

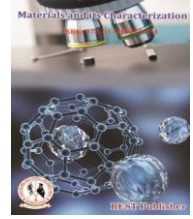


## Materials and its Characterization

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# Automatic Controlled Wheel Chair and Patient Monitoring Using IOT

\*J. Prince Antony Joel, C.Uvatrison

PSN Institute of Technology and Science, Tirunelveli, Tamil Nadu, India.

Corresponding author: [princesrce@gmail.com](mailto:princesrce@gmail.com)

**Abstract.** *The main problem faced by others for mobility. Continuous supervision is also necessary to keep check on the health of the patient. External help is needed to perform the daily activities. Electric wheelchairs are now available for paraplegics but are of no use to quadriplegics. Health monitoring, if needed, should be done externally for the patient. The main idea is to design an automated wheelchair system for paralyzed people along with continuous health monitoring. The proposed method uses head movement to decide the direction of motion of wheelchair. Health monitoring system continuously monitors pulse rate and temperature of the patient. The monitored data is wirelessly transferred to a remote device to keep track of patient's health.*

**Keywords:** *BTS, MSC, Heartbeat Sensor, Ultrasonic sensor..*

## 1. INTRODUCTION

**Embedded System:** An Embedded System is a combination of computer hardware and software, and perhaps additional mechanical or other parts, designed to perform a specific function. An embedded system is not a computer system that is used primarily for processing, not a software system on PC or UNIX, not a traditional business or scientific application. High-end embedded system - Generally 32, 64 Bit Controllers used with OS. Examples are Personal Digital Assistant and Mobile phones etc. Lower end embedded systems - Generally 8, 16 Bit Controllers used with a minimal operating systems and hardware layout designed for the specific purpose. Modern embedded systems are often based on microcontrollers (i.e. CPU's with integrated memory or peripheral interfaces) but ordinary microprocessors (using external chips for memory and peripheral interface circuits) are also common, especially in more-complex systems. In either case, the processor(s) used may be types ranging from general purpose to those specialized in certain class of computations or even custom designed for the application at hand. A common standard class of dedicated processors is the digital signal processor (DSP). Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.



FIGURE 1. Embedded Chip

## 2. SYSTEM DESIGN

### BLOCK DIAGRAM:

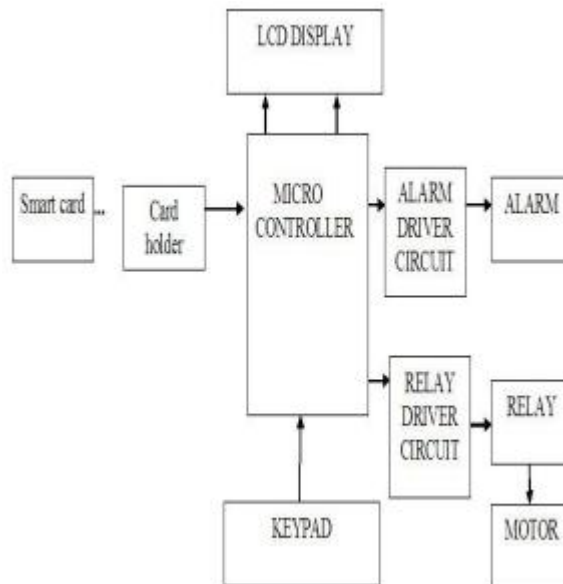


FIGURE 2. Block Diagram

**Block Diagram Description:** In this project smart card the special type of card which is embedded with charging circuit. When you buy the vehicle through loan they will provide smart card which operates particular date only. Then this smart card has to insert in the card holder attached in the vehicle. In order to activate the smart card we have to press the PIN number in the key pads which is provided by the bank. This PIN number is sent to microcontroller. Here the microcontroller is the flash type re programmable microcontroller in which we have already programmed with PIN number. So the type PIN number is compared with stored number if the PIN number is valid the microcontroller activates the relay driver circuit. Relay output is directly given to engine ignition system.

### Circuit diagram:

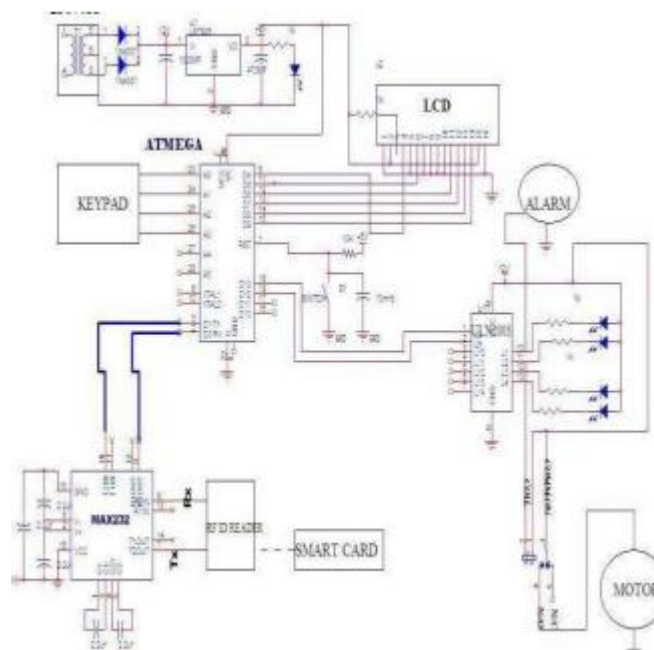
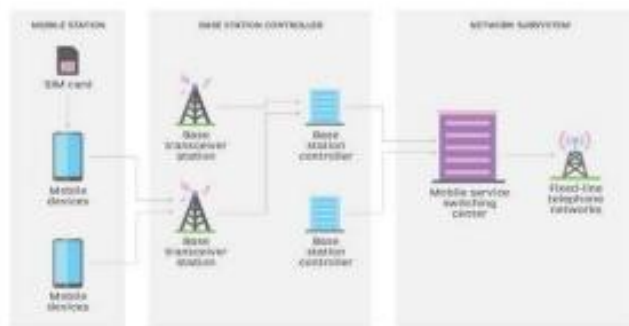


FIGURE 3. Circuit Diagram

**Circuit Diagram Description:** Power supply gives supply to all components. It is used to convert AC voltage into DC voltage. Transformer used to convert 230V into 12V AC. 12V AC is given to diode. Diode range is 1N4007, which is used to convert AC voltage into DC voltage. AC capacitor used to charge AC components and discharge on ground. LM 7805 regulator is used to maintain voltage as constant. Then signal

will be given to next capacitor, which is used to filter unwanted AC component. Load will be LED and resistor. LED voltage is 1.75V. If voltage is above level beyond the limit, and then it will be dropped on resistor. In this project we used Atmega 328 controller. Keypad is connected to controller port A0 to A3. RFID reader is connected to controller through MAX232. It is used for serial communication between controller and reader. MAX 232 is connected to controller port 2 & 3. To control vehicle motor by using driver. Driver we use ULN2003. It is connected to controller port D12 & D13. Motor is connected to driver output port 11 through the relay. Relay is act as switch. Alarm is connected to driver port 12. LCD is also interfaced to controller. It is used to display the short messages. Transformer used to convert 230V into 12V AC. 12V AC is given to diode. Diode range is 1N4007, which is used to convert AC voltage into DC voltage. AC capacitor used to charge AC components and discharge on ground. LM 7805 regulator is used to maintain voltage as constant. Then signal will be given to next capacitor, which is used to filter unwanted AC component. Load will be LED and resistor.

Composition of the GSM network: The GSM network has four separate parts that work together to function as a whole: the mobile device itself, the base station subsystem (BSS), the network switching subsystem (NSS) and the operation and support subsystem (OSS). The mobile device connects to the network via hardware. The subscriber identity module (SIM) card provides the network with identifying information about the mobile user.



**FIGURE 4.** GSM Network

The NSS portion of the GSM network architecture, often called the core network, tracks the location of callers to enable the delivery of cellular services. Mobile carriers own the NSS. The NSS has a variety of parts, including mobile switching centre (MSC) and home location register (HLN). These components perform different functions, such as routing calls and Short Message Service (SMS) and authenticating and storing caller account information via SIM cards.

### 3. HARDWARE DESCRIPTION

Arduino UNO microcontroller: "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Arduino UNO and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform. The Arduino Uno is a microcontroller board based on ATmega328. The controller used in Arduiniuno is ATmega328. Arduino has 20 digital input/output pins which consist of 6 PWM outputs and 6 used as analogue inputs.



**FIGURE 5.** Arduino UNO Board

**ARDUINO:** Arduino is a freely available electronics service based on easy-touse hardware and software. Arduino boards can able to read inputs - light up a sensor, a finger on a button, or a Twitter message - and turn it into an output - controlling a motor, switching on an LED, broadcasting something online. You can control your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming embedded C language (based on Wiring), and the Arduino Software (IDE), based on Processing. **BATTERY:** Lithium-Ion Battery for hobby purpose or robotic applications. Very light weight and small size compared to Ni-Cd, Ni-MH and Lead acid batteries. Very long life without loosing charging capacity. Weights just 280gm.



**FIGURE 6.** Battery

**ESP 8266 :** The ESP8266 Wi-Fi module is a self contained Soc with integrated TCP/IP protocol stack that can give any microcontroller access to Wi-Fi network. It is a low cost Wi-Fi module. ESP8266 uses serial transceiver (TR/RX) to send and receive data and serial command to query and change configuration of Wi-Fi .It only requires two wires(TR,RX) for communication between microcontroller and Wi-Fi module.



**FIGURE 7.** ESP8266, Wi-Fi module.

**Ultrasonic Sensor:** This HC-SR04-Ultrasonic Range Finder is a very popular sensor which is found in many applications where it requires measuring distance and detecting the objects. This Ultrasonic Sensor module is a transmitter, a receiver and a control circuit. It has very handy and compact construction. It offers excellent range accuracy and stable readings in an easy-touse package. Its operation is not affected by sunlight or black material like Sharp rangefinder are soft materials



**FIGURE 8.**Ultrasonic sensor

**Temperature Sensor:** The DS1820 digital thermometer sensor provides 9-bit Celsius temperature measurements. The DS1820 communicates over a 1-Wire® bus that by definition requires only one data line (and ground) for communication with a central microprocessor.



**FIGURE 9.** Temperature sensor

**Heart Beat Sensor:** Heart Rate data can be used in many Electronic design and microcontroller projects. But the heart rate data is difficult to read, however, the Pulse Sensor Amped help us to read heart rate. The Heart Beat Pulse Sensor amp is a plug and-play heart-rate sensor for Arduino. It's noticeably faster and easier to get reliable pulse readings. Pulse Sensor Amped works with either a 3V or 5V Arduino.



**FIGURE 10.** Heart beat sensor

**Relay:** The 5V Relay Module has three pins, the VCC, GND and Signal. It can act as switch if the circuit and the load circuit have different supply voltage. It is commonly use if the load circuit is AC. It is a switch used to connect isolated connection from the circuit using a circuit signal. It has red LED that turns on every time the coil is energized or the signal pin has a high input.



**FIGURE 11.** Relay Module

**Accelerometer:** ADXL335 is a Breakout board based on 3 axis ADXL335 IC from Analog Devices. The Accelerometer Module require no external devices and works on 5V power supply. It can be directly interfaced to ADC of a microcontroller without any external components.



**FIGURE 12.** Accelerometer

**Motor:** A DC motor is a rotary electrical machine that converts direct current electrical energy into mechanical energy. They work from the forces that are produced by magnetic fields. All types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. For the waste collecting machine we use 2 motors. else that needs to turn.

**Motor Driver:** This L293D Motor Driver Shield for Arduino is probably one of the most versatile on the market and features 2 servo and 4 motor connectors for DC or stepper motors. That makes it a great shield for any robotic project. This Arduino compatible motor Driver shield is a full-featured product that it can be used to drive 4 DC motor or two 4-wire steppers and two 5v servos. It drives the DC motor and stepper with the L293D, and it drives the servo with Arduino pin9 and pin10. L293D is a monolithic integrated, high voltage, high current, 4channel driver. Basically, this means using this chip you can use DC motors and power supplies of up to 36 Volts, that some pretty big motors and the chip can supply a maximum current of 600mA per channel, the L293D chip is also what's known as a type of H-Bridge. The H-Bridge is typically an electrical circuit that enables a voltage to be applied across a load in either direction to an output, e.g. a motor.

**Software Requirement:** Software is a set of instructions or programs instructing a computer to do specific tasks. Software is a generic term used to describe computer programs. Scripts, applications, programs and a set of instructions are all terms often used to describe software. The software used in this project are Arduino and Android studio. Arduino software: Arduino IDE is an open-source software program that allows users to write and upload code within a real-time work environment. The coding is very simple in Arduino. It consists of many inbuilt library files to make the coding process more easier. The system is fully compatible with any Arduino software board. Arduino considers the security of systems and products a top priority. No technology is perfect, and Arduino believes that working with skilled security researchers across the globe is crucial in identifying weaknesses in any technology.

**ARDUINO IDE:** Arduino is a prototype platform (opensource) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programmed (referred to as a microcontroller) and a readymade software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board. Arduino provides a standard form factor that breaks the functions of the microcontroller into a more accessible package. Some boards are designed to be embedded and have no programming interface (hardware), which you would need to buy separately. Some can run directly from a 3.7V battery, others need at least 5V.



**FIGURE 13.** Arduino IDE

**Embedded C:** Embedded C is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. **Embedded Programming:** Embedded refers to the combination of hardware and software.

Embedded systems programming is the programming of an embedded system in some device using the permitted programming interfaces provided by that system. Embedded, Java is an example of a development environment for programming embedded systems that will execute Java programs. Arduino is a very minute part of embedded systems, in fact we can call it as an application product of embedded system. **SIMULATION Software (Proteus):** Proteus is a software technology that allows creating clinical executable decision support guidelines with little effort indeed it should be fun creating your own guidelines. Once a guideline for a condition has been created, it can be executed to provide stepwise advice for any patient having that condition. Commercially in pre assembled form, or as do-it-yourself (DIY) kits. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++.

#### 4. CONCLUSION

The proposed system will help disabled people to move freely and independently and facilitating the people in charge of taking care of the disabled people to use less power for pushing the patients also user can control the wheelchair and monitor health of the disabled person from his/her android phone with android app developed to control the wheelchair. Basically, the wheelchair will provide basic needs for disabled people such as moving around without being pushed around by users also user can control and monitor health status of patient. It is easy to use and operate as the movements are just one touch away. The module is compact and economical; the various sensors present in the prototype along with the health monitoring system makes it a very enhanced module, which is very reliable and helpful.

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