



Final Year Project Showcase for Batch-2016

Department of Electrical Engineering		
1	Project Idea	Designing of motorized wheelchair with brain computer interface system to fully control it for als patients
2	Process	<p>The following Process was followed throughout the completion of project:</p> <ul style="list-style-type: none">• After necessary research work and calculations, suitable equipment were purchased.• Fabrication of ordinary wheelchair was completed to attach dc gear motor and its shaft to the wheel. And also, to accommodate DC batteries which powers the motors.• A microcontroller-based circuit was built to control dc motor.• The motor driver is controlled through Arduino uno, and the code was written such that the wheelchair is capable of moving in all four directions that are forward, reverse, right and left, which ever command is given.• There are two kind of user input methods:<ol style="list-style-type: none">1. The command for the direction is given to Arduino by android app via Bluetooth module HC-05, connected to Arduino.2. It could also be given by attention and blink detection levels of Brain captured by Neurosky Mindwave mobile 2 devices.• The software environment was established with the goal of creating a way to control the wheelchair that is simple and straightforward for the user and which will only trigger the movement when required. For this, a proper sequential loop system having four modes of operation was established.• The four different modes of operation are: Standby mode, Command Mode, Focus Mode and running mode. The user can move from one mode to another depending on their brain activity.• The speed of the wheel chair is also maintained to a specific limit for convenient movement for patient.
3	Outcome	Our proposed wheelchair can be controlled and moved in four different directions via Bluetooth android application or by EEG signals via Neurosky Mindwave Headset as per the user's requirement.



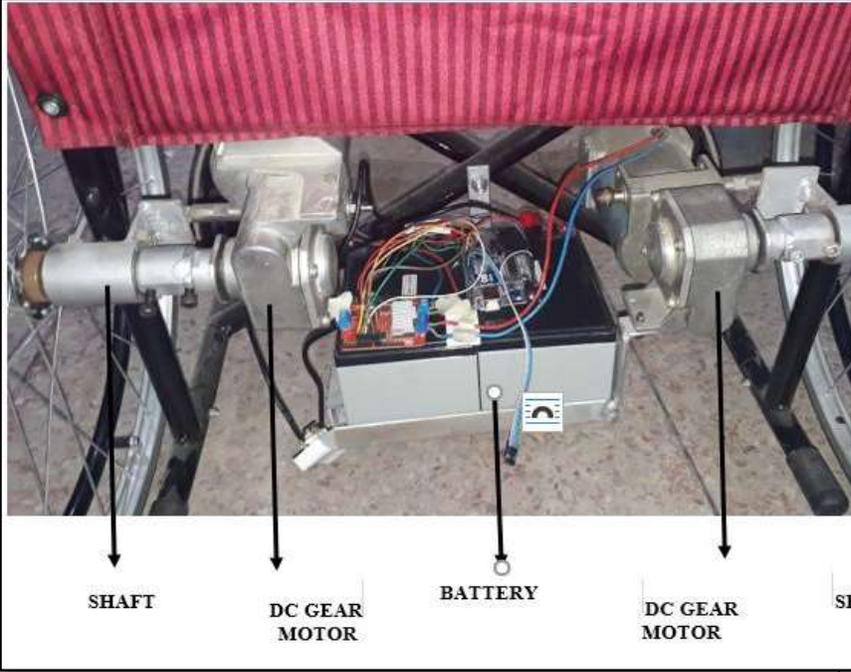
4	Evidences (Theoretical Basis)	The Project is in working condition with 81.5% average accuracy obtained through number of experiments with different users.				
		User	The Number of Commands Sent	Correct	Wron g	Accuracy
		1	50	38	12	76%
		2	50	39	11	78%
		3	50	42	8	84%
		4	50	44	6	88%
Average Accuracy				81.5%		
5	Competitive Advantage or Unique Selling Proposition (Cost Reduction, Process improvement, Attainment of any SDG (Sustainable Development Goal), increase of market share or capturing new market or having superior performance over competitor. In summary, any striking aspect of the project which compels industry to invest in FYP or purchase it. Some detail description is required in terms of how, why when what. You can select one or more from following dropdown and delete rest of them)					
a	Cost reduction of existing Product	The market price of gear control electric wheelchair starts from Rs 110,000 meanwhile Mind controlled feature is not introduced to markets across the globe yet. We made the whole electric wheelchair with Mind wave control technology in Rs 49,000 altogether.				
b	Process Improvement which leads to superior product or cost reduction, efficiency improvement of whole process (e.g. What is issue is current process and what improvement you suggests)	The Neurosky Mindwave mobile headset is a single electrode device, to further improve the accuracy of the system we can use multiple electrode device such as emotive in which electrodes are placed at different points over the head to increase the accuracy of detected eeg signals.				
c	Attainment of any SDG (e.g. How it is achieved and why it is necessary for the region)	SDG: Innovative access to Good health and wellbeing. Our proposed Project is for people with any disease resulting in full body paralysis which makes patients with fully functional brain incapable for any kind of mobility. This mind controlled electric wheelchair is the hope of such patients to reconnect with the world again.				
d	Expanding of Market share (e.g. how it expand and what is	There are some companies which are providing the facilities of Bluetooth control wheelchairs but most of them are USA based and are very costly.				



	problem with current market	Our product is the most economical and cost effective which is providing dual control facilities i.e Bluetooth mobile application or mind control mechanism. Therefore, our product is better in terms of cost than any other related product in the market and thus it has bright scope due to its Brain computer interface potential.
e	Capture new market (e.g. Niche market or unaddressed segment)	Market size and targeted consumers can be enhanced by introducing some new and user-friendly features to adjust it with the innovative trends such as smart obstacle avoiding mechanism to improve safety, providing voice control feature or mind wave to text/speech converter system to convert our product in to AI which could provide ALS patients to fully communicate with outer world.
f	Any Environmental Aspect (e.g. carbon reduction, energy efficient etc.)	The whole system is environmental friendly. Moreover, the dc batteries have backup of 8 hours(rated) so energy efficiency is high.
g	Any Other Aspect	The product is cost effective comparatively to other electric wheelchair available in the market.
6	Target Market (Industries, Groups, Individuals, Families, Students, etc) Please provide some detail about user of the product, process or service	Target Market: <ul style="list-style-type: none"> • People suffering from neuromuscular disorders which results in full body paralysis. The project will help them move voluntarily despite their body condition. • Care takers of such patients as it clearly provide relief to them. • Automatic Wheelchair supplier and general public cause our proposed system is cost effective. • Students can further research and enhance the product in various ways such as converting this Wheelchair into mind control AI.
7	Team Members (Names & Roll No.)	Areeba Amin (EE-16142) Bareerah Rahman (EE-16156) Aiman Khalid (EE-16148) Kulsoom Fatima (EE-16137)
8	Supervisor Name	Mr. Iqbal Azeem (iqbal.azeem@neduet.edu.pk)

9 Pictures



		 <p>SHAFT DC GEAR MOTOR BATTERY DC GEAR MOTOR</p>
10	Video	https://drive.google.com/file/d/1bLnwMSEXyOsnwVcQe_yP6QDMX5GuvQD/view?usp=sharing