Requirement Document:

Mini Drone

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**Creation Date**: Jan 1, 2022

**Review Date**: May 1, 2022

# General Information

This SRS document described the requirements for the development of a minidrone . This multi-purpose drone is a rotary-wing flying object whose development and application range is expanding in the last decade.

A close-up of a bicycle

Description automatically generated with low confidence

# Functionalities

The minidrone should be able to support different applications in Agriculture, Logistics and delivery, Emergency response, Inspection. To offer functionality in such broad range of applications the minidrone need to satisfy the following basic functional requirements

## Takeoff and Land

The minidrone must have Vertical takeoff and landing (VTOL) capabilities. This will enable the minidrone to have

* efficient maneuverability
* ability to hover steadily
* minimal space needed to launch

## Perform Controlled Flight

The minidrone should have a 6 DOF movement capability during flight to achieve its desired applications.

### Flight Range

The range of the minidrone must be at least 20 kilometers. This will extend the usability of the minidrone by allowing longer range of operation and reach.

### Flight Region

To avoid expected obstacles in its operation area, the drone must be able to achieve and maintain a constant altitude of 200 meters.

### Flight Control

The flight is managed from a control system, and it can operate autonomously or based on guidance from central location

## Carry a load

The minidrone should be able to carry a maximum load of 5 kg.

## Communicate with Ground base

The minidrone should be able to receive commands and send information to a ground base that controls its operation

# System Components

An operation mini drone should have the following basic components

## Main Body

The is the central hub provides structural support and housing for the other components making up the minidrone. It also contains connection point to attach the payload to the minidrone.

## Power Module

The power unit should be able to provide necessary power to the propulsion, flight control and communication modules.

## Propulsion Module

The propulsion module consists of one or more rotor assemblies that contain a propeller and a motor driving the propeller.

## Flight Control Module

The flight control module consists of the following basic components

### Control System

Flight controller receives data from sensors and performs calculations, designed in control strategy to control the behavior of the vehicle while performing different maneuvers

### Path planning

The system should plan its original path and continuously update it based on environmental factors or new user requests

## Sensor Module

The minidrone should have a redundant IMU for improved calibration and pose estimation. It also contains encoder sensors to measure velocity of propeller motors for use as an input to the flight control modules.

## Communication Module

The minidrone must have Wi-Fi network communication and radio communication.

## Payload

The minidrone can carry different payload types depending on the application focus. A camera is the most often used payload to deliver images and video to a central control location.