DEPARTMENT OF APEX INSTITUTE OF TECHNOLOGY

PROJECT PROPOSAL

1. Project Title: -Autonomous Drone Navigation System

2. Objectives: - An Autonomous Drone Navigation System involves developing software and hardware components that enable drones to navigate and operate independently without human intervention. These systems typically integrate various technologies such as computer vision, GPS, sensors, and AI algorithms to perform tasks like path planning, obstacle avoidance, and real-time decision-making.

3. Project Scope: -

The Autonomous Drone Navigation System project aims to develop an advanced, reliable navigation system that allows drones to operate autonomously in a variety of environments. The primary focus is on integrating cutting-edge sensors like LiDAR, cameras, and GPS to enable real-time obstacle detection, environment mapping, and precise path planning. By leveraging these technologies, the project seeks to enhance the drone's ability to navigate safely, even in challenging and dynamic environments where traditional GPS-based navigation might fail.

A key aspect of the project involves the development of algorithms that ensure the drone can adapt to changing conditions, such as moving obstacles or varying terrains. These algorithms will be designed to optimize navigation efficiency while maintaining a high level of safety and reliability. The system will also consider environmental factors, ensuring that the drone can perform consistently in different weather conditions and across various terrains.

The project will also address critical constraints, such as power management and regulatory compliance, ensuring that the drone operates within legal and practical boundaries. The scope of the project will be limited to the technical development and testing phases, where the system's capabilities will be validated through simulations and controlled real-world testing.

However, the project will not cover aspects such as commercial deployment, extensive testing in extreme conditions, or long-term maintenance strategies. The ultimate goal is to produce a proof-of-concept that demonstrates the feasibility and effectiveness of the autonomous navigation system, providing a solid foundation for future development and potential commercialization.

4. Requirements: -

- Hardware Requirements
    1. CPU and GPU
    2. Sensor
    3. Processing unit
- Software Requirements
    1. Operating System
    2. Flight Control Software
        - PX4 or ArduPilot
        - ROS
    3. Navigation and Path Planning Algorithms
    4. Obstacle Detection and Avoidance Software
        - SLAM
        - Machine Learning Models
    5. Simulation and Testing Tools
        - Gazebo or AirSim
        - MATLAB/Simulink
    6. Data Management and Logging

STUDENTS DETAILS

Name	UID	Signature
Preet	21BCS6263	
Savinaya	21BCS6154	
Bhavishya	21BCS6232	
Ashish	21BCS6194	
Abhay	21BCS6213	

APPROVAL AND AUTHORITY TO PROCEED

We approve the project as described above, and authorize the team to proceed.

Name	Title	Signature (With Date)
Ms. Mamta Sharma	Autonomous Drone Navigation System	