Smart Glasses and Applications

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Abstract

As technology is growing rapidly and integrating itself to all aspects of people's lives, a more decent approach is to be dispensed. One of the trendy technologies which aims to make life easier is wearable technology. Certain factors are implemented which are essential in today's world to deal with problems and use technology effortlessly. Smart Glasses are products that are used as an extension to the wearer's spectacles. It gives users a feel of both real and digital worlds simultaneously, providing a much more natural experience. The problem of taking out our phone from the pocket each time we receive a call or text message and unlocking it takes around 20 seconds and it can be troublesome for the user most of the time, so by providing all the required information on the glass itself adds ease to human life. Using Smart Glasses, the user can make use of applications like Google Assistant, Google Maps, etc. while on the move without removing the phone from their pocket thus avoiding the disturbing process. The Smart Glass App can act as a medium between the Smartphone and the Smart Glass. It sends out information like Date, Time, Current location, Caller's number, Incoming messages and messenger's number, etc. The earphones and mic help to pick up the calls and communicate hands-free. The camera installed on the Glasses can find its application in many sectors.

1. INTRODUCTION

The growth of technology can lead to new problems and new demands. For example, the process of using a smartphone can be tedious while traveling sometimes, like it consumes a lot of time to search for it, then take it out, unlock it and navigating the interface takes about another 20 seconds. The above procedure also requires the user to tilt their head towards the mobile screen while in motion, which can lead to minor disturbance for the user. Also, to check for any new received messages or phone calls, the user's required to have an eye on mobile phones from time to time. So, the process can be distracting for the users. This is where Smart Glass Technology comes into picture wherein the required information is displayed on the glass of the wearer and which substitutes the use of mobile phones for every small purpose. The user can get a notification on the display, seeing which one can react as per the situation or avoid to save time. With the installation of Camera onto the glasses, while on the move, the camera can view live videos and record them. In this way, the public can become a vital factor in reducing crimes with the use of Smart Glasses.

Glasses as we know them today with frames that go behind ears- date from the late 18th century. Even though contact lenses and laser operations are readily available today, there are still many people who prefer to wear glasses and find it convenient to use on a day-to-day basis. The eyewear technology layers the information onto a user's field of view with the help of certain components used in connection to each other and which in turn provides required data to the display. In terms of increased public safety this new product can be a revolutionary savior. People's privacy will be an issue, but Smart Glass is not dangerous and harmful to society. As a fast speed, and forward moving culture, we can get a lot of benefits from such a futuristic product.

The section II of our paper describes the basic block diagram of our product. It gives information about the basic connection and working of the Smart Glasses. Section III describes the components used and their description. Section IV includes information about the App developer used in our project. Section V shows the results of our project. The various applications of Smart Glasses are listed in Section VI. Finally, Section VI concludes our implemented project on Smart Glasses.

2. BLOCK DIAGRAM & WORKING

An extension is attached to our normal glasses. This extension contains all the components shown in the block diagram above except for our mobile phone.

The display is an OLED display which is controlled by an Arduino. Arduino gets the required text input from the Bluetooth module.

The information to be displayed is sent serially from our mobile device to Arduino via Bluetooth module (HC-05) which is then displayed on the screen.

Thus, the Date & Time that is set on our phone is transmitted serially via Bluetooth to the Arduino which then displays it on the OLED display. The Arduino code arranges the incoming text and then gives it to the display.

The Bluetooth module is connected to our mobile phone via Bluetooth. The mobile phone sends out the data to be displayed like phone calls, messages, date, time, etc. to this Bluetooth module.

The buzzer buzzes thus allowing the user to search for their glasses by sending a signal from their phone to the Bluetooth module.

The earphones and mic are connected to the mobile phone via Bluetooth. These are immensely helpful when we receive calls while travelling.

One can also use mobile apps like Google Assistant, Google maps, etc. with the usage of these components.

Google Maps application has the feature 'Playing voice over Bluetooth' using which the directions can be heard over our display attached speaker.

The camera is a Wi-Fi camera, which is connected to our phone via Wi-Fi. This camera has its own app which allows the user to click photos and record videos anytime. If another user's phone is connected to the camera, then that user can view the live videos too.

3. COMPONENTS USED & THEIR DESCRIPTION

Every component works cordially under the commands of the processor to give desired results. Each part of the block diagram in figure 1 explained below:

3.1. Display

An OLED display is interfaced with ATmega328p, which is used to display the data received from a smartphone by using a smartphone application.

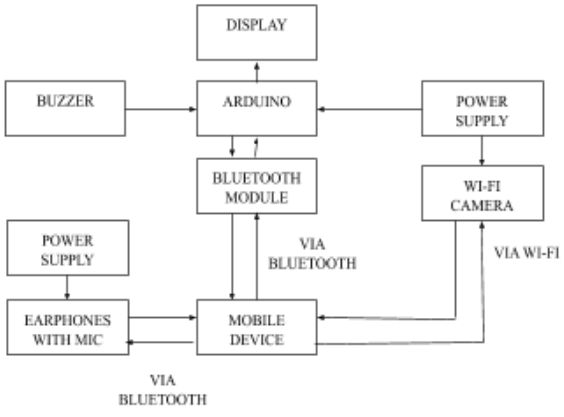

Figure 1: Block diagram

3.2. Bluetooth Module (HC-05)

The Bluetooth Module helps in transfer of data between the Arduino and the user's smartphone.

3.3. Image Capture (Camera)

The Wi-Fi Camera installed on the glasses will capture photos and videos. This camera has its own application which can run on multiple smartphones thus allowing multiple users to view the live videos simultaneously.

3.4. Arduino Nano (ATmega328P)

The Arduino Nano is a small, compatible, flexible microcontroller board based on the ATmega328P. This board is connected to the Arduino Software on the computer. It receives the data from the Bluetooth module, performs operations on the received data and forwards it to the display.

3.5. Audio (Mic and Speaker)

These are used for providing and receiving audio information on phone calls.

3.6. Piezo Buzzer

The buzzer helps in implementing the feature 'Find my glasses' by sending a signal from the Smart Glasses application on the user's smartphone to the Arduino via Bluetooth. This signal starts the buzzer which helps the user in finding their Glasses.

4. APPLICATION DEVELOPMENT

In order to control the display of the Smart Glasses using our mobile phone, we need an application which sends out the required information from our mobile phone to the display

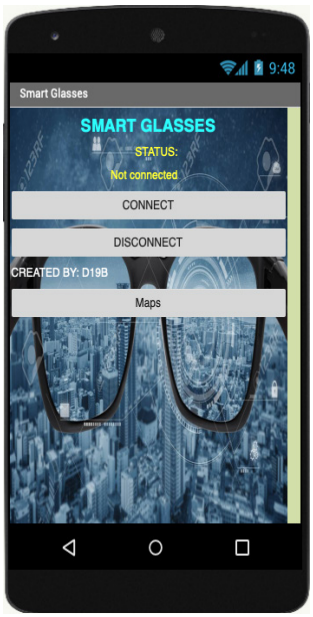

Figure 2: Front-end designing

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via Bluetooth. There are numerous ways to develop our own apps. One of them is to develop a software application using MIT App Inventor. Application development using MIT App Inventor is divided into two parts: Front-end designing shown in figure 2 and Back-end designing.

A. Front-end designing: This is where we can design the look of our app by adding various components like buttons, list picker, etc.

B. Back-end designing: This is where we write the codes related to the components added in the front-end designing. MIT App Inventor provides us blocks which we can put together to write code.

5. MAKING OF THE FRAME

The 3D model of the frame has been designed using Fusion360 Software. The frame design is as shown in Figure 3–8 shows the location:

6. RESULTS

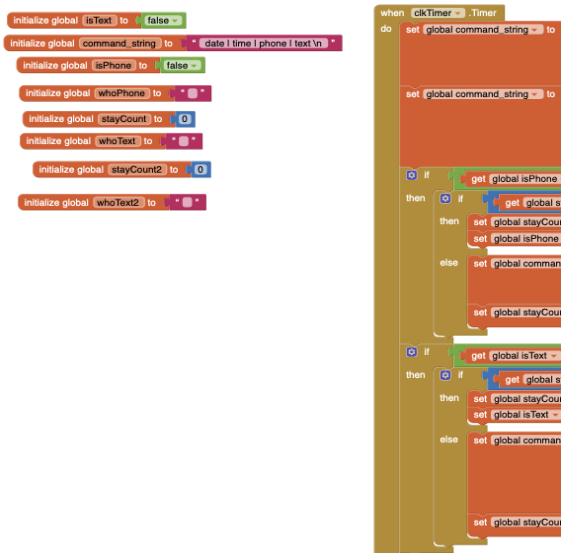

Figure 3: Back-end designing.

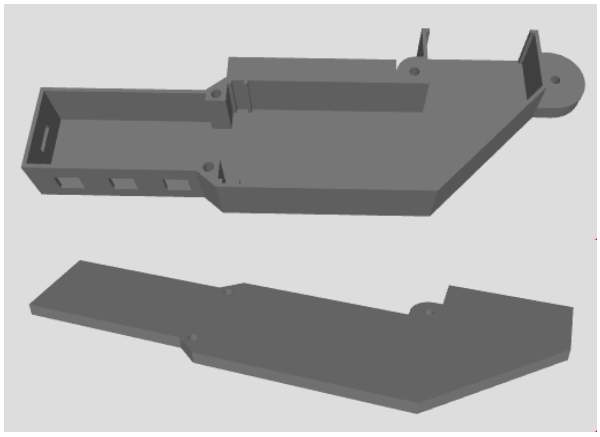

Figure 4: Frame for Display

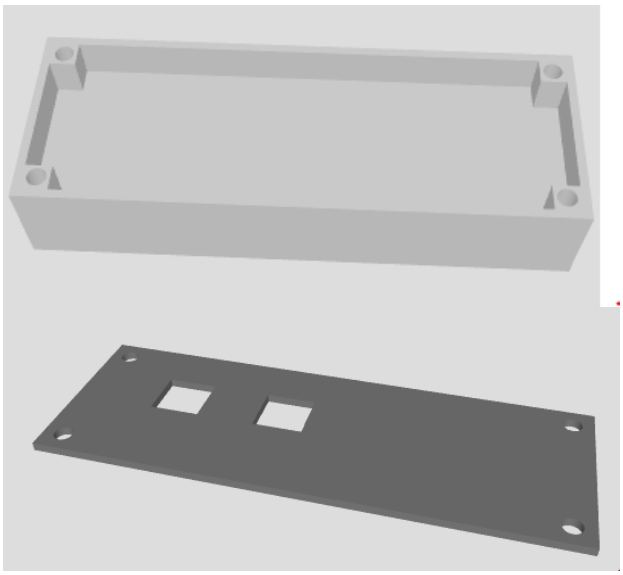

Figure 5: Frame for Camera

Figure 6: Displaying caller's number

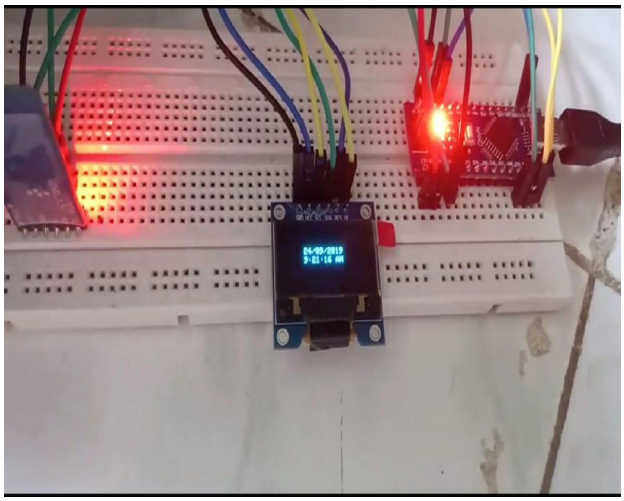

Figure 7: Displaying Date & Time

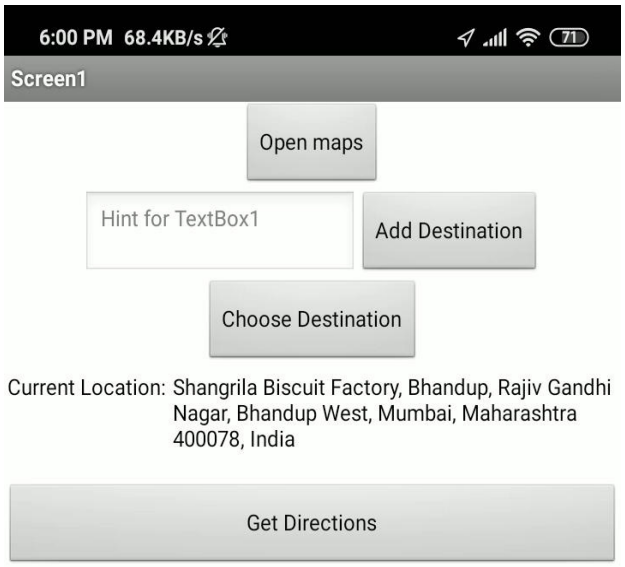

Figure 8: Displaying current location

7. APPLICATIONS

7.1. Day to Day Life

In day-to-day life, Smart Glasses will help the user by providing the features it offers. Date and time can be displayed. An incoming phone call will get displayed onto the glass and therefore the user can respond to it by the audio mic provided, same with text messages. Users will also find it helpful in case of clicking pictures and recording videos. As the product is hands free, it can be used at places where multitasking is required.

7.2. Medical Fields

Smart Glasses can be used for recording tiny details of an operation. While on the move, if a user wishes to capture something then he will be able to do so by pressing the capture button.

7.3. Educational Purposes

Smart glasses can also be used for educational purposes. For example, the Wi-Fi camera allows multiple users to connect to it. This can be helpful while teaching medical students. The doctors can perform the surgery while wearing the glasses with the camera switched on. Thus, if the students are connected to the same camera, they can watch the live video of how the surgery is performed and learn from it.

8. CONCLUSIONS

With the help of the components listed above, we can implement a Smart Glass that displays Date, Time, Caller's Number, Messenger's number and received the text message, user's current location. The earphones and mic attached to the frame allows the user to pick up calls without using their phone. It also helps the user to navigate hands-free.

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