

Solar Powered Mobile Charging System With Locker

Dr. B.Y.Masram¹, Abhinav Samrit², Ashvin Barange³, Rakesh Ghumtkar⁴, Sohankit Barai⁵, Hemant Nakhate⁶

¹ Professor, Electronics & Telecommunication Engineering, Yeshwantrao Chavan College of Engineering, Nagpur, India.

² Student, Electronics & Telecommunication Engineering, Yeshwantrao Chavan College of Engineering, Nagpur, India.

³ Student, Electronics & Telecommunication Engineering, Yeshwantrao Chavan College of Engineering, Nagpur, India.

⁴ Student, Electronics & Telecommunication Engineering, Yeshwantrao Chavan College of Engineering, Nagpur, India.

⁵ Student, Electronics & Telecommunication Engineering, Yeshwantrao Chavan College of Engineering, Nagpur, India.

⁶ Student, Electronics & Telecommunication Engineering, Yeshwantrao Chavan College of Engineering, Nagpur, India.

ABSTRACT

We all know this era is mobile phone era. Almost 70-80 percent people have mobile phone. Communication is more important in all fields. Today's smart phone having much more facilities, due to that facilities mobile phone required more charging. Sometimes our work may interrupted in mid-way due to lack of charging. This system gives charging to that mobile phone which need immediate charging. In the mid-way of journey. Once we connect the mobile to charging slot we get a temporary password. After inserting mobile phone in charging slot and charging begins, and door of locker get locked. This charging system is depend on the solar energy. Using solar panel the sun energy (photons) is converted into electrons (current). We know that solar energy is free to use, so that maintenance cost reduces. That's why in this system we use the solar energy. And the locker is for safety of our mobile phones in public places.

Keyword : - Solar panel, Solar system, Rechargeable battery, Atmega328p.

1. INTRODUCTION

In today's world more than 66% population addicted by Smart phones and smartphone play vital role in daily life, Because it make world more close. it is also helpful for doing daily task like online shopping, Net banking, online streaming, etc. Usually when we go outside or long tour like events, business meetings, conferences, etc. generally we do not carry mobile chargers along with our smartphones. In this days we have better capacity of mobile as well as power banks but at certain point it also require charging. When the mobile battery is almost die we feel hectic and worried. To solve this problem we design solar power mobile charging system with locker. In this project we provide a solution for charging of mobile at public places. The person who wants to charge Mobile have to connect mobile with the charger. It also have locker to protect our smartphone from stolen.

1.1 BASIC ASSUMPTION

To design Solar Powered Mobile Charging System basic assumptions are as follows.

1. Charging Current is required up to 4.8AH@ 6VDC
2. Solar Panel having size 650x565x40 mm, 38WP capable of supplying up to 3.0 amp is used.
3. Servo motor for locking purpose .
4. IR (Infrared) sensor for detection of mobile phone in the locker.
5. Microcontroller; ATmega 328p AVR family is used.
6. Battery.
7. LCD display.

2. ARCHITECTURE OF PROPOSED SYSTEM

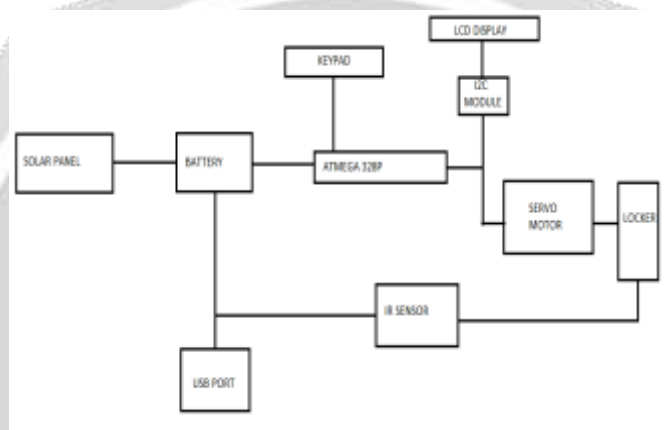


Chart -1: Block diagram of Solar Based Mobile Charging system

The proposed solar based mobile charging system with a locker which charges the mobile with safety. It works on solar power, so we need a solar panel with a rechargeable battery. The battery provides a supply for USB port as well as microcontroller which controls all the essential operations. In addition, we need the IR sensor for sensing whether the user device is inserted or not, and red and green LED glow according to it. At first, the user determines whether or not a device is in the locker. If not, the status is displayed on the LCD display, and the system generates a one-time password using the arduino IDE software programming, which users must remember until the device is received. The system only allows three attempts to try the correct password. If a user crosses that limit, the system gets automatically locked. And it is unlocked only with the help of the master key. Which is only known to admin .



Fig -1: Front Panel Pic of Our Prototype



Fig -2 : Prototype box of solar based mobile charging system(Back Panel)

3. COMPONENTS AND THEIR SPECIFICATION

The project entails a simple Mobile charging system comprising of the following components: ATmega328p, I2C module, IR sensors, Buzzer, LCD Display, Servo motor, connecting wires, Rechargeable battery and Solar Panel.

3.1 ATmega328p

The ATmega328p is a single chip high performance efficient microcontroller. It is an 8-bit AVR RISC based microcontroller. Use for providing clock pulse and also use for interfacing peripherals and Storing internally data. Input voltage to the uc. The input and operating voltage is +1.8 to 5.5V. it having the CPU speed frequency of 1MHZ. It having internal oscillator of 8MHZ. it is having 28 pins. Arduino ATmega is based on AVR RISC architecture.

SPECIFICATION:

- Having FLASH memory of 32KB.
- Having 2 external interrupts pins.
- It is having 2 timers T0 and T1.
- It also having pins for transmission and reception of data i.e., TX/RX pins.
- Having SRAM 2KB, EEPROM 1KB.
- PWM i.e., pulse width modulation pins.
- Reset pin for reset the microcontroller.

3.2 SERVO MOTOR

A servo motor is a type of motor that can rotate with great precision. Normally this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows the servo motors to rotate with great precision. It is used for locking purpose. We use here 45 degree turn of servo motor to lock and unlock the door of locker using latch.



Fig.3 Servo Motor And Latch Arrangement(with I2C Module)

3.3 LCD DISPLAY

16X2 LCD MODULE: It is a module basically used for displaying the short information like time, date, weeks, short headings as per the user. It is a 16-pin module and is called as 16X2 LCD because it is having 16 Columns and 2 Rows. In our project we are using it because to display the Time When the patient takes the Pill. Each row can print 16 characters in display.

SPECIFICATION:

- Having Operating voltage of 4.7V and current consumption of 1mA.
- It is available in Blue and Green Backlight.
- In this module each character is built by 5x8 pixel box.
- Having Read/Write pin used to read, write data generally grounded to write data to LCD.

3.4 IR SENSOR

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. IR is invisible to the human eye, as its wavelength is longer than that of visible light. Everything that has a temperature above around five degrees Kelvin gives off infrared radiation. For our project we are using this IR sensor to detect a smartphone in a locker. So that unnecessary charging should be prohibited. Whenever there is a mobile phone in the locker only then the charging port will be on, otherwise it will be off. So that we can prevent electricity loss.

3.5 SOLAR PANEL

Solar panel refers either to a photovoltaic module or to a set of solar photovoltaic (PV) modules electrically connected and mounted on a supporting structure. A PV module is a packaged, connected assembly of solar cells. Solar panels can be used as a component of a larger photovoltaic system to generate and supply electricity in our project for charging and running our whole project.

4. ALGORITHM FOR SOLAR BASED MOBILE CHARGING SYSTEM

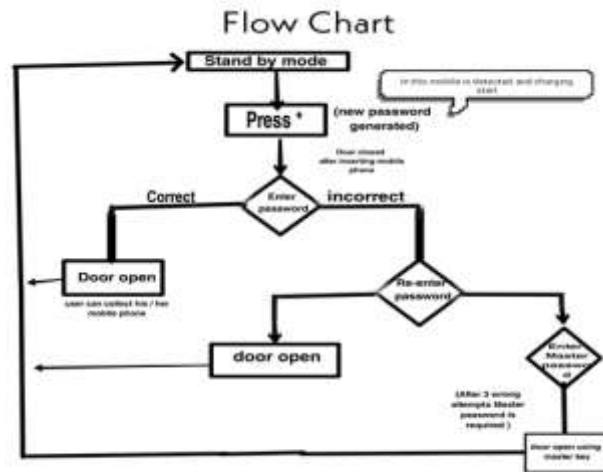


Fig.4- Flow Chart Of Solar based Mobile Charging System.

Flow diagram of this system is as shown in above figure . And steps of the algorithm as shown below .

1. Press * button (you will get a Token No.)
2. Insert mobile phone
3. Lock the door of locker
4. Enter Token No. (when you want to take out your mobile phone)
5. If token is correct door open otherwise it will give user 2 more attempts
6. If all attempts are wrong, Buzzer will on.
7. And It will ask for Master key (Master key belongs to administration dept.)
8. If master key or any of token no. is correct door will open.

```

randNumber = random(100, 1000);
Serial.print("\nRANDOM=");
Serial.println(randNumber);
lcd.clear();
lcd.print("MOBILE TOKEN");
lcd.setCursor(0,1);
lcd.print("NOTE DOWN:-");
lcd.print( randNumber);
delay(6000);
  
```

Fig. 4Function for Random Number

7. RESULT

The hardware of this solar activated mobile charger [1] is as shown in figure . This one is the complete Solar based mobile charging system with locker[4]. Which is totally depending on solar hence it is more useful in today's life. This system effectively receives maximum energy from sun and provide us charging stations at public places .

only one drawback is that it will not used in all night because sun energy is not available. But some percent of battery will charge so that for some time this charging system can use.

6. CONCLUSIONS

This system is useful in emergency situation in non residential areas and Also have Low power consumption. hence can be charged under low light conditions also. Using solar energy it can provide mobile charging ports in rural areas and in forest areas. This system is particularly significant throughout the summer season with its long days of sunshine readily available to capture and no energy will be lost. In rural areas electricity is not available all time but communication is one of the need of people, so this solar based mobile charger helpful for those areas. In this proposed system the locker is also one of the important part. So this system is useful from all ways.

5. ACKNOWLEDGEMENT

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6. REFERENCES

- [1] S .Banu Prathap, R.Priyanka, G.Guna,Dr.Sujatha“ coin based cell phone charger ” International Journal of Engineering Research & Technology(IJERT) ISSN:2278-0181 Volume 2,Issue 3 (March 2013).
- [2] Aparna D. Pawar , “ Coin Based Solar Mobile Charger ”International Journal of Engineering and Technical Research (IJETR) ISSN: 2321-0869, Volume-3, Issue-5, May 2015.
- [3]Ch. Sumalatha, A. Viyayamanasa, "Bank Locker Security System Using RFID and GSM Technology", International Journal for Research in Applied Science & Engineering Technology, vol. 4, no. 4, April 2016.
- [4]U. J. Ogri, D. E. B. Okwong and A. Etim, "DESIGN AND CONSTRUCTION OF DOORLOCKING SECURITY SYSTEM USING GSM," International Journal Of Engineering And Computer Science ISSN:2319-7242, vol. 2, no. 7, pp. 2235-2257, 2013.