# Fail Tolerant Drone

(Tentative Proposal)

## Over view

The Future is coming and we cant stop it now. We will be having flying machines all above us very soon transporting goods and even people. We have to design our machines so that we stay save from these flying machines because they will be in the open environment unlike a Metro where if any, the damage will be restricted to the particular metro rail and not to the others moving on the road or staying in there home; or the road ways where enough research has been done on the safety measures, now there is a considerable amount of automation already in our cars and vehicles. The problem with then flying vehicles like drones is that they are intrinsically very unstable, and if there is any catastrophic failure they become much more insecure and unstable. So, we want to design and build a prototype drone which can stabilize it self on a damage like failure of one of the motor thrusters, etc.,

## Aim

To design and build a drone that is autonomously stable and fail tolerant.

## Work plan

**Building a stable drone that can execute given commands.**

- We will create a CAD model of frame and get it printed or laser cut and assemble the parts.
- Using our custom Python code for the Raspberry Pi and hardware we make sure that the drone is stable while flying.

**Sensor interfacing with the Raspberry Pi.**

- We will interface extra Gyroscope and Accelerometer sensors so that we can sense the damage precisely and let change the algorithms that govern the flight of our drone.

**Writing code for fail tolerancing the drone.**

- Instead of damaging the propellers or the frame physically we will switch off or alter the functioning of the parts using software to simulate the damage.
- We will now capture the mechanics and make models, use control theory to write algorithms to re-stabilize the drone.

**Experiments**

- Drone will be tested under various situations and is modified accordingly to get a better result.

## Budget

| | |
|---|---|
| Pixhawk flight controller | 7000/- |
| GPS and compass module | 2200/- |
| Rasberry pi | 3000/- |
| Framework, Motors, ESC, Propellers, wires etc | 5600/- |
| Gyroscope/Accelerometers and other sensors | 3000/- |
| Total | 20800/- |

## Future Scope for improvements

Drones can be made fully **autonomous and safe**.The branch of mathematics called '**Control theory**' is very much useful in implementing estimation and control algorithms which helps with the drones agility and stability. We can extend this project to planes and VTOLs in the future which will also be the part of the tomorrow's flying age.

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(Sign of facilitator)

Any modifications in the abstract will be provided in the link that was submitted on the Survey conducted for DISA 2019.