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Auto Pilot Landing System for VTOL Aircraft

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***Abstract*— This invention particularly relates to aeronautical engineering and more particularly provides device and methodology for facilitating landing of aerial vehicles which can further be utilized for enhancing flight capabilities in near earth environment. In this paper we have considered Sea Harrier as VTOL (Vertical Take-off and landing) aircraft, and there is explanation given in the rest paper.**

***Index Terms* —ADC , DAC, Ultrasonic-sensors, Microcontroller.**

I. INTRODUCTION

The proposed system is based on microcontroller which enable for safe landing of aircraft in adverse condition and limited visibility. Aircraft particularly VTOL aircraft(Sea Harrier) are very difficult to operate during landing, when the pilot is unable to observe adequately the motion of aircraft with respect to landing area E.g.:- As a aircraft approaches a landing site in desert, downwash from the rotor typically strips up the sand, which greatly reduces visibility. This is very dangerous because the pilot cannot adequately observe the landing area to obtain the necessary visual feedback of aircraft speed and position. This system enables safer landing during degraded environment such as brownout, whiteout, night operations and the like. Microcontroller system using different sensors is used for this purpose. It is an object of this system to land safely during reduced visibility conditions. Previous work just comprises about distance measurement and this system includes distance measurement along with autopilot landing excluding all the disadvantages of manual landing .

II. PROPOSED PROCESS

Aircraft particularly VTOL aircraft are very difficult to operate during landing, when the pilot is unable to observe adequately the motion of aircraft with respect to landing area .

The proposed system is based on microcontroller like 8051/Arm controller connected to sensors through ADC and DAC converter which carries signals to mechanical control unit for controlling like thrust in aircraft during landing which enables safe landing of aircraft in adverse conditions and limited visibility. In this process ultrasound waves or ultrasonic transmitter are used and signal are received by ultrasonic receiver . This system enables safer landing during degraded environment such as brownout, whiteout, night operations and the like. Microcontroller system using different sensors is used for this purpose. Frequency of all the four sensors will be different so that the receiver should not receive the signal from another transmitter . Hardware model of neural network can also be applied instead of microcontroller. This system enables pilot to land safely during reduced visibility conditions.

In one of the preferred embodiment of present invention ultrasonic radar system is used for the detection of altitude. Apart from that we can used laser light technology an RF waves for measurement of altitude. In normal conditions when pilot start autopilot mode the autopilot landing system start's, at that time firstly the altitude will be detected . After that when the output of four sensors will be same it will go to controller and the aircraft will come down until predefined time and then the aircraft will get stabled for few seconds on that altitude and then again the altitude will be detected by the sensors and again output will get same the aircraft will come down for a predefined timing and when the output of sensors will be zero(finite value of sensor from ground in stop condition) the engine will halt. Now , when the output of one or two sensors will be different at that time the aircraft will move aside or in forward direction as per the programming of microcontroller.

This system enables safer landing during degraded environment such as brownout , whiteout , night operations and the like . This system helps pilot to land safely during reduced visibility conditions.

Proposed Position for Sensor

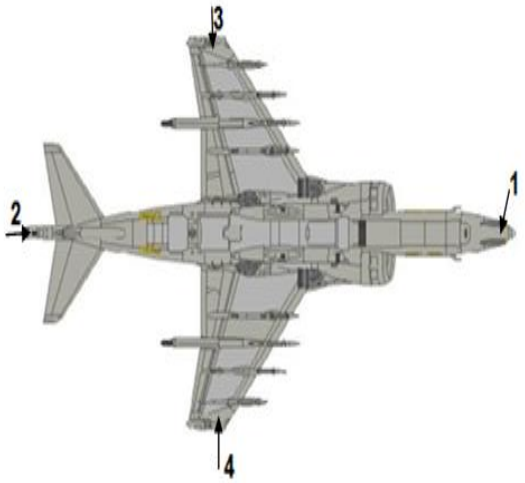
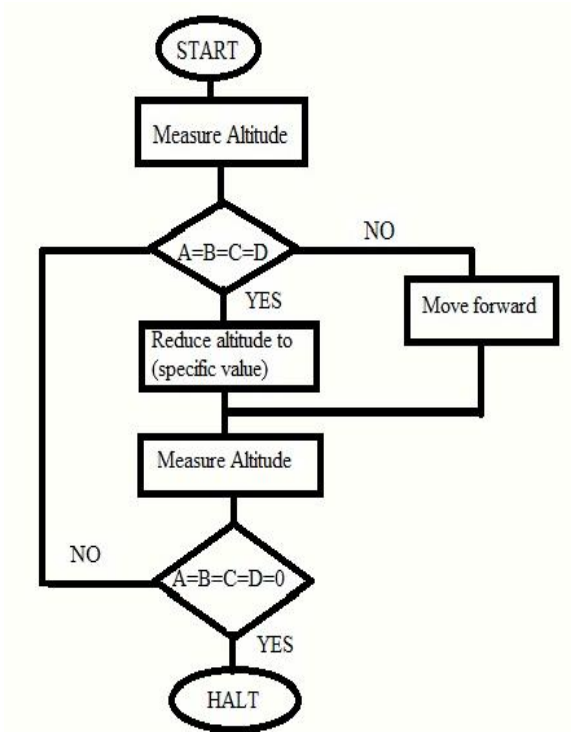


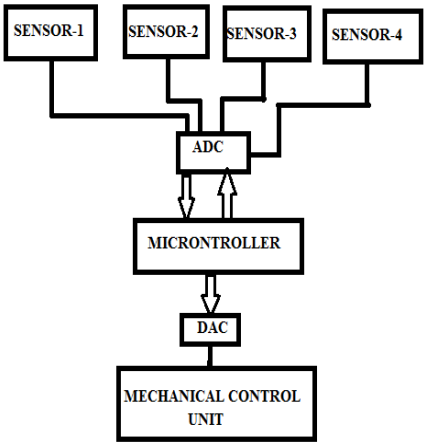
Diagram 1

Diagram 1 shows position of the sensor 1, 2, 3, 4.

III. System Flowchart



IV. System Block Diagram



V. Conclusion

- Safe landing in reduce visibility condition.
- Blind landing using suggested autopilot process.
- Safe landing in hilly area.
- This system could also be used for STOL aircraft in future .

Appendix

This work includes microcontroller based programming to control various parameters of aircraft. Like thrust control and position of exhaust jets.

References

[1] IPO(Indian Patent Office) ,*Patent No.2821/MUM/2011*,Mumbai 2011, pp. 67.
[2] Colleu , Rachel ,US patent No.141596,Oct1993.

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