Smart Mobile Charger

S. Gowtham[1] S. Anguraj[2] P. Thirumoorthy[3] N. Priyadharshini[4]
[1,2,3]Student [4]Assistant Professor
[1,2,3,4]Department of Electrical and Electronics Engineering
[1,2,3,4]Kongu Engineering College, India

Abstract— The smart charger is used to provide safety to the mobile phone from overcharging and overheating, because overheating which leads to cause high tension in battery and thus leads to explosion of the battery. Thus the role of smart charger becomes significant. This paper describes about the control of mobile charging by means of WiFi technology. An android application is developed in which the charging status, call status and temperature status of the mobile is fetched from the mobile. The collected data are transmitted to the WiFi module by which it controls the charger.
Key words: Smart Charger, WiFi Technology

I. INTRODUCTION

In day to day life the mobile plays important role. It is important to charge the mobile daily. There is a dangerous situation on overcharging and on overheating. Sometimes it leads to blasting of mobile. This smart mobile charger detects and cuts off the supply when battery is full, when the mobile gets overheated and also during call. The system consists of android application, wifi module and relay. The android application continuously monitors the mobile and when it satisfy the above criteria it sends the control signal wirelessly through wifi. The wifi module on the charger kit acquires the data on control signal and transfers it to the inbuilt arduino. Then arduino controls the relay and thus charger can be switched off.

The home automation system using android and wifi home automation have the purpose to make the place intelligent so that energy is conserved and security is maintained[1].The another application of wifi technology is a wifi based robot controlling by webpage interface and video monitoring. It is an interesting tool to perform laboratory experiments within Electronics and Telecommunication Engineering. Designing of the system requires the knowledge of physical components, sensors, embedded system and decision algorithm. Due to this, a concept of designing a robot which can be controlled through Wi-Fi emerged in our minds[2].The usage of ESP8266 wifi module and the interfacing can be obtained by the paper home automation through smart phone using ESP8266 Wi-Fi module by IOT. This is possible through wireless communication the most popular RF technology suitable with worldwide range in remote control is wifi through internet[3].In this project the data from the mobile is get through the android application. So the paper on research and development of mobile application for android platform gives many information. Due to the developing of mobile is getting better, the performance index is much higher than the actual requirements of the software configuration. [4].The another paper on software development is future trends in software engineering research for mobile apps in which they discussed about current and future research trends within the framework of the various stages in the software development life-cycle.

The requirements are design, development, testing, and maintenance [5].

II. EXISTING SYSTEM

The existing system contains auto cut off feature. It just uses a timer. The existing system have auto cut off feature by manually setting a timer.
1) It does not automatically cut-off the supply and user has to set the time.
2) It cannot protect the mobile from overheating.
3) It cannot disconnect supply while mobile is on call.

III. PROPOSED SYSTEM

The smart mobile charger detects and cuts off the charge when battery is full, when the mobile gets overheated and also during call. The system consists of android application, wifi module and relay. The android application continuously monitors the mobile and when it satisfies the above criteria it sends the control signal through wifi.
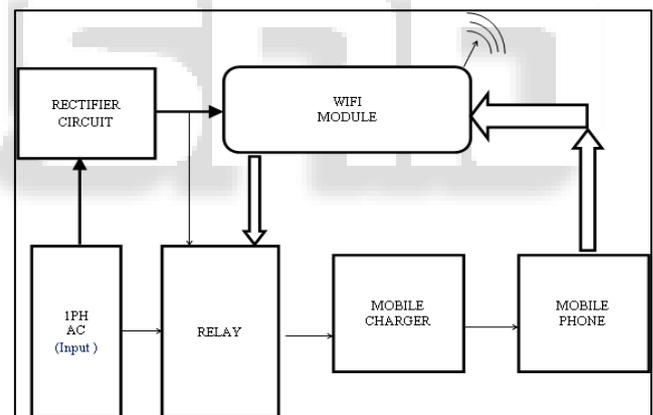
A. Block Diagram

Fig. 1: Block Diagram

B. Components Used

1) Smart Charger Application

The smart charger application is developed in the android platform(Android SDK).The function of this application is to fetch the data like charging status, temperature status and call status from the mobile and transferred to wifi module. These data transferring is based on IoT concept.
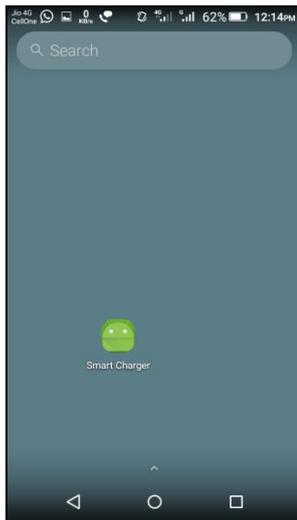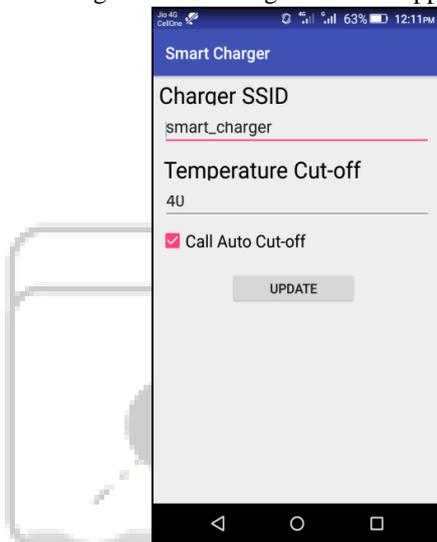
Fig. 2: Smart charger Android application

Fig. 3: Smart Charger Android Application Configuration

2) Nodemcu Module (esp8266)

NodeMCU is an open source IoT platform. It has a firmware. The firmware uses the Lua scripting language. It is based on the elua project, and built on the Espressif Non-OS SDK for ESP8266.It's Module widely used as IoT gateway. (Arduino + ESP8266 = Wifi enabled IoT gateway). Arduino-like hardware IO. Excellent few system on board for Internet of Things (IoT) projects. The ESP8266 chip requires 3.3V power supply voltage. It is not be powered with 5 volts like other arduino boards. NodeMCU ESP-12E board can be connected to 5Vusing micro USB connector or VIN pin available on board. The I/O pins of ESP8266 communicate as input/output max 3.3V only. i.e. The pins are not 5V tolerant inputs.

3) Power Supply

A power supply unit is required to deliver power to the load. The main function of the power supply unit is to provide required power for the operating devices without any interruption. Step down transformer is used to step down the supply from 240v to 5v. Rectifier unit is used to convert the ac supply into dc.IC7805 is used to provide a constant 5v supply to the devices. A step down transformer consists of low turns on the secondary coil that the primary side coils. The induced voltage across the secondary coil is less than the applied voltage across the primary coil and the voltage is "stepped-down". A 230 volt input supply is given to the transformer and it delivers the output as 12 volt with 1A current. A bridge rectifier consists of four diodes in a bridge circuit configuration. This provides the same output polarity for either input polarity. The purpose of rectifier is used to converting an alternating current (AC) input into a direct current (DC) output. A bridge rectifier provides full-wave rectification from a two-wire AC input. 7805 is a voltage regulator integrated circuit. To regulate the voltage 7805 is used. This IC maintains the output voltage at a constant value. 7805 provides +5V regulated power supply.

4) One Channel 5v Relay

A one channel 5v relay module is an electrically operated switch circuit. This allows you to turn on or off a circuit using voltage and/or current much higher than a microcontroller can handle. Relay has no connection among the low voltage circuit and the high power circuit. The relay protects each circuit from each other. The one Channel 5v relay has three connections named NC, COM, and NO. It depends on the input signal trigger and the jumper. It is placed at high level effective mode so that it closes the Normally Open switch at high level input and at low level effective mode which operates the same but at low level input. The new 5V Relay Module is perfectly made for Arduino application. The relay consists of VCC, GND and Signal pins. It will act as switch when the circuit and the load circuit have unique voltage. It is generally use if the load circuit is AC. This is a switch used to make connection to the isolated connection from the circuit using a circuit signal. It has LED that blinks on every time the coil is energized or the signal pin has a high input.

5) Three Pin Plug Point

A single phase 240v, 5A three pin plug point is used for connecting the charger.
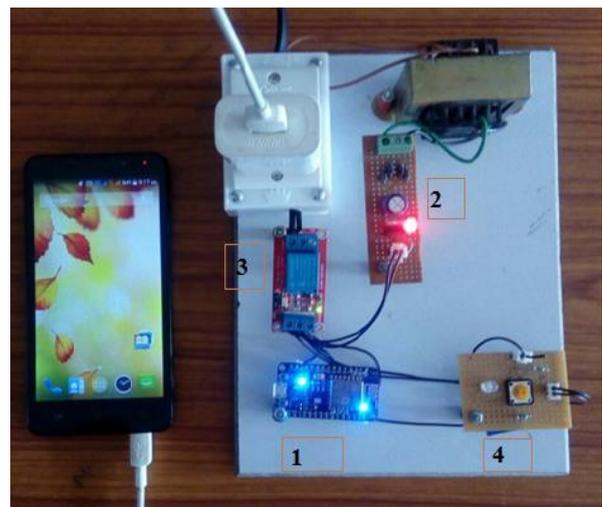
IV. HARDWARE SETUP

Fig. 4: Hardware Connection Diagram

The Fig.4 shows the hardware diagram of smart mobile charger. A single phase 230V AC supply is given to the 12V step-down transformer. A 12V AC is given to the Rectifier Bridge and AC is converted into DC. Then 12V DC is given to 5V regulator (LM 7805) and constant 5V is obtained. A 5V DC is used for Relay and wifi module. Relay is connected to the charger plug supply.

V. Sequence of operation of application

1) Step 1: The user when connect the mobile to the charger socket the application runs on the background memory always. Then the application seek permission from the user whether to enable the smart charger or not. When the user presses the enable button the further process will starts. If the user presses the disable button the the process will be stopped.

2) Step 2: After the smart charging is enabled the user wants to set the temperature range so that the charging will be disabled when temperature exceeds the limit. It also includes auto call cut off feature where user can enable or disable it.

3) Step 3: After clicking the update button the smart charger is configured and the charging is enabled. This can be indicated by the "Charger connected" indication in the mobile screen.

4) Step 4: The application is monitoring the battery level and temperature of the mobile phone continuously and displaying it on the home screen.

5) Step 5: The application disconnects the supply to charger when mobile is on call.

VI. Result and conclusion

The hardware kit implements the smart charger successfully and the operation result shows the efficiency and significance of smart charging. The temperature is monitored and the charger is disconnected when it goes beyond 40 degree Celsius. The charger is also disconnected when fully charged and during receiving call.

VII. Conclusion

This system is used to prevent the improper charging of mobile phones. This is used to avoid the mobile explosion while the user speaking through phone when mobile phone is connected with charge, which implies human safety. This system also prevent the mobile explosion by means of overheat in the phone. Its cost is also less and effective system for mobile protection against explosion.

References

[1] Prof.R.S.Suryavanshi, Trinity College of Engineering, Pune presented a paper on 'Home Automation System Using Android and WiFi' in International Journal of Engineering and Computer Science ISSN: 2319-7242 Volume 3 Issue 10 October, 2014 Page No.8792-8794, 2003.

[2] Mohammed Saquib Khan, Ataur Rehman Khan, Altamash Khan, Akmal Kalia, Lochan Bisne ,'WI- FI Based Robot Controlling by Webpage Interface and Video Monitoring' on IEEE congress,2015.

[3] Anilkumar B., Lakshmidevi N., Praneeth Choudary 'Home Automation through Smart Phone using ESP8266 Wi-Fi Module by IOT', Information Sciences, Vol.183, pp. 1-15,2017.

[4] Li Ma, Lei Gu,Jin Wang, 'Research and Development of Mobile Application for Android Platform' , IEEE Congress , pp. 137-145,2013.

[5] Meiyappan Nagappan, Emad Shihab [6], 'Future Trends in Software Engineering Research for Mobile Apps', 2014.

[6] Deepa V. Jose, Lakshmi Priya C, G. Priyadarshini and Monisha Singh , "Challenges and Issues in Android App Development-An Overview", International Journal of Advanced Research in Computer Scinece and Software Engineering 5(1),pp. 811-813,2015.

[7] Abhinav Kathuria, Anu Gupta, 'Challenges in Android Application Development: A Case Study', International Journal of Computer Science and Mobile Computing, Vol. 4, Issue. 5, pp. 294 – 299, 2015.