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COLLISION AVOIDANCE SYSTEMS FOR UNMANNED AERIAL VEHICLES

Борщова І.П.
Науковий керівник – к.філ.н., доцент Степанова І.С.

Now there is a considerable increase of interest to unmanned aerial vehicles (UAVs). Absence of a human being onboard allows carrying out maneuvers, inaccessible for manned aircraft.

There are two types of collision avoidance systems. They are: TCAS (Traffic alert and Collision Avoidance System) and ADS-B (Automatic Dependent Surveillance – Broadcast).

TCAS is a tool designed to prevent midair collisions between aircraft. Operational experience has demonstrated the utility and efficiency of TCAS. At the same time, operation of TCAS has identified areas in which the design and algorithms needed refinement or improvement to further enhance the efficiency of TCAS and its interaction with the controllers and the ATC system.

ADS-B is radically new technology that is redefining the paradigm of Communication Navigation – Surveillance in Air Traffic Management today. Already proven as a viable low cost replacement for conventional radar, ADS-B allows pilots and air traffic controllers to "see" and control aircraft with more precision than has ever been possible before.

However there are a lot of problems in the development of pilotless airplanes, which must be solved. Existing systems do not allow solving the most pressing problems facing the global aviation. They do not have correct algorithms for collision avoidance, and can not assess the risk of collision. Therefore there is the task of development such an approach that would allow solving existing problems.

The proposed system will be applied as follows. The manager of ground control point knows the weight and the number of passengers on board a plane that moves towards UAV. Using the tables of coefficients the manager of ground control point defines values of coefficients M and N. These values are the inputs of the fuzzy system, then the system calculates value of potential losses coefficient.

Then the controller calculates and constructs risk surfaces. After this it converts continuous risk model into the discrete matrix of risks in all points of 3 –d plane and exposures all possible routes. Finally the controller chooses among all routes the most optimal which would allow to provide the minimum risk of collision taking into account dynamic properties of the system.

Thus, having estimated risk in all points of space, it is possible to optimize the way of UAV motion to such that the manoeuvre of collision avoidance with a minimum risk can be carried out. So, offered approach allows to promote reliability of any collision avoidance system for unmanned aerial vehicles.