

Smartwatch

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Abstract- Wearable smart devices are already amongst us. Smartwatches are one of the key factors of the wearable technology and are being used by a large population of consumers. Smartwatches are trending devices that give its users the ability to be connected, send/receive emails and messages, and even make calls on the go. Given the phone has been picked out from pocket and now is on hands, a person still needs to do some steps such as unlocking the phone, finding the app. The number of steps involved in checking notifications in smartphone are high and thus a smart watch device is helpful. Smartwatch that are already in this market are advanced and costly. The system we are developing is very small size and low cost. This watch is programmed using Arduino's open source libraries and functions. It provides the user another way to interact with the smartphone.

Indexed Terms- Smart device, wearable technology.

I. INTRODUCTION

Wearable technology is becoming the most trending fields and it is expected to grow with increase in its demand. Smartwatches are one of the wearable device that are capable to link with the smartphone. A smartwatch provides user to perform various functions such making or receiving calls, provide alerts or notifications along with time, stopwatch, alarms and etc. Smartwatches are mainly used to show time but with development in technology we have added various functionality in the watches.

Smartwatches are normally wore on the wrists by the user as we have a smaller screens and they cannot have large batteries. Although they have a long lasting batteries which last for more than a single day. The main aim of a smartwatch is to reduce or save peoples time by making tasks simpler for the users. Also smartwatches have become a fashion accessory.

With an increasing growth of smartwatch industries, smartwatches have numerous functions and have

various capabilities. But along with all this smartwatch have their own hidden risks. A smartwatch stores large amount of sensitive data. This data should not be compromised. The smartwatches store lot of information such as user location, personal location and many more. Therefore it can store lot of data which can be misused if the data is obtained by wrong person. As lot of data is stored in digital forms which has increased the demand of cyber security.

There are plenty of things, functions with respect to smartwatch but our main goal in developing a smartwatch is to understand different challenges in hardware design, coding, packaging and how should be the watch designed so that we can save users time. A smartwatch is a wearable computing device that closely resembles a wristwatch or other time-keeping device.

In addition to telling time, smartwatches are Bluetooth-capable. The watch becomes, a wireless Bluetooth adaptor capable of extending the potential of the wearer's smartphone to the watch. In such a case, the user can use the watch's interface to initiate and answer phone calls from their mobile phone, read email and text messages, listen to music, dictate email or text messages.

II. LITERATURE SURVEY

1) Najuka Jagtap, Jagannath Wadgaonkar, Kalyani Bhole, "Smart Wrist Watch", 2016 IEEE Students' Conference on Electrical, Electronics and Computer Science (SCEECS).

It uses a real-time clock (RTC) offerings time in Hour: Minute: Second composed with Day/Month/Year and keeps track of current real time. It provides details of important body parameters. This data is stored in EEPROM by date and time, so that one can reset or read the stored data. Since it uses a PIC microcontroller the length of the program will be big because of using RISC (35 instructions). Program

memory is not accessible and only one single accumulator is present in PIC microcontroller.

This watch has multiple features which include calorie burn calculator, temperature measurement oxygen saturation measurement and the important one is the real time clock. The real-time clock displays the current time on the LCD. The only problem with this design is the microcontroller i.e. the PIC microcontroller. It has got outdated and the ATmega328 is much better with larger amount of memory and RAM.

- 2) Jagmohan Chauhan, Suranga Seneviratne, Mohamed Ali Kaafar, Anirban Mahanti, Aruna Seneviratne, "Characterization of Early Smartwatch Apps", IEEE International Workshop on Sensing Systems and Applications Using Wrist Worn Smart Devices, 2016.

The smartwatch apps makes it easier for the user to communicate with the smartphone. Apps provides large number of customization applications for the smartwatch. There is chance of leakage of data through third party advertising and analytics companies. Around 20% tested apps across all platforms send smartwatch specific user activity to third party trackers.

Android Wear apps can be developed in two ways:

- a. Apps only sending notifications from smartphone to smartwatch and has only handheld APK.
- b. Apps having both handheld and wearable APKs.

The apps with both handheld and wearable APKs are identified by inspecting the decompiled source code for certain classes, permission and methods as follows:

- a. Class names containing Wearable Data Layer APIs.
- b. Wearable.BIND_LISTENER permission.
- c. Invocation of notification related methods.

- 3) Manal Al-Sharrah, Ayed Salman, Imtiaz Ahmad, "Watch Your Smartwatch", 2018 International Conference on Computing Sciences and Engineering (ICCSE), 2018.

Since smartwatch consist of user's personal information this paper various techniques to keep those information secure. The backup data should be

encrypted as it contains lot of sensitive information. Since the size of watch is small it creates difficulties in establishing good authentication techniques. The smartwatch use to perform test was Apple Watch and wasn't performed on any other watch.

The smartwatch stores a lot of personal information and sensitive data which can directly extracted from the backup.

2. It is important to encrypt the data stored in the smartwatch so that even it is stolen the information stored in it is safe.

3. Forensic analysis on Apple watch is done is three steps:

- a. Physical Analysis
- b. Backup Analysis
- c. Wireless Communication Analysis

- 4) Siddharth Sathe, Arjun Gade, Ajay Jadhav, "ARDUINO BASED SMART WATCH", International Research Journal of Engineering and Technology (IRJET), 2017.

Here Arduino Mini is used which has an ATmega microcontroller which has better performance than other microcontroller. It provides less number of steps to access an app in comparison to a smartphone.

The generic principle is that the smart watch interaction should be natural, simple and easy-to use with minimum number of menus on screen, apps should be easily accessible. This Smart Watch is developed with minimum cost. It consists of two mechanisms. The first mechanism consists of the sensors embedded in the circuitry of the watch, whereas the second mechanism is the interaction between a smart phone and the watch.

III. HARDWARE AND DESIGN IMPLEMENTATION

1. HARDWARE

The hardware that is used is as follows:

1. Smartwatch PCB

The main component of a smartwatch is the Printed Circuit Board (PCB). Since the watch should be compact and wearable by a user we are making use of a PCB which will have all the parts soldered on to it.

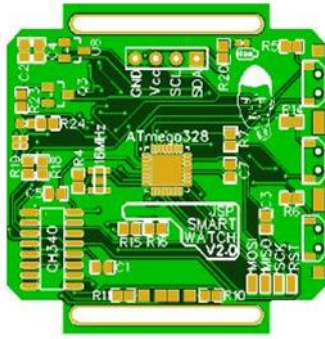


Fig 1: Front side of Smartwatch PCB



Fig 2: Front side of Smartwatch PCB

2. Bluetooth HC-06 module

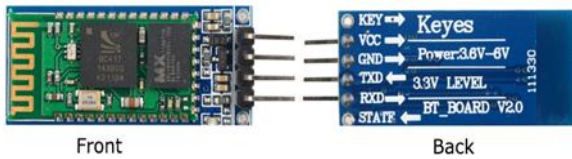


Fig 3: HC-06 Bluetooth

The HC06 bluetooth also has 4 pins which are TX, RX, GND and VCC. GND is ground whereas VCC pin is connected to 3.3V and TX, RX are connected to transmitting and receiving pins.

3. OLED Display



Fig 4: OLED Display

OLED screen is used to display all the necessary information which will be visible to the user. The OLED displays has 4 pins namely GND, VCC, SCL, SDA. SCL and SDA are used of transmission and receiving and GND is ground pin whereas VCC is connected to a 3.3V supply. The OLED screen used here is 128x64 SSD_1360.

4. DESIGN

The block diagram for the smartwatch is as shown below:

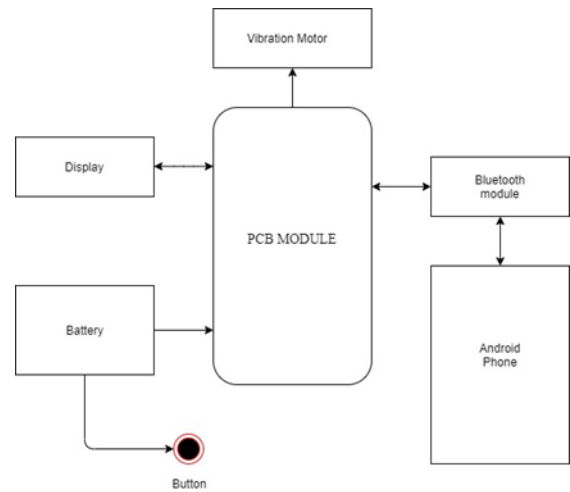


Fig 5: Block Diagram of Smartwatch

The main PCB module has various parts soldered on it. Some of the important chips are the bluetooth module which will be used for making a connection between smartwatch and a smartphone. A vibration motor to vibrate the smartwatch to indicate the user that they have received a notification or set an alarm. The display is the most essential part of the smartwatch. It will be used to display all things like time, day, date, notifications received, etc. Lastly the battery will power the entire smartwatch.

IV. EXPECTED RESULT

The smartwatch is developed with minimum cost. The watch will perform all the normal watch stuff such as showing day, date, time. It will also have an alarm and a stopwatch. Along with this the watch will be able to read data from mobile and display it on the watch screen using bluetooth. It will display all the notifications on the smartphone and will also notify user if they receive phone calls. This will make easy

for user to read their messages, emails, and receive phone calls.

CONCLUSION

With the increasing demand in the market for smart devices, the demand for smartwatch is increasing. As the new technology is being invented, it is getting cheaper as the time progresses. With this we can say that with time cheap products are getting good and good products are getting cheap. Even the smartwatch developed is cheap when considered with other watches in the market.

This smartwatch is capable of displaying date, day and time. Along with this basic feature it can also be connected to the smartphone using a bluetooth which will be helpful to display notifications received on the mobile device on the watch. Along with this it can also store three to seven messages in the memory. It can store small number of messages because of the limited memory space it had.

Finally we can say that the watch can perform functions which will help the user from not constantly checking their phones intern they can check their watch to see if they have received any important message or not which will save the users time as they won't waste time checking unwanted messages on the mobile.

REFERENCES

- [1] Najuka Jagtap, Jagannath Wadgaonkar, Kalyani Bhole, "Smart Wrist Watch", 2016 IEEE Students' Conference on Electrical, Electronics and Computer Science (SCEECS), 2016, page 1-2.
- [2] Jagmohan Chauhan, Suranga Seneviratne, Mohamed Ali Kaafar, Anirban Mahanti, Aruna Seneviratne, "*Characterization of Early Smartwatch Apps*", IEEE International Workshop on Sensing Systems and Applications Using Wrist Worn Smart Devices, 2016, page 2-4.
- [3] Manal Al-Sharrah, Ayed Salman, Imtiaz Ahmad, "Watch Your Smartwatch" 2018 International Conference on Computing Sciences and Engineering (ICCSE), 2018, page 1-3.

- [4] Siddharth Sathe, Arjun Gade, Ajay Jadhav, "ARDUINO BASED SMART WATCH", International Research Journal of Engineering and Technology (IRJET), 2017, page 837-839.

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