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Vision Based Brain-Computer Interface Systems for Performing Activities of Daily Living

Researchers at the University of South Florida have invented a novel computer vision based brain computer interface (BCI) that enables users to select an from a scene, and determine an action to be automatically performed on the object.

According to the 2010 census data report, 19.2 million Americans suffer from some form of disability and are unable to perform typical activities of daily living (ADL) independently or without the aid of a human helper. Many of these people have tetraplegia or are partially paralytic. Some suffer from a brainstem stroke or amyotrophic lateral sclerosis (ALS). In many cases, the person eventually becomes completely locked-in, and is unable to move the muscles in their body.

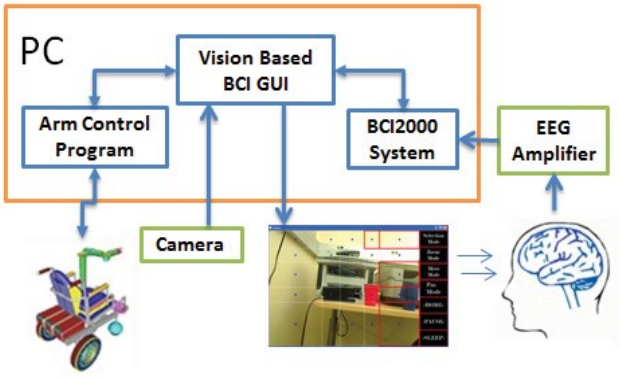
USF inventors have invented a noninvasive brain-computer interface (BCI) for controlling a robotic system. The BCI and robotic system enable patients to carry out ADLs by focusing their attention on a screen displaying a task workspace and stimuli corresponding to activities or actions to perform. The stimuli generate signals in the brain that can be analyzed and processed by a BCI system. As a result, the BCI can detect human intention, and command a robot to execute a task without limited human intervention.

This interface will reduce the cognitive load on the user, as well as reduce the time required to perform and/or complete tasks. The functionality of the interface is composed of: 1) Segmenting a scene image for use with the BCI, 2) Enabling a user to select segments, 3) Identifying objects in the segments, 4) Enabling the user to select an action to be carried out on the object and 5) Performing the selected action.

ADVANTAGES:

- **Breakthrough Object & Command selection technique**
- **Substantial reduction in BCI inputs from user, and time to complete tasks**
- **Users achieved an average accuracy of 93.33%**

Revolutionary Computer Vision Based BCI



Schematic Diagram Showing the BCI and a Wheelchair Mounted Robotic Arm Systems

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