# Design and Fabrication of Automated Wheelchair

**Prof. V. M. Bansode[1], Junaid Shaikh[2], Muneeb Khadri[3], Sadashiv Samshette[4], Maaj Patel[5]**
Assistant Professor, Mechanical Engineering, NBNSSOE, Pune, India[1]
UG Student, Mechanical Engineering, NBNSSOE, Pune, India[2,3,4,5]

**Abstract:** *The widespread prevailing loss of limbs is a day-to-day scenario due to accidents, age, health problems, and wars. A wheelchair monitored with the Android mobile application is developed to help the disabled patients by using an android application to control the movement of a wheelchair in different directions. The main criteria are to design a wheelchair that will be controlled wirelessly and will be very convenient to operate with no physical efforts. The wheelchair controlled by the android application will be a boon for many patients who are dependent on a wheelchair for their mobility. This project will help the disabled to function in the wheelchair on their own.*

**Keywords:** Android Phones, Microcontroller Atmega-328, DC Motors, Wheelchair, etc.

## I. INTRODUCTION

Several studies have shown that both children and adults benefit substantially from access to a means of independent mobility, including power wheelchairs, manual wheelchairs, and scooters. Independent mobility increases vocational and educational opportunities, reduces dependence on caregivers and family members, and promotes feelings of self-reliance. For young children, independent mobility serves as the foundation for much early learning. Non-ambulatory children lack access to the wealth of stimuli afforded self-ambulating children. This lack of exploration and control often produces a cycle of deprivation and reduced motivation that leads to learned helplessness.

The widespread prevailing loss of limbs is day-to-day scenario due to accidents, age, health problems, and wars. A wheelchair monitored with the Android mobile application is developed to help the disabled patients by using an android application to control the movement of a wheelchair in different directions. The main criteria are to design a wheelchair that will be controlled wirelessly and will be very convenient to operate it with no physical efforts. The wheelchair controlled by the android application will be a boon for many patients who are dependent on a wheelchair for their mobility.

## II. OBJECTIVES

1. To fabricate an easily operating wheelchair for differently-abled person with lower limb disability.
2. Improve the existing wheel chair in terms of daily usage.
3. Analyze the wheelchair according to human factor engineering and material selections

## III. PROBLEM STATEMENTS

Disabled people use wheelchairs due to various reasons. And most of the people prefer to use an electrical wheelchair since it's easy to get to places. These electrical wheelchairs are controlled by a joystick on the arm rest. But when the person arm is injured or has limited movement, it becomes hard for them to use the wheelchair. And it's hard for other people to help him/her too since the joystick is fixed on the arm rest.

## IV. LITERATURE SURVEY

**[1] Fidaus Kamaruddin,** A Smart Wheelchair Management and Monitoring System using Arduino. In order to growth to develop the medical field. Therefore, a technology that manage to brilliantly control plants watering rate

according to its soil moisture and user requirement is proposed in this paper. The developed system included an Internet of Things (IoT) in Wireless Sensor Network (WSN) environment where it manages system either manually or automatically, depending on the user requirement. This proposed system applied Arduino technology and the micro controller and transceiver for the communication channel, respectively. It will save the budget for hiring employees.

**[2] Shawn Plesnick**, explains a method for implementing an Eye tracking device for controlling electrical wheelchair. Through the use of measured gaze points, it is possible to translate a desired movement into a physical one. This form of interface does not only provide a form of transportation for those with severe disability but also allow the user to get a sense of control back into their lives.

**[3] Kyung Mog Lee**, describes Electronic Wheelchair Controller with a Smart Phone's Speaker-independent Recognition Engine. The Smartphone was programmed with a Google's speaker independent recognition engine and a Google map, which can be used as a remote controller for seven Voice commands: Left, Right, Forward, Backward, Faster, Slower and Stop. The recognition time for each one of the seven commands were measured.

**[4] R. K. Megalingam,** the chair which can be controlled by pre-decided suitable voice commands or manually, using a Joystick switch are related to the linear movement of the joystick in forward or reverse directions.

**[5] R. R. J. P. D. H. J. Pandya and Hyun Tae Kim**, proposed manufacture and portrayal of a minimal effort MEMS based piezo-resistive smaller scale drive sensor with SU-8 tip utilizing research facility made silicon-on-protector (SOI) substrate. To plan SOI wafer, silicon film (0.8 μm thick) was stored on an oxidized silicon wafer utilizing RF magnetron sputtering procedure. The micro cantilever drive sensor was incorporated with an electronic module that distinguishes the adjustment in protection of the sensor concerning the connected power and shows it on the PC screen.

**[6] Y. J. Li, J. Zhang, Z. Y. Jia, M. Qian, and H. Li**, described a novel piezoelectric six-part drive/torque sensor with four-point supporting structure, and makes look into on constrain detecting component's spatial game plan of the novel sensor. Two sorts of various spatial plans are propelled, tablet and square course of action. The numerical models are constructed and figured. Keeping in mind the end goal to achieve the medical benefit to the handicapped people.

## V. COMPONENTS

**BOARD USED TO CONTROL DEVICE**

**ARDUINO**

It is an open-source microcontroller, which is used as the basic platform for many projects ranging from primary to expert. It is a single board which consists of many electronics so that any person who lacks knowledge on advance electronics can easily use the board to light up an LED or to build an advanced robot. After releasing several types of Arduinos boards the team has agreed to develop one platform and make further enhancements based on that platform in order to give customers the ease of changing to a newer version. This new platform is named as Arduino Uno.

**RESISTOR**

A package of material which exhibits a certain resistance made up into a single unit is called a resistor.

**DIODE**

Selenium type is commonly used in the early days in ac power suppliers but in recent years it has been replaced by silicon type as it sometimes emits toxic fumes when it burnt out. The characteristic is that it allows current to flow in one direction as shown in the symbol below.

## CAPACITOR

A capacitor or condenser is a passive electronic component consisting of a pair of condenser dielectric. When a voltage potential difference exists between the conductors, an electric field is present in the separated by a dielectric.

## BATTERY

It is current storage device has, voltage capacity of Volt -12V, used charging current -0.750mA, charging voltage-14.5V, Output current-1.5Ah.

## MOTOR CONTROLLER

This motor driver is perfect for robotics and mechatronics projects and perfect for controlling motors from microcontrollers, switches, relays, etc. Perfect for driving DC and Stepper motors for micro-mouse, line following robots, robot arms, etc. This motor driver uses screw terminals for easy connections, mounting holes for easy mounting, back EMF protection circuit, heat sink for better heat dissipation and more efficient performance.

## MOTOR

100RPM 12V DC geared motors for robotics applications. It is very easy to use and available in standard size. It consists Nut and threads on shaft to easily connect and internal threaded shaft for easily connecting it to wheel.
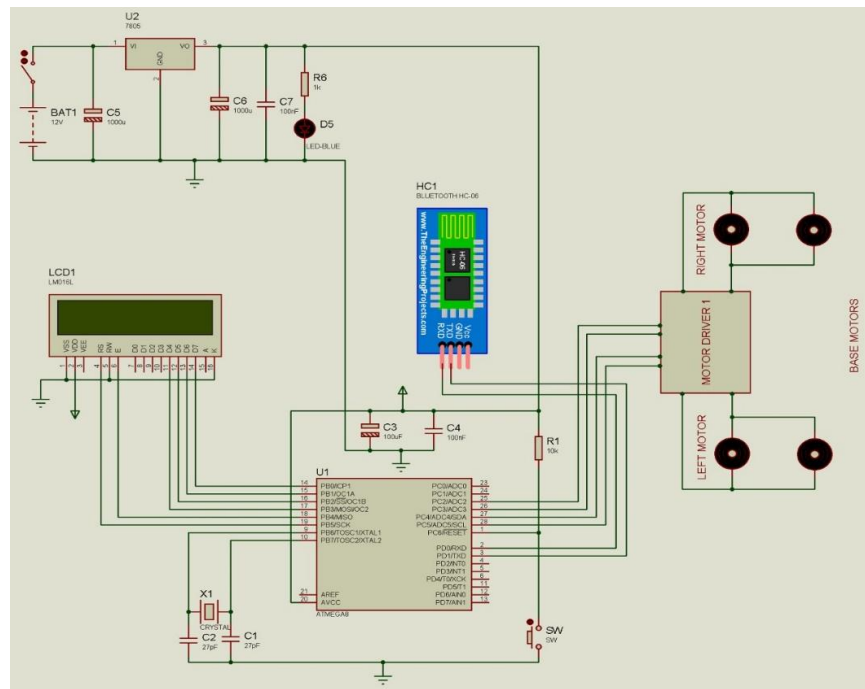
## CHIP (ATMEGA328).

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.

## BLUETOOTH MODULE

Serial port Bluetooth, Drop-in replacement for wired serial connections, transparent usage. You can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to your embedded project and etc. And in it, we provide HC-05 and HC-06. HC-05 could be setting to Master or Slave by user.

## VI. SYSTEM WORKING CIRCUIT

## VII. CONCLUSION

In proposed technique we implemented Arduino / atmega328 microcontroller based Automated Wheelchair has operating condition with Bluetooth. In Bluetooth operation we can control it from any mobile blue tooth control application. In manual mode robot goes continuously forward and if obstacle detected it turn left or right according to programming conditions

## ACKNOWLEDGMENT

## REFERENCES

[1] A Chandana Urs, Shubha J, Sushmitha Pai B, Vaishnavi A Pikle "Design of Smart Wheelchair Using IOT Technology ", International Journal of Scientific Development and Research (IJSDR), 2017.

[2] Vaishnavi V. Daigavane and Dr. M.A Gaikwad "Smart Wheelchair Monitoring System Based on IOT" Advances in Wireless and Mobile Communications. ISSN 0973-6972 Volume 10, Number 5 (2017), pp. 1107-1116, Research India.

[3] Basic electrical engineering by Kothari and Nagrath.

[4] Basic electronics engineering by R. S. Shedha.

[5] Basic Electrical and Electronics Engineering by R.K. Rajput.

[6] Electronic for you by magazine.

[7] www.alldatasheet.com by For Components Data sheet.

[8] a1ronzo. (2011, 03 21). IOIO-OTG Beginners Guide. Retrieved 09 2013, from sparkfun: https://www.sparkfun.com/tutorials/280 Alana Officer, A. P. (2011).

[9] World Report on Disability. 1211 Geneva 27: World Health Organization. Android, the world's most popular mobile platform. (n.d.), 2013, from Android Developers: http://developer.android.com/about/index.html.