

Aerial Robot Control Interfaces

Background

In recent years, research into autonomous robotic systems have been intensified. And with such progress arises the need to develop more intuitive ways of interacting with these advanced machines. One area of particular interest is the application of these HCI in unmanned aircrafts. Some of which are being investigated and have been categorized as follows.

Electromechanical control interfaces

This are control interfaces that are based on the conversion of mechanical force applied on a surface into electrical control signals. Some of this interfaces includes: joysticks, switches, keyboards, and trackballs controllers. This electromechanical control interfaces have the advantage of being very accurate, very reliable, and highly efficient; but awkwardly unnatural, which is why very long hours of training may be required



Vision based control interfaces

The vision based control interface probably offers a more intuitive, dynamic, flexible, and perhaps a more accurate control than that offered by the electromechanical control systems interfaces (keyboard and joystick controllers). However, the development of such a system like this is difficult and even much more difficult to implement. This usually involves some form of image capture (often with the camera, but could also be x-ray, ultraviolet, or infrared imaging) for which actions are based on perception which is in turn based on proper image segmentation and pattern matching for the recognition. Some milestones



in this area include the Microsoft Kinect, Leap motion device, google project soli, and groove gesture amongst several others.



Bioelectronics based control interfaces

This control interface is based on electrical pulse signals generated by the activity of a biological organism. The Myo device developed by Thalmic Labs uses electromyography (EMG) techniques to achieve control signals. Another bioelectronics based techniques is the used of the brain and mind in achieving control – electroencephalography (EEG).



Summary

Recent development in interface technologies have lead to the development of several aerial robot control interfaces for unmanned aircrafts. Some of this development are being investigated and have been sorted into the following three major categories:

- ❑ Electromechanical control interfaces
- ❑ Vision based control interfaces
- ❑ Bioelectronics control interfaces



References

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