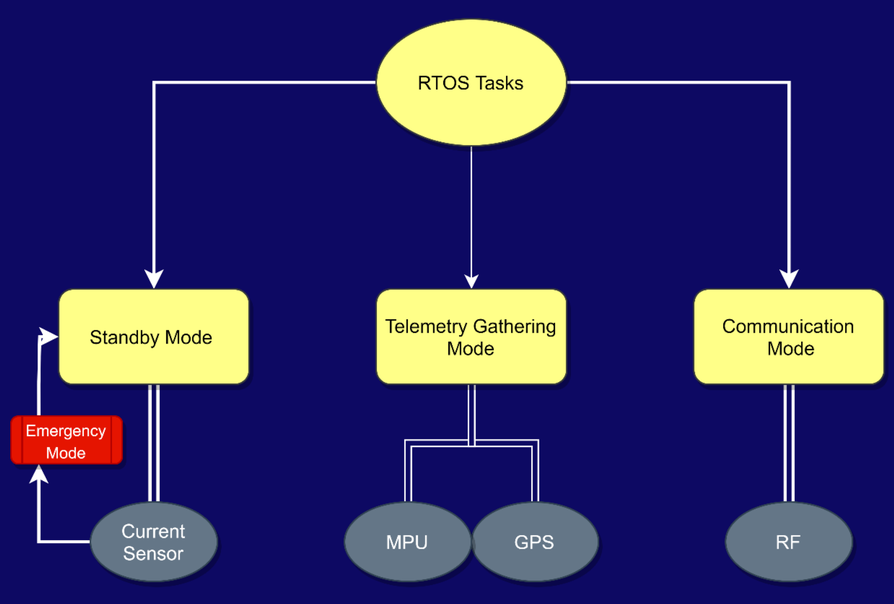
The On-Board Computer (OBC) is the brain of the satellite. OBC is responsible for implementation of control law, processing associated with payload, data packeting activities associated with communication, monitoring load health status, handling of data storage etc. The processor needs to interface with various sensors, actuators present onboard to acquire data to perform its activities and responds accordingly through actuators. Scheduling of the activities of the processor is essential due to the number of tasks it has to perform.

Board Design and Implementation

Hardware:



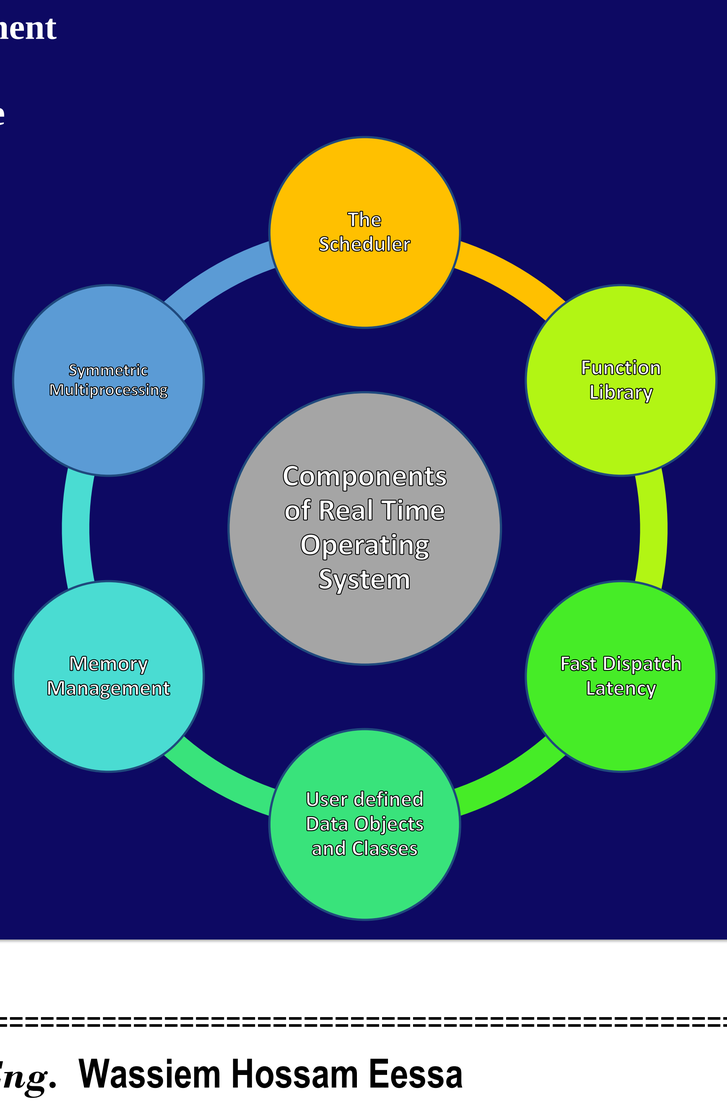
Software:



What and Why RTOS ?

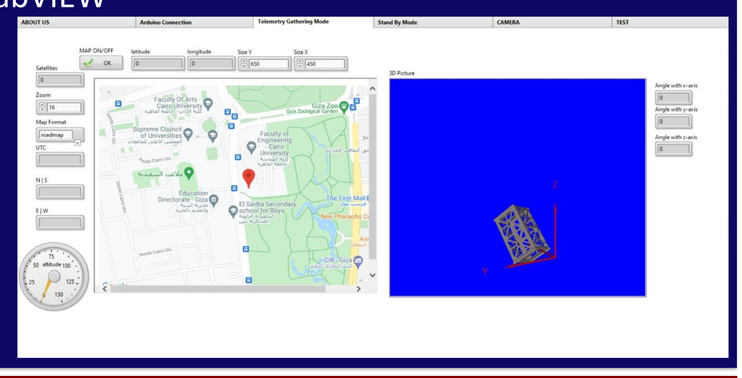
Most operating systems appear to allow multiple programs to execute at the same time. This is called multi-tasking. In reality, each processor core can only be running a single thread of execution at any given point in time. A part of the operating system called the scheduler is responsible for deciding which program to run when, and provides the illusion of simultaneous execution by rapidly switching between each program.

- ✓**Task Management**
- ✓**Less Downtime**
- ✓**Efficiency**
- ✓**Availability**
- ✓**Reliablitiy**



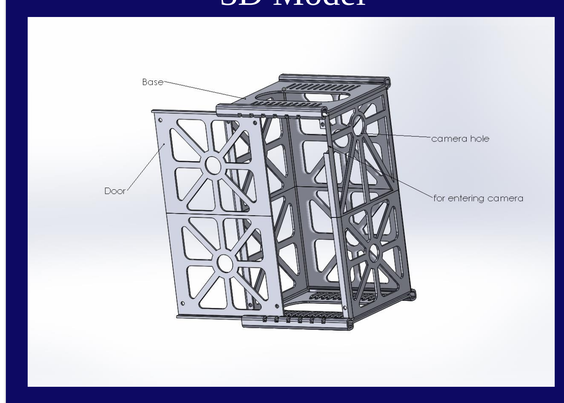
Ground Station

the Ground station is built using LabVIEW environment to handle command uplink and telemetry downlink to the satellite through the RF connection, the ground station displays different information and functions through different tabs:

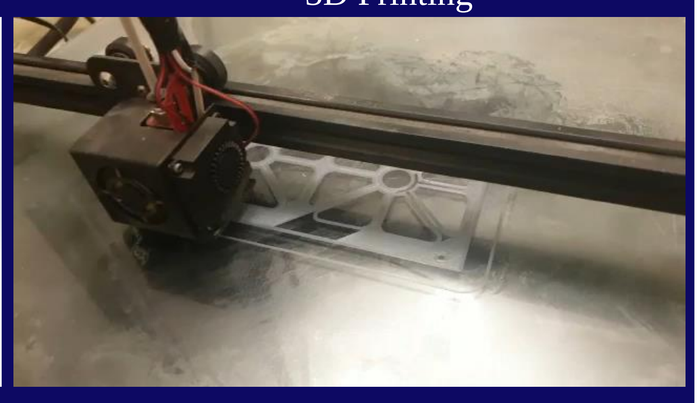


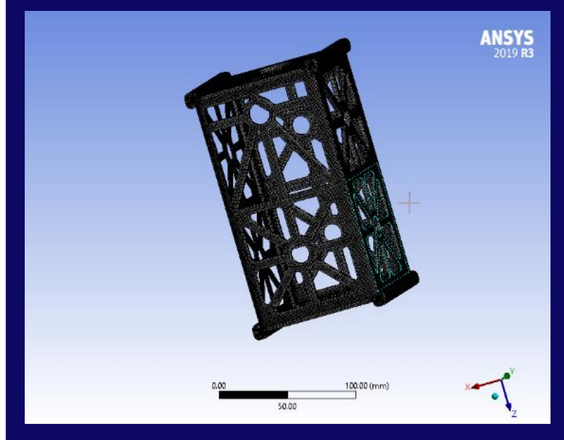
Structure Design and analysis

3D Model

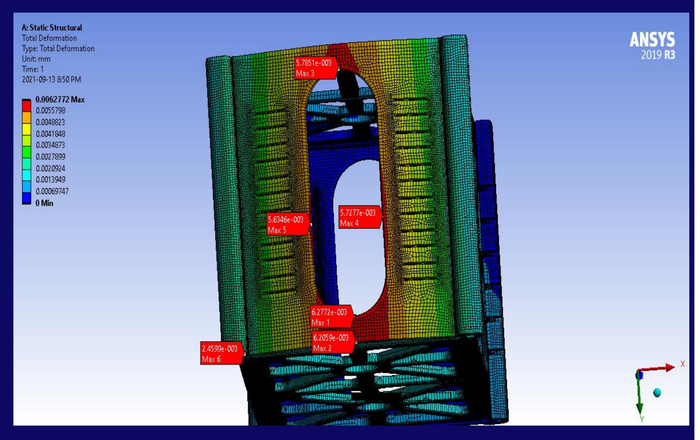


3D Printing





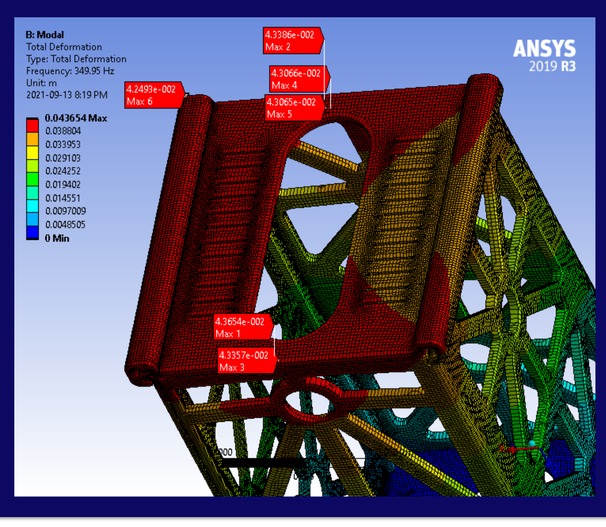
Deformation



Mesh Generation

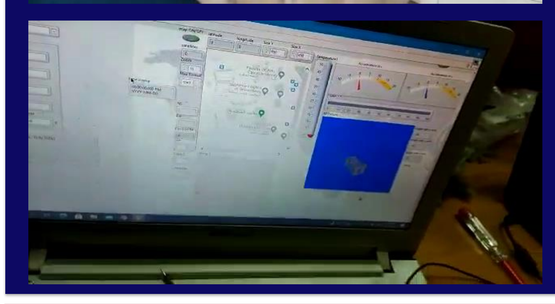
Mode Shapes

Mode	Frequency (Hz)	Mode	Frequency (Hz)
1	349.95	11	1328.2
2	435.67	12	1340.1
3	682.52	13	1439.6
4	858.95	14	1482.9
5	1005.1	15	1538.4
6	1074.5	16	1573.5
7	1090.6	17	1662.8
8	1145.5	18	1660.6
9	1191.4	19	1713.9
10	1263.5	20	1748.5



Testing

The satellite worked fully wireless and sent data to the ground station.



Future Plans

- **Using more powerful RF module or Wi-Fi module with higher baud rate.**
- **Building the software on a more advanced microcontroller.**
- **Decrease the size of the satellite.**
- **Optimizing the code.**
- **Implementing the simple serial protocol (SSP).**

Team Members

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