

SMART GLASSES

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Abstract— This paper describes my first research experience in developing a smart project. In our daily life we use Android devices like smart phones and tablets. And some other Android-powered devices like camera, TV, smart watches, etc are already there in use. Whenever we read about Android OS, we think of its usability in our Android smart phone or Android tablet. We generally limit Android devices to just being Smart phones and tablets. However, in reality, there are many other devices that get powered by Android. Some latest Android powered electronic gadgets are cameras, Television sets and smart watches. And all this just can be done by programming your Arduino with an Android Device. Bluetooth or WiFi module can be used for wireless connection of Android and Arduino. By making a setup and with a little bit coding we can create a new device like Smart Glasses. Smart glasses are wearable devices that display real-time information directly in front of user field of vision by using augmented reality technique. Generally they can also perform calling and receiving function, run some application and support internet connectivity. The emergence of glass, is just a prototype with enhanced features in it. The main purpose of this smart glass would be hands-free displaying of information currently available to most smart phone user and allowing for interaction with GPS voice navigation. These glasses will have the combined features of virtual reality and augmented reality. Smart glasses will operate through an Android Application that will be present in our smart phones.

Keywords- Arduino, Android device, USB cable, Arduino Droid, Bluetooth module, Display

I. INTRODUCTION

This document is a final report from my research experience as an undergraduate student. My mentor, Sawan Sir, M.tech, from the Dept. of Electrical and Electronics at the PSIT Kanpur, directed my effort in this project for adapting Arduino and Android technology for the 'Smart Glasses'. Basically an Arduino board is connected to a computer via USB, where it connects with the Arduino development environment (IDE). The user writes the Arduino code in the IDE, then uploads it to the microcontroller which executes the code. And then we connect the Arduino to an Android device via Bluetooth. An Android application is then developed to command Arduino and then Arduino works according to the code IDE code. And show data accordingly on the Display.

Arduino code is written in C++ with an addition of special methods and functions. C++ is a human-readable programming language. When you create a 'sketch' (the name given to Arduino code files), it is processed and compiled to machine language. The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software can be used with any Arduino board.

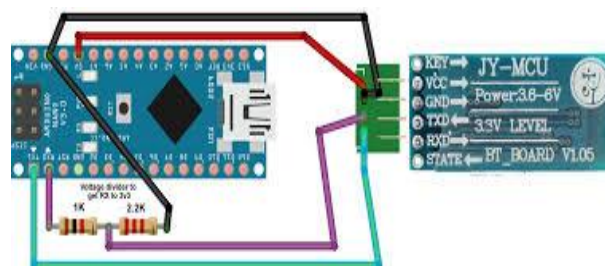


Fig. 1 Arduino, Bluetooth and Android

II. ARDUINO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IOT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them

to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

A. Types of Arduino

The list of Arduino boards includes the following such as:

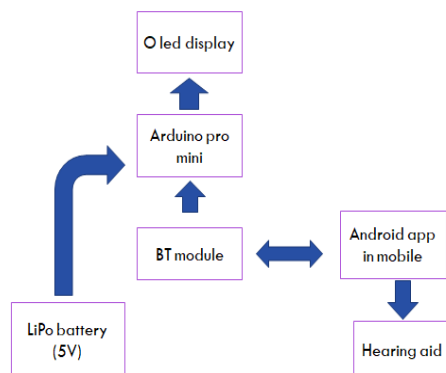
- Arduino UNO(R3)
- LilyPad Arduino
- Red Board
- Arduino Mega(R3)
- Arduino Leonardo
- Arduino Pro Mini

The Arduino board used in this project is Arduino Pro Mini. It is an ATmega328P microcontroller based electronics prototyping board.

III. INTERFACING BETWEEN ANDROID AND ARDUINO

In order to allow communication between Arduino and Android based smart phone, we need to use Bluetooth communication. Almost all Android based devices have built in Bluetooth communication module. Hence, we need to use an external Bluetooth Module for Arduino board.

A. Block Diagram



B. Components

- Arduino Pro Mini
- Li Po Battery
- Power bank Module
- OLED Display
- HC – 06 Bluetooth Module
- Android device with host availability
- Connecting wires
- 10K Preset
- Slide Switch

C. Component Description

1) Bluetooth module:

Bluetooth is one of the most commonly used wireless technology standards for exchanging data from fixed and mobile devices over short distances. Bluetooth based personal area networks (PANs) allows information exchange with high levels of security. Using Bluetooth technology, different electronic devices communicate with each other wirelessly. The range of transmission of Bluetooth technology is typically less than that of Wi-Fi and Zig Bee. But still many low range devices like audio players, mobile phones etc. use Bluetooth as the main communication. Also, the range of frequency for Bluetooth is 2.41 GHz, which is same as that of Wi-Fi and Zig Bee. There are two types of Bluetooth modules based on the way they work: Master Bluetooth Module and Slave Bluetooth Module. The main difference, as the names suggest is that a Master Bluetooth module can send or receive data from other Bluetooth modules whereas a slave Bluetooth can only listen to Master Bluetooth module. Even though the communication between two Bluetooth modules is wireless, they need some protocol to share the transmitted data with other devices like Microcontrollers. The most commonly used protocol is UART. The Bluetooth module used in this project is shown in below image

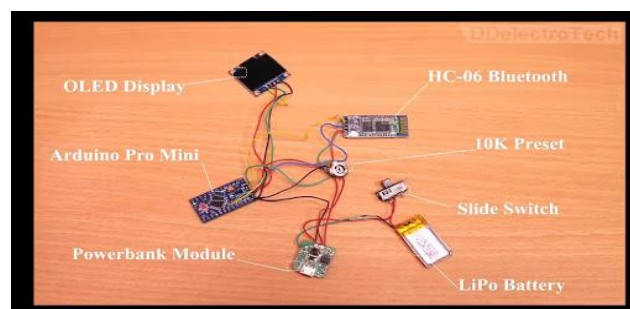


This Bluetooth module comes with 4 pins as seen in the image. VCC is connected to 5V supply, TX must be connected to the RXD of the microcontroller, RX must be connected to the TXD of the microcontroller and GND must be connected to ground. The default baud rate of a HC-06 Bluetooth Module is 9600 in communication mode and 38400 in AT mode

2) OLED Display:

The driver chip, SSD1306 can communicate in multiple ways including I2C, SPI and 8-bit parallel. However, only the 128x64 display has all these interfaces available. For the 128x32 OLED, only SPI is available. SPI since it's the most flexible and uses a small number of I/O pins. The OLED and driver require a 3.3V power supply and 3.3V logic levels for communication. The power requirements depend a little on how much of the display is lit but on average the display uses about 20mA from the 3.3V supply. We can run the entire display off of one 3.3V supply or use 3.3V for the chip power and up to 4.5V for the OLED charge pump or 3.3V for the chip power and a 7-9V supply directly into the OLED high voltage pin.

A. Circuit Design



IV. CONCLUSIONS

At first, the research experience took me in several directions until getting acquainted with the variety of electronics devices that can be connected with these Android devices. As explained throughout this report, Arduino was the preferred tool to interface to, as it provides the right combination from the hardware details and presents real time data to the user through display. As an Electrical Engineering major, I found myself deeply interested in swimming across this abstraction layer - where hardware meets Arduino. There is more to be done to achieve a more polished functionality of the Arduino with Android.

V. ACKNOWLEDGMENT

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