EECE 461 Project Proposal

I.   Motivation

Wheelchairs are widely used by individuals with motor disabilities. As a result, they are usually incapable of controlling a manual wheelchair because of their disability. Users could have problems ranging from cardiovascular problems, vision impairment [1], fatigue, slow reflexes. In order to improve the lives of these individuals, our project will focus on improving the traditional electric wheelchair to meet the needs of the user.

II.   The System

A. Functionality

For this purpose, we will modify a wheelchair so as it detects obstacles and avoids them in case the disabled user lacks the ability to do so. In addition to avoiding obstacles, our modified wheelchair would be able to avoid holes and gaps in the road. As a result, it protects the user from falling into unseen obstacles. Moreover, our designed system is capable of determining the minimum and the maximum velocity needed to drive the wheelchair up and down an inclined path.

B. Features

The modified wheelchair should be capable of:
1- Detecting obstacles in the way
2- Finding the minimum and the maximum speed needed on an inclined path
3- Detecting gaps that objects its way
4- Alarming the user in the case of a lack of power

C. Sensors Used

To achieve these features, we propose to use the following 5 sensors:
1- IR/Capacitive/Proximity sensor to detect the obstacles [2]
2- Accelerometer which is used to determine the inclination angle
3- Force sensor to measure the weight of the person
4- Velocity sensor to detect the speed of the wheelchair
5- Ultrasound or a laser sensor to detect gaps
6- A voltage sensor to determine the wheelchair battery power

III.   List of Group Members

The members of this project are Ebrahim Karam, Hassan Hmedi, and Rayan Al Sayed Ali.

IV.   References

[1] R. Simpson, D. Ding, S. Guo, S. Hayashi, E. LoPresti, W. Ammer, V. Sharma and R. Cooper, "National Library of Biotechnology Information," Journal of Neuroengineering and Rehabilitation, 3

October 2005. [Online]. Available: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1262756/. [Accessed 19 March 2016].

[2] J. Hoey , D. Gunn, A. Mihailidis and P. Elinas, "Obstacle Avoidance Wheelchair System," IEEE, Toronto, 2006.