

**The Hong Kong University of Science and Technology
School of Engineering**

Disney-HKUST Grant for Technology and Well-Being

Transcript of “Brain-Computer Interface for Wheelchair Control”

Hi, we are a team of Year-4 undergraduate students studying Electronic and Computer Engineering. Our project is supervised by Professor Jianan Qu (Professor, Department of Electronic and Computer Engineering).

In the Star Wars universe, there are many different types of characters, often with disabilities or injuries from war. But this never stops them from doing what they wish to accomplish. Through the use of advanced technologies, they always find ways to overcome their disabilities and live life to the fullest extent.

Controlling the wheelchair is essentially like using the force to control things and using our system, users can now control their devices simply with the power of their mind.

There are millions of people suffering from mobility impairments around the world. They rely on electric wheelchairs to complete their daily living tasks and get around from place to place unassisted. For many patients, traditional motorized wheelchairs are not an adequate solution, as they are often hard to control or sometimes not even feasible for those with severe disabilities.

We therefore designed a solution using a brain-computer interface. This does not require a functioning nervous system and instead, relies only on the power of the brain. For our project, we decided to simulate the wheelchair using a small car. Though it was originally designed to be a control system for wheelchairs, our system extends beyond it and can be used to control any kind of device.

Our solution will allow a user to simply put on the electroencephalogram (EEG) headset which detects the brain's neural impulses. The EEG signals are then magnified through our custom designed amplifier circuit. We use signal processing techniques to filter out the noise and unwanted artifacts. Machine learning algorithms detect and classify certain motion and thought-based features. These signals are eventually relayed to the microcontroller on board, which operates the wheelchair. We can also fit in various other sensors to create an advanced hybrid system.

We wish to transform the lives of the physically disabled, improve their wellbeing and at the same time, give them back their freedom.