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INCREASING THE RELIABILITY OF THE MEASURING SYSTEMS HIGHLIGHTS OF AIRCRAFT

The urgency of the research of the problem is caused by the solution of the task of increasing the reliability of the barometric altimeter at low altitudes, which have a short flight time and occur during the flight of the multicopter.

The aim of the research is to develop a method for increasing the functional reliability of the miniature barometric altimeter of a multicopter by complexing the altimeter with a platformless inertial system (PINS) and a satellite navigation system (SNS).

The research used Arduino-uno microcontroller and a barometric altimeter, developed on the basis of a digital piezoresistive atmospheric pressure sensor (module with barometer as BMP-280 from BOSCH). The module BMP-280 also has a built-in sensor of temperature.

The new scientific and technical results include the choice of the most effective method of increasing reliability – the method of functional redundancy and complexing systems.

Therefore, to increase the reliability of the barometric altimeter, a functional complexing method was chosen, when redundancy in the system is created by redundancy of the main function of the object according to the purpose.

Such main function of the barometric altimeter is a measurement of altitude of the multicopter flight.

Thus, as a functional reserve, all on-board measuring systems of multicopter can be considered, which give an opportunity to obtain information about the flight altitude.

There is a new integrated navigation system for unmanned aerial vehicles, which consists of the BINS navigation complex based on micromechanical sensors (MEMS) and SNS, which has high reliability indicators.

The system is implemented as a loosely coupled scheme based on the optimal Kalman filter, which allows both the development of independent solutions in the BINS & SNS, as the complex solution obtaining on the basis of the Kalman filter according to the SNS and BINS data.

This research suggests a complexing of the miniature barometric altimeter based on a piezoresistive pressure sensor with this system.

A miniature barometric altimeter is designed for its practical application onboard of aircraft (multicopter). In addition, using the developed complex flight altitude measurement system with platformless inertial system and a satellite navigation system will improve the reliability of both the altimeter and the aircraft in general.

REFERENCES

1. Nechyporenko, O. M. (2014). The method of analysis of reliability of frequency pressure sensor for systems of air signals of aircraft . Electronics and Control Systems, 41-46.
2. Нечипоренко О. М. (2010). Основи надійності літальних апаратів. навч. посіб. О. М. Нечипоренко. , 235-239.
3. Жуков В. М. (2008). Спосіб підвищення надійності барометричного висотоміра з використанням супутникової системи визначення місцезнаходження . Retrieved from [http:// www.freepatent.ru/ patents/ 2316785](http://www.freepatent.ru/patents/2316785)
4. Software Arduino IDE. Retrieved from [https://www.arduino.cc/en/Main / Software](https://www.arduino.cc/en/Main/Software)