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Home automation by smart wheelchair for the physically handicapped person using Arduino

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ABSTRACT

In this paper, we have implemented a wheelchair which is helpful to handicapped persons for performing their activities in day to day life. The overall operation of the wheelchair is to facilitate handicapped person with safe smovement. Also the additionally, the feature is to control basic home appliances with the help of remote sensor from the wheelchair. This project uses AVR microcontroller Atmega328 circuit and Direct Current Motor to create the movement of a wheelchair with help of the mobile application. An additional feature is to control basic home appliances with the help of remote device which is very useful for a handicapped person to operate home devices.

Keywords: AVR microcontroller, Arduino compiler, Motor Driver, IR Sensor, LED.

1. INTRODUCTION

While the needs of many individuals with disabilities can be satisfied with power wheelchairs, some members of the disabled community find it is difficult or impossible to operate a standard power wheelchair. This project could be part of an assisting technology. It is for more independent, productive and enjoyable living.

The aim of this project is to control wheelchair automatically for moving forward, backward, Left and Right with the help of the mobile application. The objective of this project is to facilitate the movement of people who are disabled or handicapped and elderly people who are not able to move well. The result of this design will allow certain people to live a life with less dependence on others. This project uses AVR microcontroller Atmega328 circuit and Direct Current Motor to create the movement of a wheelchair with help of the mobile application. The result of this design will allow certain people to live a life with less dependence on others. An additional feature is to control basic home appliances with the help of remote device which is very useful for a handicapped person to operate home devices.

2. METHODOLOGY

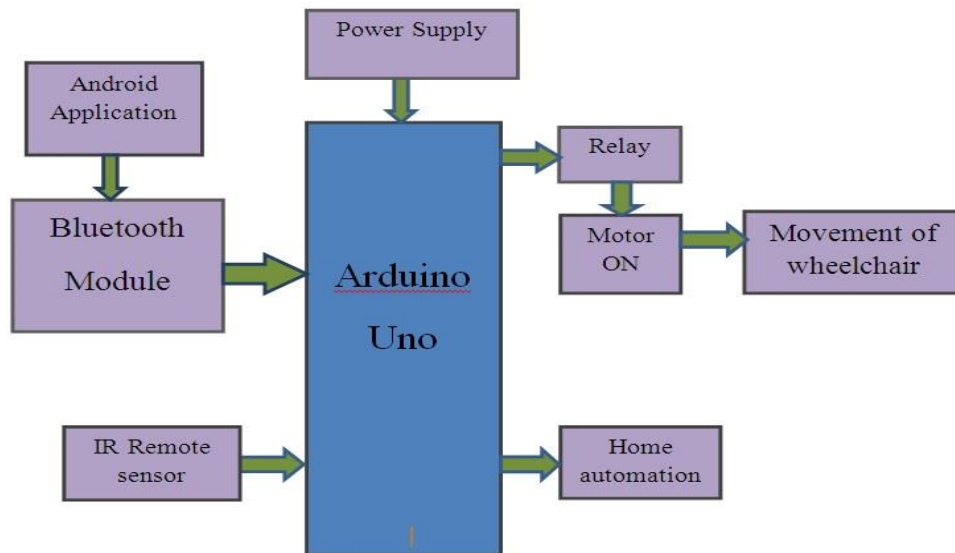


Figure 1 Block Diagram

This system operation is divided in two parts we use the AVR microcontroller Atmega328 with the help of Arduino compiler to performing overall function of the circuit. First is the to control the movement of wheel chair. For controlling we receive the signals coming from a mobile application through Bluetooth Module to control the movement of the wheelchair by using DC motors Second part is to control home appliances for that we use remote sensor to ON or OFF the device.

3. HARDWARE DESCRIPTOIN

3.1 Arduino UNO Board



Figure 2 Arduino Board

Arduino is a device that take the input from various sensors and perform the operation at output pot of the board. It is a microcontroller development board for writing software for the hardware circuitry. It consists of an AVR microcontroller Atmega328 IC. The Atmel Atmega328 is a low-power CMOS 8-bit microcontroller based on AVR enhanced RISC architecture. It has 14digital input/output pins, 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

3.2 Motor Driver

3.2.1 IC L293D



Figure 3 Motor Driver

The DC motor is used in the robot applications. Here we can use L293D driver motor for control the rotation of the motor. The L293D motor driver is used to control the motors in both directions. The left and right side motors are used to drive the motor to turn left and turn right. This system is used to move wheelchair safely. It also used for activating the relay to the load for activating the home appliances. Which ON or OFF the devices.

3.3 Bluetooth Module HC-05

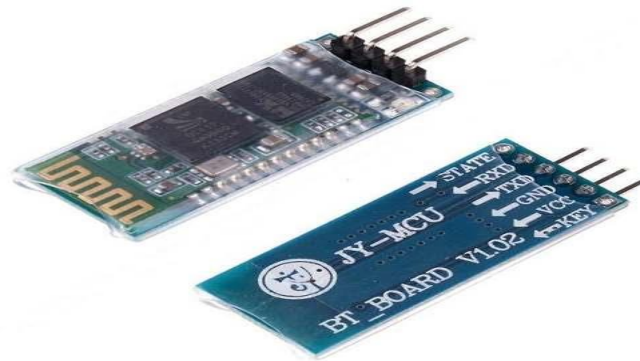


Figure 4 Bluetooth Module HC-05s

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm. Hope it will simplify your overall design/development cycle.

This Bluetooth module is interfaced with the Arduino board which receives the signal coming from the mobile application and send to the any Arduino board pin.It performs the operation according to the signal and activates the motors for movement.

3.4 IR Sensor

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion.

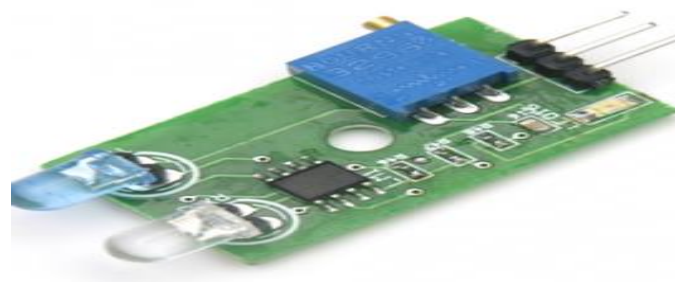


Figure 5 IR Sensor

These types of sensors measure only infrared radiation, rather than emitting it that is called as a sensor. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be

detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. The IR sensor is used for activating the home appliances with the help of the remote device. When we press the button it receives the signal from the remote sensor and sends to Arduino .It activates the relay pin where the load is connected and switched ON or OFF the home appliances.

4. FLOW CHART

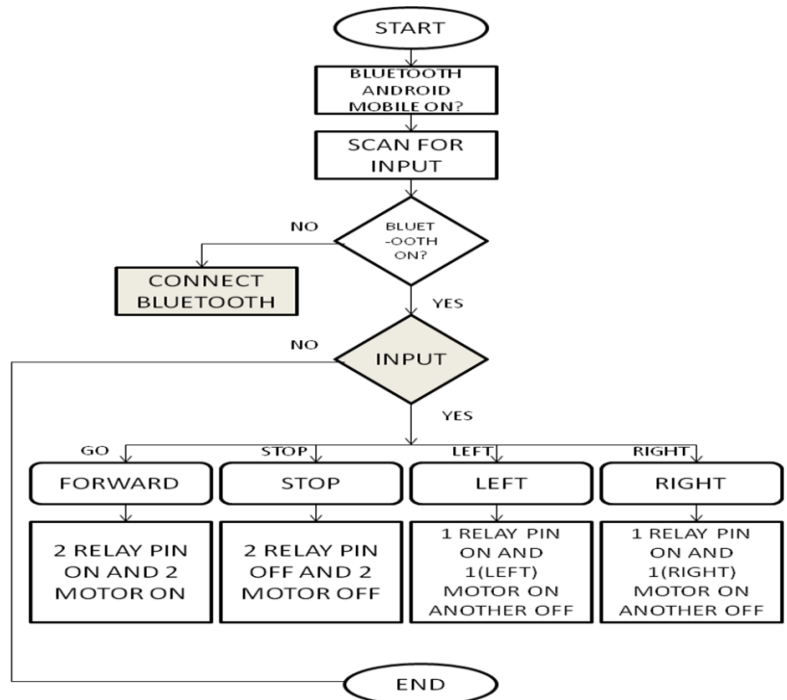


Figure 6 Flowchart of android control wheelchair operation

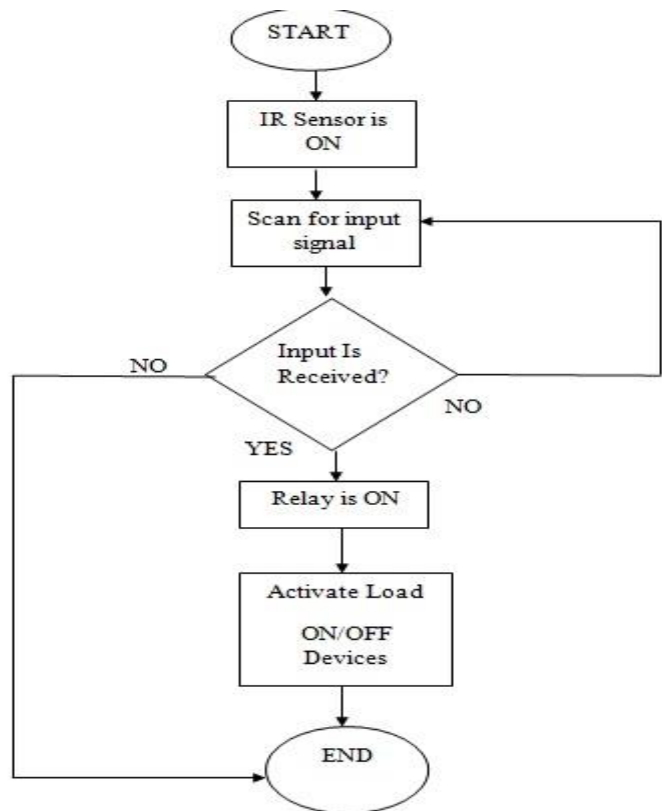


Figure 7 Flowchart of Home Automation operation

5. ADVANTAGES

- As the case of movement user can easily move with his/her sovereignty which is almost similar to walk.
- This wheelchair does not require hand motivated motion.
- By using an IR remote sensor we can easily operate the home devices with the help of this wheel chair.

6. FUTURE SCOPE

- ▶ Floor-mapping technology (GPS).
- ▶ The Caterpillar Track will be too helpful for the journey towards the stairs and hard surfaces. The normal wheel is used instead of the traditional normal wheel for only safety purpose.

7. RESULT

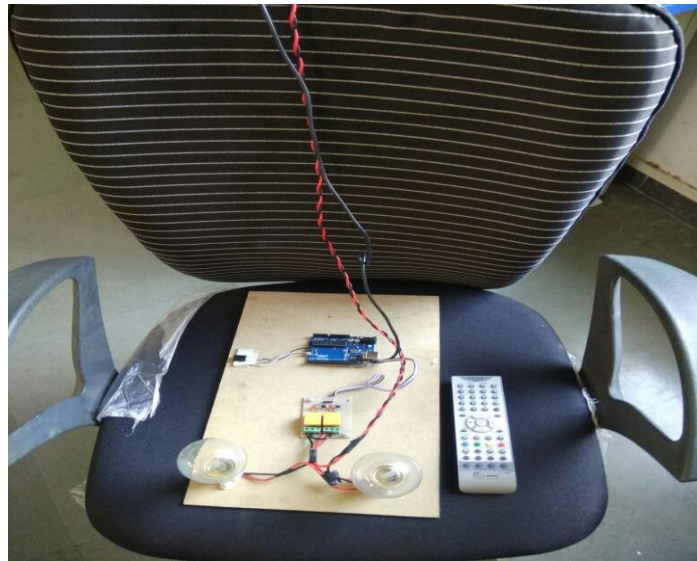


Figure 8 Prototype Wheel Chair

8. CONCLUSION

We have successfully designed and implemented a motorized wheelchair controlled by mobile application through Bluetooth module HC-05 and controlling the home appliances with help of the remote device.

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