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A SMART FOUR WHEEL ELECTRIC MOBILITY FOR PHYSICALLY DISABLED

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ABSTRACT

People who visual impairments or with physical or mental disabilities which prevent them from driving safely can now experience independent mobility. Smart vehicle is mechanically controlled devices designed to have self-mobility with the help of the user command. This reduces the user's human effort and force to drive the vehicle. Further more it also provides an opportunity for visually or physically impaired persons to move from one place to another.

Keywords: Hc-02, RFID.

I. INTRODUCTION

The smart vehicle system with voice recognition and touch controlled using an embedded system. An android application is developed and installed on the android smartphone. The system is divided into two main modes: voice recognition mode and touch mode. For the voice recognition mode, elderlies or physically disabled people (users) can provide the voice input, for example, "go", "reverse", "turn to the left", "turn to the right" and "stop". The vehicle will move according to the command given. For the touch mode, the user can select the specified direction displayed within the four quadrants on the screen of the android smartphone to control the vehicle. An Arduino Uno is used to execute all commands. The motor driver and HC05 Bluetooth module are used in this system. This system is designed to save time and energy of the user.

In everyday life, the problem of a person to always stay with the patient has always generated some issues. Smart vehicle has rightfully provided the solution to the above problem. With lesser complexity and maintenance, it can be easy to install. A smart vehicle aims to provide aid to those handicapped and physically challenged persons by providing them with some sort of mobility which would greatly help them.

II. LITERATURE SURVEY

1. Prof. Vishal V. Pande, Nikita S.Ubale, "Hand Gesture Based Wheelchair Movement Control for Disabled Person Using MEMS", Int. Journal of Engineering Research and Applications ISSN: 2248-9622, Vol. 4, Issue 4(Version 4), April 2014, pp.152-158. This paper is to develop a wheel chair control which is useful to the physically disabled person with his hand movement or his hand gesture recognition using Acceleration technology. Tremendous leaps have been made in the field of wheelchair technology. However, even these significant advances haven‟t been able to help quadriplegics navigate wheelchair unassisted. It is wheelchair which can be controlled by simple hand gestures. It employs a sensor which controls the wheelchair hand gestures made by the user and interprets the motion intended by user and moves accordingly. In Acceleration we have Acceleration sensor. When we change the direction, the sensor registers values are changed and that values are given to microcontroller. Depending onthe direction of the Acceleration, microcontroller controls the wheel chair directions like LEFT, RIGHT, FRONT, and BACK.

2. Krishnamoorthy, Shubham Pandey, Shubham Chandewar, "Smart Assisted Vehicle for Disabled/Elderly using Raspberry Pi " , May 2018 International Journal of Reconfigurable and Embedded Systems (IJRES) Vol. 6, No. 2, July 2017, pp. 82~87. Independent mobility is a key component in maintaining the physical and psychosocial health of an individual. Further, for people e having disabled/elderly, independent mobility increases vocational and educational opportunities, reduces dependence on caregivers and family members, and promotes feelings of self-reliance. Psychologically, a decrease in mobility can lead to feeling of emotional loss, anxiety, depression, educed self-esteem, social isolation, stress, and fear of abandonment. Even though the benefits of powered mobility are well documented, the safety issues associated with operation of powered vehicles often prevent clinicians and rehabilitation practitioners from prescribing powered mobility.

So we are introducing an intelligent vehicle for disables/elderly people which uses an array of sensors to help with the movement of the vehicle with minimal human interaction. Functionalities of the proposed system are further enhanced using android interface connect to the vehicle via Bluetooth.

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III. METHODOLOGY

- **OBJECTIVES**

To design and develop

• Smart vehicles, which are capable of perceiving their surroundings and moving around without human intervention.

• To develop Simple, collision less and flexible in speed and to cover desired travel distance.

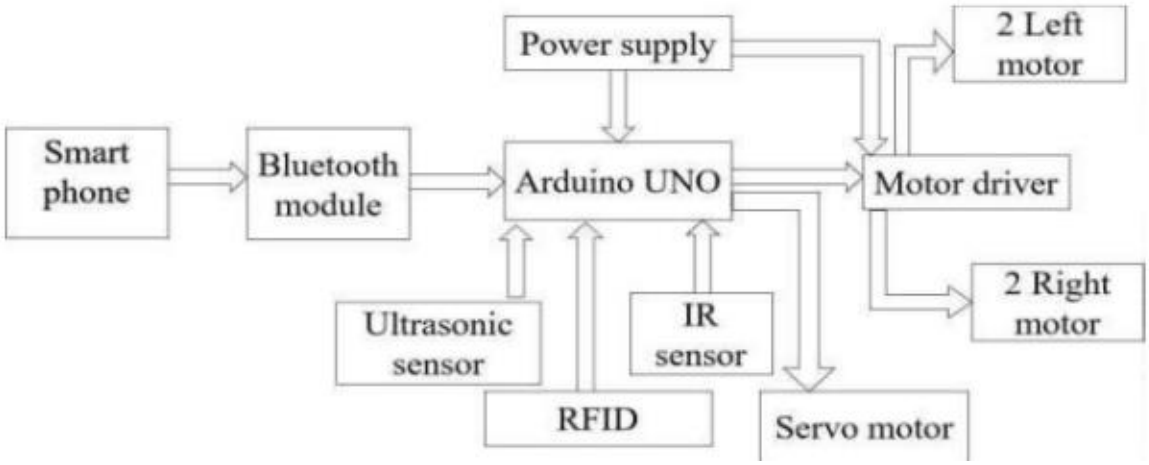

Figure 1: Block diagram of proposed smart vehicle

Arduino Uno is a microcontroller board based on the ATmega328. The architecture of Arduino microcontroller is the AVR and the operating voltage is 5V. The HC-05 Bluetooth module is designed for the transparent wireless serial connection setup. It has only 4 pins which are 5V, GND, TX and RX. The 5V and GND pin are used for power purpose and the TX and RX pin are used for a serial interface. The pin configurations of 6 to 9 are used to control the motor driver. Pin 6 and 7 are connected to motor driver 1 and pin 8 and 9 are connected to motor driver 2. The pin configurations of 10 and 11 are used for serial interfacing with the TX and RX. When the users RFID tag is shown to the RFID reader, the servo motor opens the door if the user is authorized otherwise, it will not open the door. IR sensor sense when user enter into the vehicle and then vehicle get started. Arduino Uno will decode and process the data delivered from the Bluetooth. Then it will pass the signal to the motor driver. The motor driver will direct the vehicle according to the command given. The power supply is used to supply electrical energy to the Bluetooth module, Arduino Uno, motor driver and motor. The user can control the movement of the vehicle by giving command via the android smartphone. The user can select one of the modes to given command.

An IR sensor is an electronic instrument that scans IR signals in specific frequency ranges defined by standards and converts them to electric signals on its output pin (typically called signal pin). The IR signals are mainly used for transmitting commands over the air on short distances (typically few meters) like what we have already worked with on TV remote controls or other similar electronic devices.

IV. RESULTS AND DISCUSSION

After implementation of the smart vehicle and its functionality was tested, it is found that the movement of the vehicle using the touch mode revealed an excellent functionality in all given directions. The android application is perfectly designed in order for the user to control the vehicle. The sensor system guarantees the detection of obstacles. The ultrasonic sensor system located around the vehicle, permits any obstacle in its environment to be detected.

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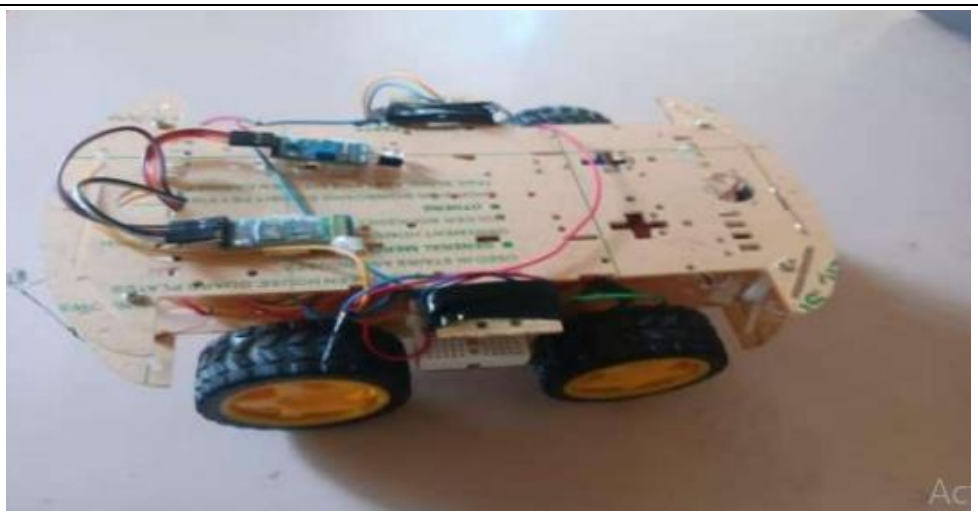

Figure 2: Result of Proposed smart vehicle system

V. CONCLUSION

This smart vehicle system is a combination of mechanical, electrical, and communications system. The system designed has undergone a few tests and successfully completed the basic performance. The objectives were achieved as the software and hardware implementation worked well as expected. The designed smart vehicle is flexible to operate either a touch mode or voice recognition mode, therefore this success is to serve many people with disabilities. From the conducted research, it can be seen clearly that a mobile controlled vehicle will have a bright future. It should be continued and developed in the future as it has a huge potential to improve its performance, reliability, and safety. For future work, it is suggested to use a more powerful and lighter weight motor to support various weights of users. Besides, this system needs a lot of enhancements to improve its accuracy and functionality.

VI. REFERENCES

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[4] A.Krishnamoorthy, Shubham Pandey, Shubham chandewar "Smart Assisted Vehicle for Disabled/ Elderly using Raspberry Pi", May 2018 International Journal of Reconfigurable and Embedded Systems (IJRES) Vol. 6, No. 2, July 2017, pp. 82~87.