Autonomous Systems Laboratory

Project:
An Investigation into the use of Novel Human-Computer Interfaces to control small Unmanned Multi-rotor Aircraft

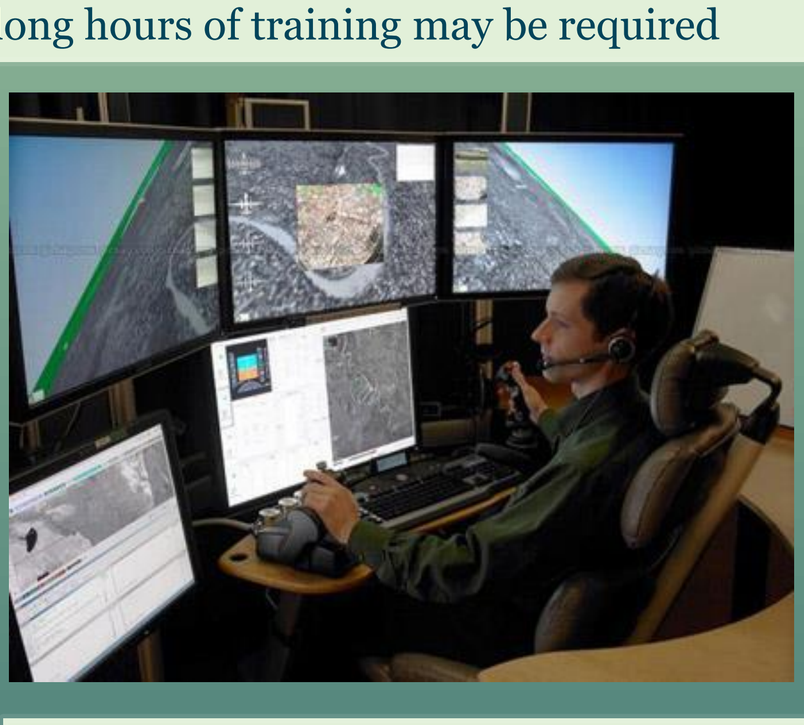
UNIVERSITY OF Southampton
Engineering and the Environment
Aeronautics, Astronautics and Computational Engineering

Aerial Robot Control Interfaces

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

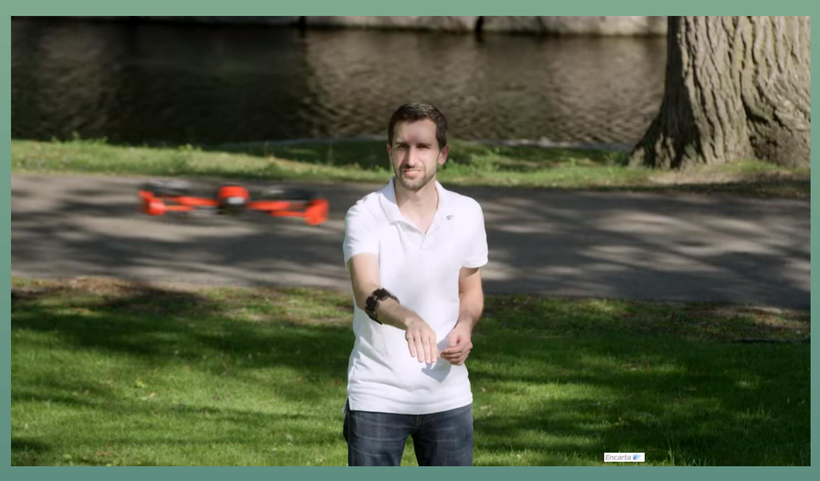
Background
Recent development in human machine interaction and interface technologies have lead to the development of several aerial robot control interfaces for unmanned aircrafts. Some of this development are being investigated and have been sorted into three major categories.

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

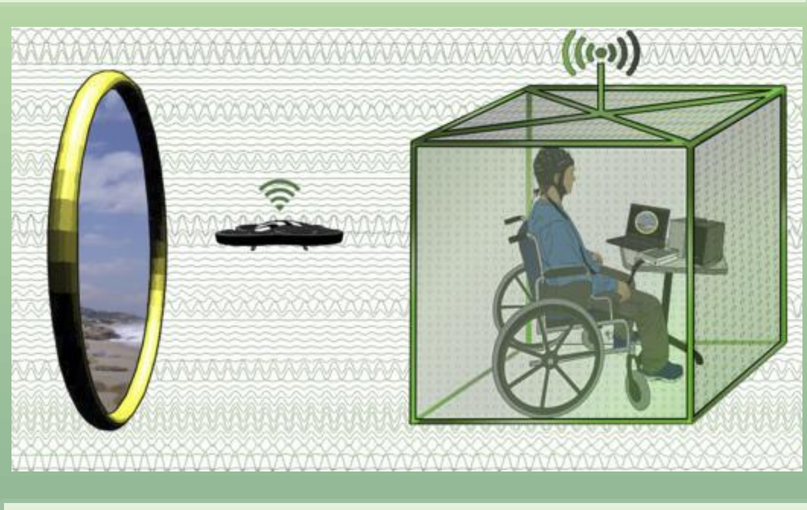


Vision based control interfaces
The vision based control interface probably offers a more intuitive, dynamic, flexible, and perhaps a more accurate control than that offered by the electromechanical control systems interfaces (keyboard and joystick controllers). However, the development of such a system 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).



References
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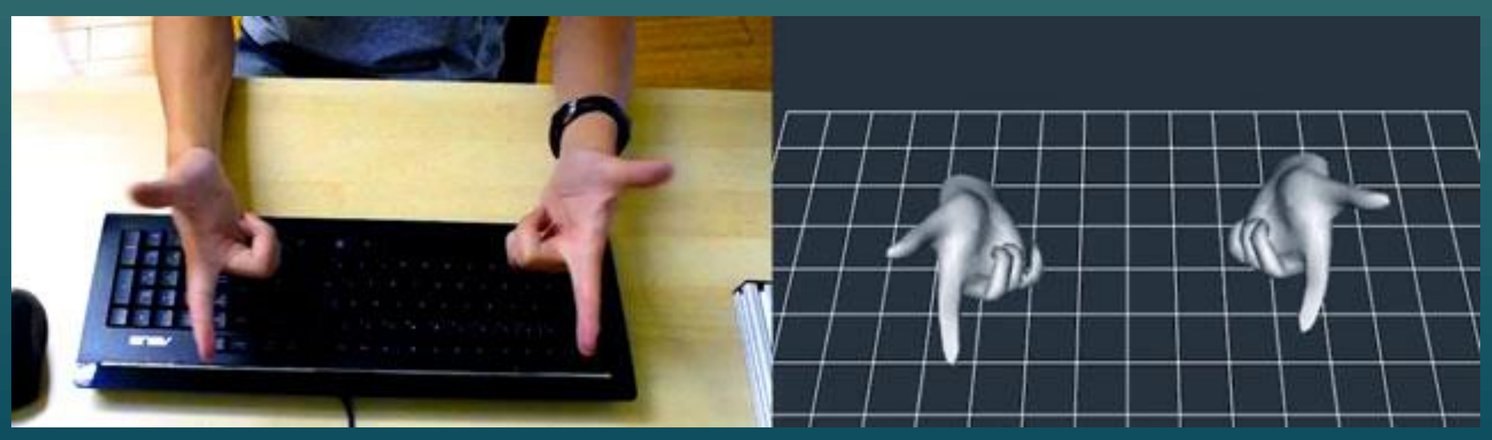

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