Visual Aircraft Guidance System With the Use of Artificial Neural Networks

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Abstract

Air transportation is developing nowadays faster than ever before. Innovations that improve safety are invaluable because millions of people use this means of transportation every day. Using a system of visual aircraft guidance for landing at an airport or airstrip can solve numerous problems related for example to a failure of ILS system or even lack of it. It could also work as a backup system or a co-operating system which is capable of finding a safe place in case of an emergency landing, eliminating pilot error like overlooking terrain obstacles. The system could also be used in military aircraft which would translate into higher safety, precision and possibly less collateral damage. The main task of the system is usage of real time imagining for guiding aircraft o the runway and support at any stage of the approach. The system is built on generally used ready libraries for image recognition (finding shapes on an image) and scripts using artificial neural networks to determine the position of points in relation to objects, however its implementation in visual aircraft guiding is a novelty. The research has been based on data collected by one of the team members who is a keen on hang gliding. It allowed for data collection in various weather conditions. The system required a correlation of IT sciences, aviation, meteorology and other relevant natural sciences based on laws of physics. The prototype has been based on commercial components but ultimately could be built on dedicated solutions which would certainly contribute to improved efficacy reaching nearly 100 percent. The presented system is an ideal solution for application in military and civilian technologies. It can be tailored to customer's needs. Research shows high implementation rate – in 98 percent of the studied cases. The system is innovative. It increases safety proves effective in various fields of aviation. Its application in geometry, approximation of points and characteristics of objects impact in space might make it one of the most desired safety systems.

References

1. K. S. Narendra and K. Parthasarathy. Identification and control of dynamical systems using neural networks. Neural Networks, IEEE Transactions 2002.
2. H. Hashimoto and H. Sato. Visual control of robotic manipulator based on neural networks. ndustrial Electronics, IEEE Transactions 2002.
3. Z Zhang and S. Yue and G. Zhang;. Fly visual system inspired artificial neural network for collision detection. ELSEVIER 2015.