

Solar Powered Smart Vehicle for Physically Disabled People

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Abstract- The challenging problem faced by the paralyzed people is their independent mobility. They need an external help to perform their daily activities. The main objective of this project is to provide an automated system for disabled people. The smart vehicle will work based on the head movement of the user. The recognized gestures are used to generate motion control commands to the controller so that it can control the motion of the wheel according to the user intention. The head movement is the gesture which can be performed by the physically disabled people those do not having limbs.

Keywords- Smart vehicle, Solar Panel, Head Motion control, Obstacle detector,

I. INTRODUCTION

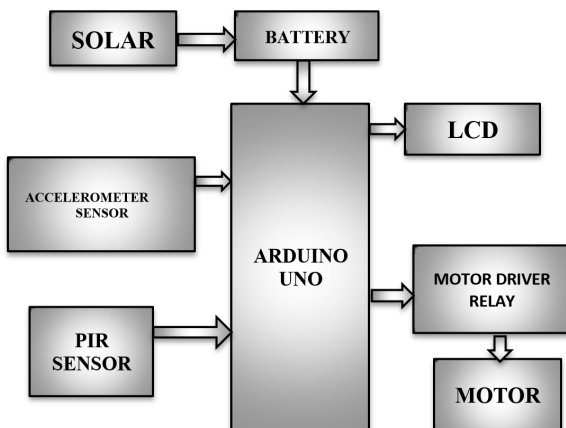
Rehabilitation Engineering is the application of engineering principles and technology in the field to uplift the people with disabilities. Quadriplegics are persons who are not able to use any of the extremities. The robotic smart vehicle supports through the movements of head. Head movements control is particularly useful for severely-handicapped people who have spinal cord injury or quadriplegia which cannot use their hands to control the vehicle. This will be an effective method to eradicate the social problems faced by the physiologically challenged persons. This is directly interfering with the social relevance of the society. It is very difficult to make them move from one place to another. The main reason behind the implementation of this project is to give a helping hand for the sufferings of the challenged people. They have no way to get rid of from the bed due to their lack of movements by designing the smart vehicle for the challenged people can reduce the sufferings of the patients to an extent. Solar Powered vehicle play a vital role in bringing independence to the severely mobility- impaired and allow people to get on with their activities of daily living. Many people who suffer from mobility-impairments rely on Solar powered smart vehicle to get out and about.

II. LITERATURE REVIEW

Presently Available Different Types of Wheelchair

1. **Manual Wheelchairs:** These are the type of devices that help a person to move him without any assistance of battery.
2. **Electric Wheelchairs:** A power chair can be used by someone who hasn't got the dexterity or mobility, perhaps, to drive a mobility scooter due to arm, and do not have the leg strength to propel a manual chair with their feet.
3. **Pediatric Wheelchair:** These types of wheelchair provide a key-enabling technology to young children who would be unable to navigate independently in their environment.
4. **Stair climbing wheelchair:** The stair-climbing wheelchair exists at present can be grouped into 3 categories-continuous stair climbing wheelchair, intermittent-stair climbing wheelchair and auxiliary stair climbing wheelchair.
5. **Various Technique Used in Wheelchair Control**
There is a vast development in the field of wheelchairs. Out of all the methodologies, HCI (Human Computer Interface) and HMI (Human Machine Interface) are the latest and most effective techniques. In user interface systems both bio-signals and nonbio-signals are used as a medium of control. Bio-signal based devices mainly use bio-signals like EEG, EOG or EMG as control signals. The bio-signal based approach is used for completely paralyzed patients who can only use their bio-signals as the only resource to control.
 1. **EEG based:** The Electroencephalography (EEG) records electrical brain signals from the scalp, where the brain signal originates from postsynaptic potentials, aggregates at the cortex, and transfers through the skull to the scalp.
 2. **EMG based:** EMG measures electrical currents that are generated in muscles during its contraction. A muscle fiber contracts when it receives an action potential.
 3. **Chin Control Technique:** In this technique chin is put in cup shape joystick and is usually controlled by neck movements (flexion, extension, and rotation).

III. BLOCK DIAGRAM



1. **Arduino Uno-** ARDUINO is an open-source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objects that can sense and control objects in the physical world.
2. **Accelerometer Sensor-** This accelerometer module is based on the popular adxl335 three-axis analog accelerometer IC, which reads off the x, y and z acceleration as analog voltages. By measuring the amount of acceleration due to gravity, an accelerometer can figure out the angle it is tilted at with respect to the earth. By sensing the amount of dynamic acceleration, the accelerometer can find out how fast and in what direction the device is moving.
3. **PIR sensor-** An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.
4. **Motor Driver-** L293D is a dual H-Bridge driver, so with one IC we can interface two DC motors which can be controlled in both clockwise and counter clockwise direction and a motor with fixed direction of motion.
5. **Solar Panel-** Solar panels absorb the sunlight as a source of energy to generate electricity or heat. A photovoltaic (PV) module is a packaged, connect assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 365 Watts (W). The efficiency of a module determines the area of a module given the same rated output – an 8% efficient 230 W

module will have twice the area of a 16% efficient 230 W module. There are a few commercially available solar modules that exceed efficiency of 22% and reportedly also exceeding 24%.

IV. MOTION RECOGNITION

The Smart Vehicle allows the patient to have a control over four different directions namely forward, backward, left, right.

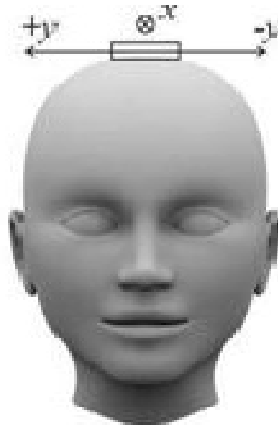


Fig: x y Acceleration due to gravity

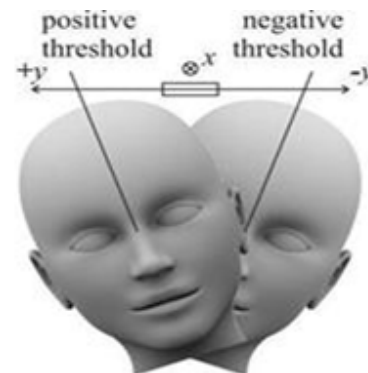


Figure- The position of the accelerometer relative to the head motion in right and left side.

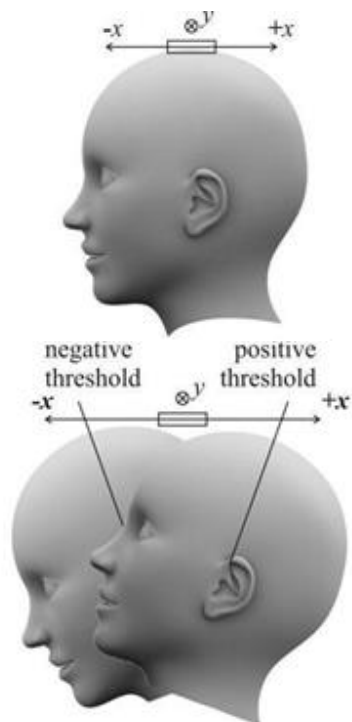


Figure- The position of the accelerometer relative to the head motion in forward and backward direction

V. ADVANTAGES

- User-friendly and Ecofriendly.
- Helpful for the paralysis stroke people who don't have much stamina in the hands.
- Reduces the human activity.
- Reduces the physical strain.
- Spontaneous output.

VI. RESULT

The wheelchair that is controlled by the Accelerometer is successfully designed.

VII. CONCLUSION

- Successfully Fabricated solar powered smart vehicle for physically disabled people
- Use of Solar power reduces the energy consumption
- Thought is a process which is distributed across the brain and is not localized to a particular region of it. Thus using the EEG acquisition techniques, it is extremely difficult to build a system.
- Head movement technique provides an incredible trend for various subjects and thus delivers a framework which can be used further for system design.