Investigating the Possibility of Brain Actuated Mobile Robot through Single Channel EEG Headset

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Abstract Brain-computer interface (BCI) is a fast-growing technology involving hardware and software communication systems that allow controlling external assistive devices through Electroencephalogram (EEG). The primary goal of BCI technology is to ensure a potential communication pathway for patients with severe neurologic disabilities. A variety of BCI applications have been presented in the last few decades which indicate that the interest in this field has dramatically increased. In this paper, the possibility of a brain-actuated mobile robot using single-channel EEG headset has been investigated. EEG data has been collected from Neurosky Mindwave EEG headset which consists of a single electrode. EEG feature in terms of power spectral density (PSD) has been extracted and classified this feature using the support vector machine (SVM). Then the classified signal has been translated into three devices command to control the mobile robot. This mobile robot can be driven in three directions namely forward, right and left direction. Data collection from EEG headset and sending commands to a mobile robot, the entire process has been done wirelessly.

Keywords: Electroencephalogram (EEG), Brain-Computer Interface (BCI), Neurosky, Mobile Robot.

1 Introduction

Generally, healthy users can operate the robots with a conventional input device such as a keyboard, a mouse, or a joystick. These devices are, however, difficult to use for elderly or disabled individuals. For this reason, some special interfaces like sip-and-puff systems, single switches, and eye-tracking systems have been proposed [1]. However, these special interfaces do not work for some severely disabled people with illnesses such as amyotrophic lateral sclerosis (ALS). These severely disabled individuals cannot convey their intentions or operations to robots with these interfaces.

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