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WiFi Enabled Smart Watch Appliance Control

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Abstract: ***Smartwatches are extremely fascinating because of the numerous features provided by them with tiny body. The Smartwatch craze began when Pebble released their first Smartwatch. Since then, many companies are constantly working on designing the most utilitarian Smartwatch. But, What really makes a Smartwatch cool? It is definitely its looks and features. The best way to get personalized features on a Smartwatch is to design and build one on our own.***
Keywords: Pebble, Smart watch, Blynk Server, WIFI Module.

I. INTRODUCTION

The main features of this Smartwatch are to display time, weather and most importantly you can control other appliances by pressing the buttons on the watch. The watch receives all the data through the internet, so it has to be connected to the internet to function.

Here's how it functions:

1) Time: The watch connects to the nearest NTP server to get the time and date.
2) Weather: The temperature data is obtained from Yahoo Weather API.
3) Controlling other Appliances remotely: The watch connects to the Blynk server and uses its bridge function to directly control the other ESP8266 Relay module TO CONTROL THE OTHER APPLIANCES.

II. BLOCK DIAGRAM

A. *Transmitter Section*

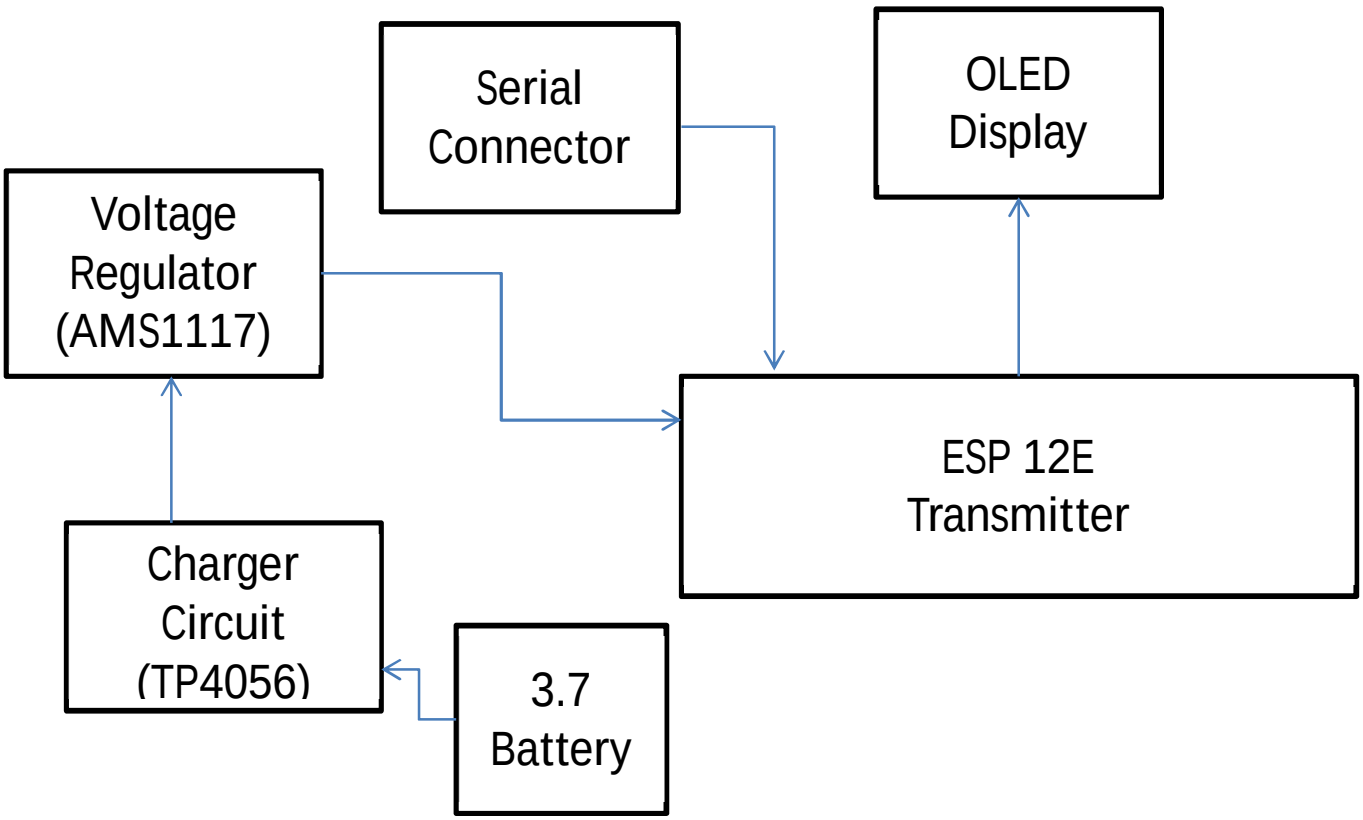

Figure-1:Block Diagram of Transmitter

B. Receiver Section

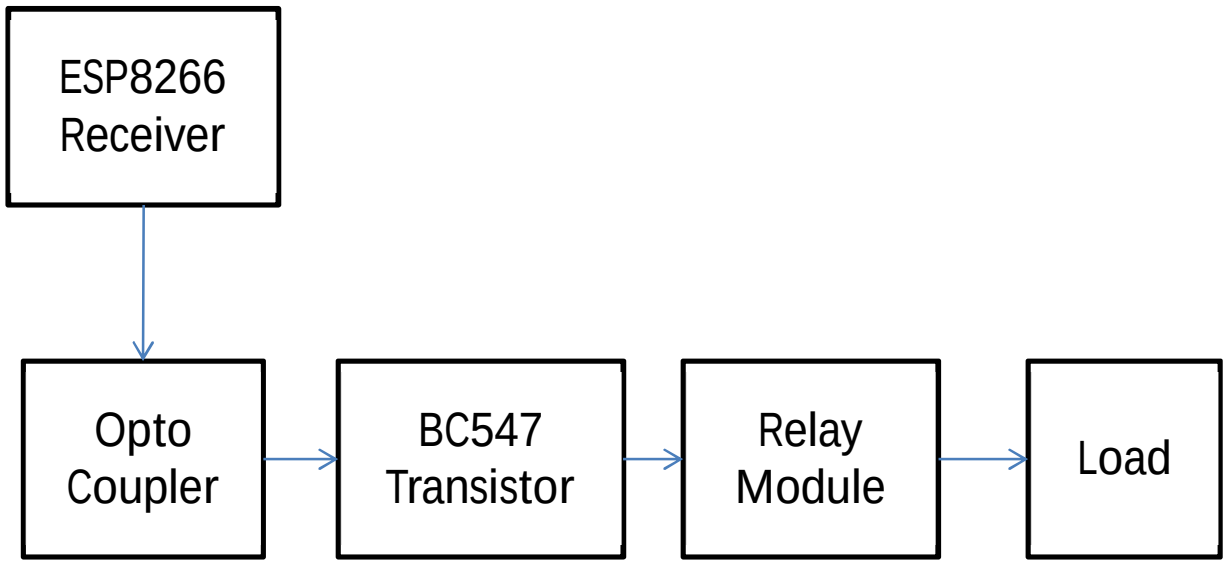

Figure-2:Block Diagram of Receiver

C. ESP-12E

ESP-12E WiFi module. It is a core processor ESP8266 in smaller sizes of the module encapsulates Tensilica L106 integrates industry-leading ultra low power 32-bit MCU micro, with the 16-bit short mode, Clock speed support 80 MHz, 160 MHz, supports the RTOS. ESP 12E is high integration wireless SOCs, designed for space and power constrained mobile platform designers.

ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor.

D. ESP8266

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime.

E. Relay

A relay is basically a switch which is operated by an electromagnet. The electromagnet requires a small voltage to get activated which we will give from the Arduino and once it is activated, it will pull the contact to make the high voltage circuit.

F. Opto Coupler

The well-established relay-driving circuit uses an optocoupler to isolate the grounds and noise coupling between the low-voltage digital-control signal circuit and the relay as load . As the power supply decays to +1.2 V, it turns the optocoupler off, which in turn de-energizes the relay.

G. OLED Display

An OLED display works without a backlight because it emits visible light. Thus, it can display deep black levels and can be thinner and lighter than a liquid crystal display (LCD). In low ambient light conditions (such as a dark room), an OLED screen can achieve a higher contrast ratio than an LCD, regardless of whether the LCD uses cold cathode fluorescent lamps or an LED backlight.

III. WORKING

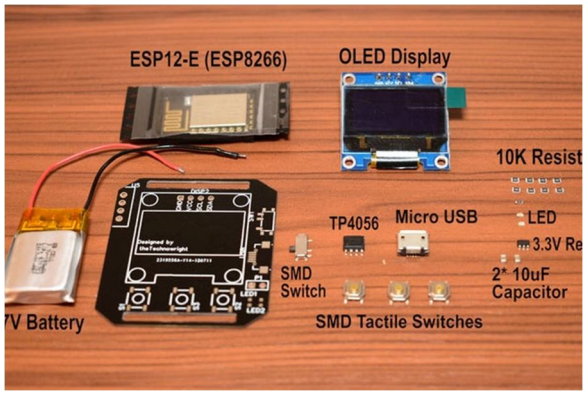

Figure-3: Main Components

Most of the Components can be bought alone but some of them have to be salvaged from other modules. I had taken the 3.3V Voltage Regulator from an arduinouno, the 2 buttons from nodeMCU and the LED's, resistors along with TP4056 were from the 3.7V LiPo Battery Charger circuit.

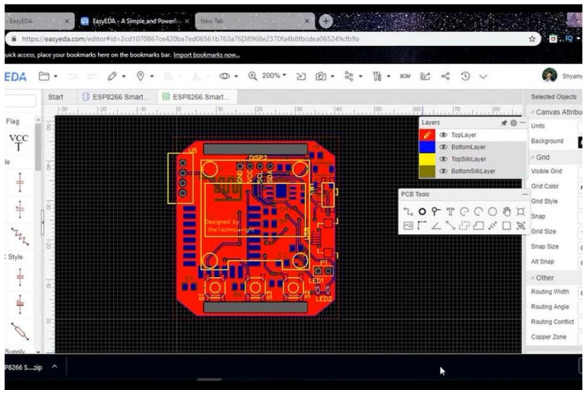

Figure-4:EasyEDA Tool

I didn't want the watch to be clunky and heavy so I thought the best way to reduce the usage of wires is to make a PCB. I designed the Schematic and Printed Circuit Board using EasyEDA: https://easyeda.com , then I ordered the PCB's from JLCPCB.

To order a PCB, visit www.jlcpcb.com and upload your gerber file.

Here is the PCB gerber file: https://github.com/theTechnowright/DIY-Smartwatch...

Then solder all the components to the PCB. I used a soldering to solder the THT components and a hot air Soldering gun for the SMD components. Using the Hot Air soldering iron I was able to solder all the SMD parts without difficulty. But it is not impossible to solder them without it.

After soldering the components, I found out that the GPIO pin 9 cannot be used as an input. So I had to cut the copper trace using anXacto knife and soldered a thin wire from the button to the GPIO 14 pin.

Before we upload the code, we have to get the Weather API from Yahoo Weather API. Visit the page, under the YQL query click on the green text and scroll all the to the end till you find the text "nome, ak". Here you should add your city's name and country code. For example, I placed "Bengaluru, IN" where 'Bengaluru' is aa city and 'IN' for India.

After doing that, click on the "Test" button below and copy the link given under 'Endpoint' from "/v1" till the end of the link.

Then download the arduino code from here: https://github.com/theTechnowright/DIY-Smartwatch-...

In the code, first insert the Blynk Authentication code which will be emailed to you after creating a new Blynk Project. Then type in the WiFi SSID and password.

Paste the copied Yahoo API link in the place where it says ‘const String url = “” ‘ And then under the BLYNK_CONNECTED, Insert the authentication code of the other ESP8266 which controls the Relays. Finally scroll down till you find “TimeChangeRule”, Here add or subtract minutes from UTC according to your time zone.

I had previously done a DIY Weather Station project which gives a step-by-step tutorial to use BLynk. And here is the link to the DIY WiFi Relay project:

Now wire the 4 pin serial communicator to the USB-TTL convertor accordingly;

A. *ESP-12eUSB-TTL Convertor*

GND - GND

RST - RTS

RX - TXD

TX - RXD

On the arduino IDE, select your device as NodeMCU 1.0 and choose the correct COM port and upload the code. While uploading the code make sure to press and hold the flash button on the watch.

Now, turn ON your watch by sliding the switch. Then it should show a message saying " Connected to WiFi".

On pressing the middle button, the watch will display Temperature, Time and date. And the other two buttons control the two relays of the WiFi Relay module. You connect the relay to any electrical appliance and that can be controlled by the watch. The best thing to do is to connect it to an extended power outlet. And Make sure to connect the Relay switch to the live wire and not the neutral.

IV. RESULT

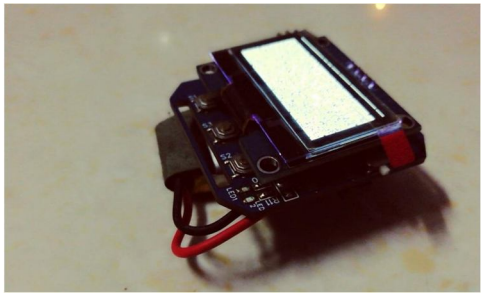

Figure-5:Display Of The Watch

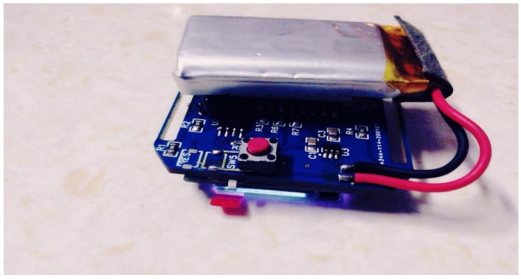

Figure-6: 3.7V Battery

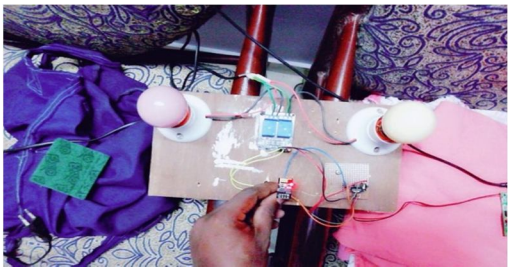

Figure-7:Final Design Of Our Project

Figure-8:Displays A Message “Connected To Wifi”

Figure-9:Displays The Time And Wheater

Figure-10: Displays A Message Of Light Is On or Off

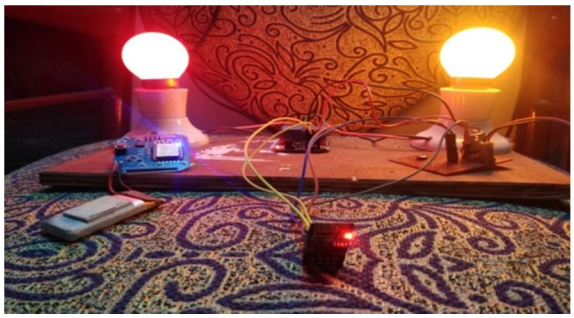

Figure-11:The Light Is On

V. CONCLUSION

This paper demonstrates the more user friendly way to control the home appliances than home automation using smart phone because it removes the necessity of searching the mobile and taking it out of the pocket every time. Using this system you can control the appliances from any location on the earth. This system can be used easily by all the age groups and especially it provides most benefits for physically challenged people as well as elderly people without the need to go towards the switches to turn them ON and OFF.

VI. FUTURE SCOPE

"There is definitely a future for the smartwatch. The market is still extremely young. Users start realizing the actual potential. There is enough criticism to create realism." Today, the smartwatch has become synonymous with wearable technology. However, the idea of the smartwatch is nothing new. The world's first smartwatch was made by Seiko in 1998. Dubbed Ruputer, the watch had a rectangular 2-inches screen and allowed users to play games, look at contact information, and of course, check the time.

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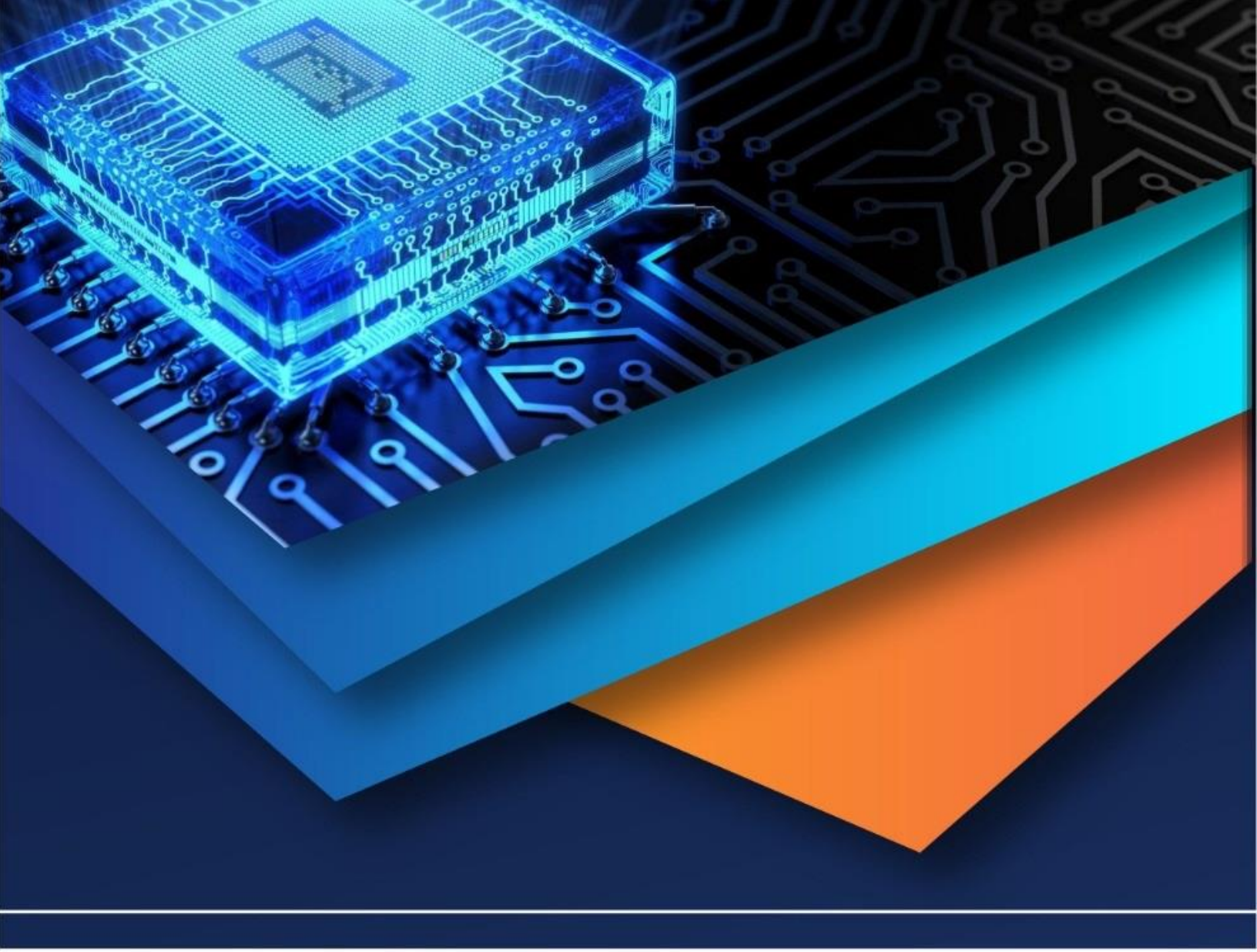

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