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Gaming engine platform for prosthetic sensory interface

Project type: BSc/MSc Thesis, Collaboration

Description

Electromyographic (EMG) control schemes on the muscles of amputees have been used as a standard for controlling robotic prostheses for a number of years [1]. While different EMG control schemes are being investigated [2] to increase robustness in accuracy and precision, there is little work being done in investigating alternative sensory paths for control of prosthetic devices. Computer games have been successfully utilized in experimental and rehabilitation environments as an effective means of investigating concepts while providing incentive to their users. A computer game platform can thus serve as an effective plug-and-play test bed for experimentally evaluating various sensory paths for the control of robotic devices.

Tasks

You will be provided with an experimental platform using JMonkeyEngine and Bullet physics as the basis for realistic game environments. The platform comes with a number of interfaces built-in to get you started (keyboard/mouse, microcontroller with 2-axis joystick, sEMG sensors). Additionally, data-logging facilities are in place to aid in evaluating the various sensory paths. Your task will be to extend the platform by (1) implementing additional sensor interfaces and (2) designing suitable game environments. Further, you are to validate the viability of the platform and provide quantitative comparison of the sensory interfaces for a given task.

Applicant

The applicant should be a Computer Science or Software Engineering student or graduate, with good background in C++/Java and an interest in robotic/prosthetic applications. The thesis is to be written in English.

References

[1] Hernandez, A., Dermitzakis, K., Damian, D., Lungarella, M. and Pfeifer, R. (2008). *Sensory-motor coupling in rehabilitation robotics*. Handbook of Service Robotics, I-Tech Education and Publishing, Vienna, Austria, pp: 21-36.

[2] Asghari Oskoei M and Hu H (2007). *Myoelectric control systems – A survey*. Biomedical Signal Processing and Control, Volume 2, Issue 4, pp: 275-294.

Supervisor

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