Flipkart GRID 2.0

Autonomous Indoor Drone

Team Name : Maschinenmensch

Institute Name: Manipal Institute Of Technology

Team members details

Team Name	Maschinenmensch				
Institute Name	Manipal Institute Of Technology				
Team Members >	1 (Leader)	2	3	4	5
Name	Aditya Shankar	Soham Hans	Anurag Borkar	Praneeth Katuri	Pranav Kulkarni
Batch	2021	2021	2021	2021	2021
Area of expertise	Control, Electronics	Machine Learning	Programming	Machine Learning	Programming

Instructions (You Can Delete this Slide)

Dear Team,

Congratulations on reaching this stage - We look forward to some amazing & innovative solutions.

Please find some important instructions before you begin to prepare your submission decks.

Slide Limit : 10 Slides of Content **post (after)** this Slide
Saving Format : Save the file as a PDF to ensure your formatting remains intact
Submission Guide: Only the **'Team Leader'** will be able to submit the Deck.
Only the latest submission will be considered as final
(You can keep updating your deck within the deadline)

Wishing you all the very best !

Team Flipkart GRiD

Functionalities of the Robot

- What all can the robot do?

The bot is airborne and can navigate through the gates with obstacle avoidance within the arena of given dimensions.

- What all activities can it perform?

The bot captures images of the environment and based on this it can navigate through the gates and avoid obstacles. The bot's aerodynamic design is modelled after a quadcopter.

- Are there any things that the robot can do above and beyond the requirement?

No. The bot has been designed only along the lines of the problem statement.

Robot Specifications

Frame - GF 400 (alternate: F450) 300g with support for 10”prop

Motors - DJI 2212 920KV (alternate: Any BLDC 2212 motor having KV rating from 920-1100)

Electronic Speed Controller (ESC) - EMax BLHeli 30A (alternate: SimonK ESC having >25A limit - with BEC so you can power up your quad)

Battery - Gens Ace 3s (11.1V) 5000mAh 45C LiPo (alternate: capacity can vary from 3000-6000 at ~40C

Flight Controller - Pixhawk 2.1 Cube with Here GNSS (alternate: Pixhawk 1 with M8N GPS)

Microcontroller: Raspberri pi with Pi-Cam attached

Robot/Solution Limitations

The robot identifies the required direction based on the offset of the captured image from the centre of the image. For example if the camera detects the gate at the right-side of the camera frame, then the bot uses this offset from the centre to align itself with the gate, ie moves to the left.

Hence, the bot navigation depends on the “span” of the image captured by the bot. If the gate is not visible within the image frame, then the bot performs a random search until the gate is identified. But since the aisle width is not very large, the bot should be able to perform the task for the given arena. A wider arena would take more time.

Robot Visualization -3D Diagram/Sketch

Architecture

(Option 1)
Electronic Speed Controller (ESC) - EMax BLHeli 30A (alternate: SimonK ESC having >25A limit - with BEC so you can power up your quad)

Flight Controller - Pixhawk 2.1 Cube with Here GNSS (alternate: Pixhawk 1 with M8N GPS)

Microcontroller: Raspberri pi with Pi-Cam attached

(Option 2)
Arduino Mega 7560 with WIFI/Bluetooth(HC-05) Module for wireless processing and OV7670/OpenMV cam

(Option 3):
BeagleBone Black with OpenMV cam

GY-521 MPU-6050 3 Axis Gyroscope + Accelerometer Module For Arduino

Brief on Programming Module

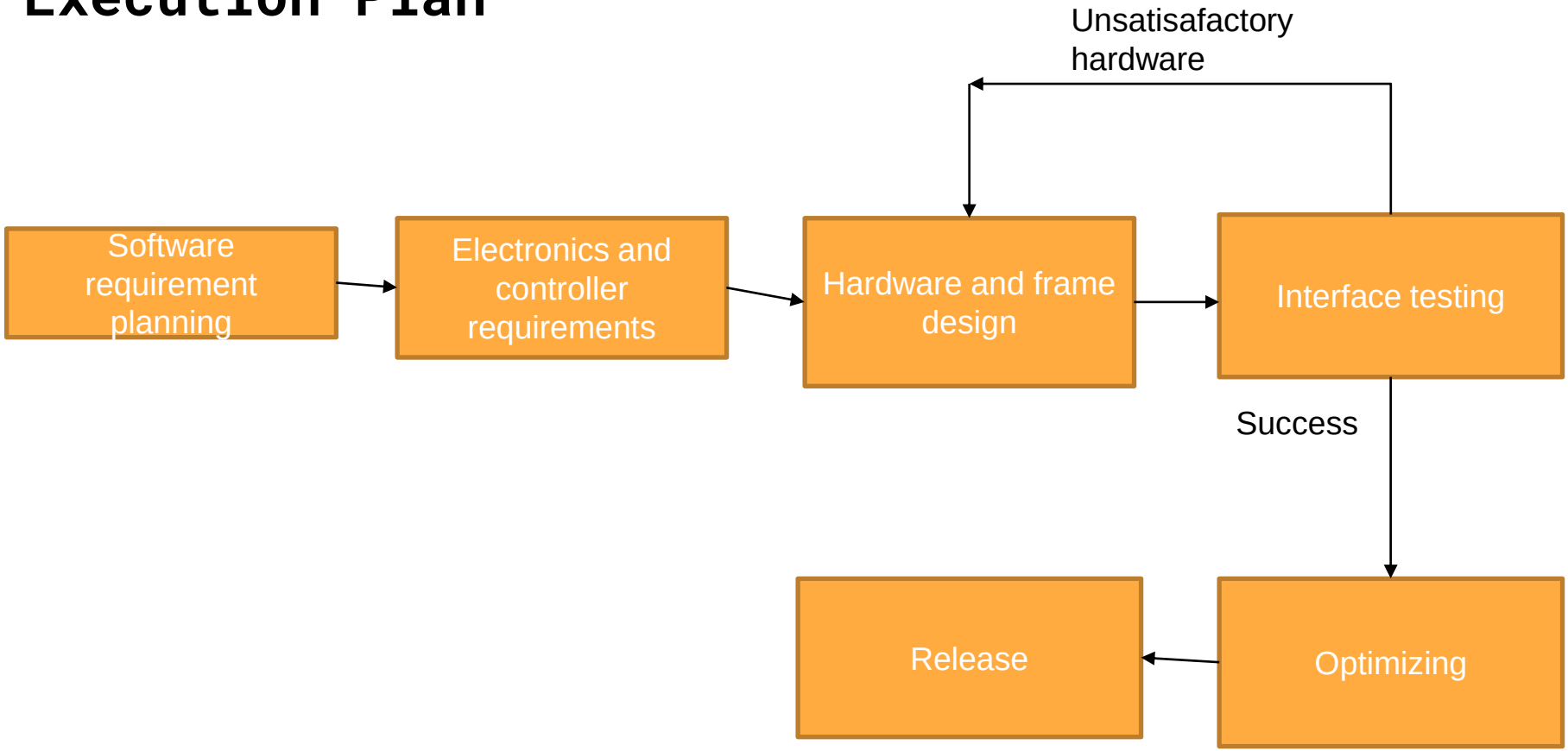
1. In case OpenMV cam is used, image processing can be done with the help of the OpenMV IDE which has pre-built features for basic object detection. Additional modifications can be added separately.

2. If a regular camera is used, the image processing will be done using our own image processing model. Images will be transferred from the microcontroller to the PC wirelessly via either the WIFI module or by encoding and sending via the serial Bluetooth module.

3. Mission Planner is an open source software that can be used to configure Pixhawk related items(in case Raspi is used). Mission Planner is available on Windows and Linux.

4. In the case of Mac os, Qground control can be used instead of Mission Planner

Execution Plan




Flipkart
GRID 2.0