**Autopilot System for Unmanned Aerial Vehicle**

**INTRODUCTION**

U.S. Department of Defense Dictionary defines Unmanned Aerial Vehicle as “A powered, aerial vehicle that does not carry a human operator uses aerodynamics forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expandable, and can carry a lethal or non- lethal payload”

UAVs are the next generation of aerial platforms to be deployed by defenses organizations around the world. Demand for UAVs is fueled by the successful deployment of these systems in combat operations in Iraq, Afghanistan and Pakistan. These unmanned platforms are used as force multipliers, performing intelligence, surveillance and reconnaissance (ISR) missions, target recognition, damage assessment and electronic warfare.

Also UAVs are in use for a wide variety of civilian applications ranging from Famers for spraying pesticides to weather reporter and geologists to gather information for topographical mapping and various other needs.

Automatic pilots, or autopilots, are devices for controlling spacecraft, aircraft, watercraft, missiles and vehicles without constant human intervention. Multi-purpose, compact unmanned aerial vehicles are important due to their abilities to replace manned aircrafts in many routine and dangerous missions. These aerial robots can be utilized in a variety of civilian missions such as surveillance in disasters, traffic monitoring, military purposes. An autopilot can refer specifically to aircraft, self-steering gear for boats, or auto guidance of space craft and missiles

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**Abstract**

This paper aims at implementing autopilot systems for small or micro unmanned aerial vehicles. The UAV flight control basics are introduced first. The radio control system and autopilot control system are then explained from both the hardware and software viewpoints. A UAV is a radio controlled Aircraft which will have flying range of 500 meters’ radius. It can be equipped with a camera and an autopilot which will be useful for surveillance purpose. The UAV can also be used in rescue mission to provide food, medicines and other utility products in areas affected by natural calamities, where it is out of human reach. The advantage of the same is safety as no human is involved and also because of its low cost of running and manufacturing. The autopilot is extremely small and lightweight allowing it to fit in aircraft of this size. The autopilot features an advanced, highly autonomous flight control system with auto-launch and auto-landing functions. Whenever UAV goes out the specified range it becomes unstable and there is risk of crashing. It is very difficult to detect the device when it is goes out the range. Due to this device can’t be land securely and is usually lost. Device can’t find the nearest ground station when it is out of range. All the info transmitted from autopilot will be access through web portal. These features allow the autopilot to be operated by a wide spectrum of skilled and unskilled users. Innovative control techniques implemented in software, coupled with light weight, robust, and inexpensive hardware components were used in the design of the autopilot.

**3. PROBLEM STATEMENT & SCOPE**

**3.1 PROBLEM STATEMENT**

An unmanned aerial vehicle (UAV for short) is any aircraft that does not have a human pilot onboard. UAVs come in a variety of sizes, designs and purposes. Initially, UAVs were earlier merely remotely piloted now here is the problem arises However, autonomous control is becoming more widely utilized. Auto-Pilot will handle take off and landing with human interface.

UAV has a certain range i.e. 0.5 kms. Whenever UAV goes out the specified range it becomes unstable and there is risk of crashing. It is very difficult to detect the device when it is goes out the range. Due to this device can’t be land securely and is usually lost. Device can’t find the nearest ground station when it is out of range. Another major concern of autopilot is weight, if the weight of circuit is heavy then it creates problem in Takeoff and Landing the UAV.

**3.2 SCOPE**

* The material has moved on from autopilots, which are basically systems to maintain straight and level flight, to inertial navigation, which serves to navigate specified classes of flightpath by generating autopilot commands.
* In short, the autopilot is responsible for controlling the handling modes of the aircraft , but control of the trajectory is the responsibility of the navigation.
* The various categories of 'autopilot' presented are different flight path controllers, all of which potentially employ the same innermost loops (e.g. autopilot proper), and are limited in scope to aviation.

**4. PROPOSED SYSTEM**

The UAV basically works on air pressure in 2:1 ratio i.e. as the air pressure at backend of UAV will increases, the frontend will start rising which results into take off of UAV Whereas while tilting the UAV the air pressure will managed accordingly for right or left side.

When UAV goes out of the range, it becomes unstable and needs a safe place to land i.e. Ground Station. Our system helps the UAV to find the nearest ground station. Whenever the UAV goes Out of the range or unstable autopilot will generate alert the signal which will make device stable and land it on ground station safely. Auto pilot balance the device with the help of Gyroscope (is a device which is use for balancing the UAV.A fixed ground station map will be stored on UAV with the help of inbuilt co-ordinates of map automatic survey will be done for checking nearest ground station. Whenever the UAV will be lost or land on any ground station it will be notified to the Administrator. Autopilot will also provide the current weather conditions. Translate High Level commands into appropriate commands to the surface.

**7. CONCLUSION**

This project will offer the chance to gain a hands-on experience of how decisions are taken in the real world. The alternative yielding the highest price cost reduction with least sacrifice for the optimal design is the most favorable solution. All factors affecting the overall performance of a given part are taken into consideration and the perfect balance between efficiency and strength are what determine the best result.

The project was bit challenging due to that none of the team members ever worked with aerial vehicles and they all had to read about it to get the basic background needed to proceed with the project while also the project advisor was very passionate and helpful in all situations and always illustrated what was not clear to any of the members.

**Estimated Cost: Rs.25000/-**