Department of Electrical and Electronic Engineering

EEE401/302

MICROPROCESSORS & INTERFACING

OPEN ENDED LAB

Build a Smart Watch by Interfacing OLED Display with Android Phone using Arduino.

1.1 OBJECTIVE

The objective of this experiment is to provide on hand practice for designing a smart watch via OLED display; which will be connected to our smart phones and will show the current time and temperature.

1.2 Equipment Require

- 128×64 OLED display Module (SSD1306)
- Arduino Pro Mini or Arduino Board
- Bluetooth HC05/HC06
- Connecting Wires
- 3.7v Li-On Battery
- Jumper

1.3 Pre- lab Preparation

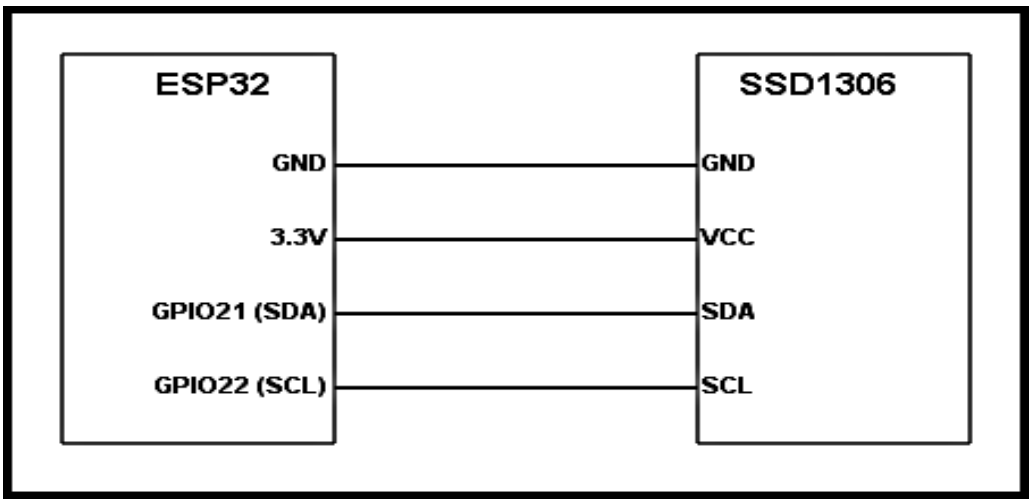
The term OLED stands for "*Organic Light emitting diode"* it uses the same technology that is used in most of our televisions but has fewer pixels compared to them. It is real fun to have these cool looking display modules to be interfaced with the Arduino since it will make our designed output look cool.

1.4 Theoretical background

Arduino community has already given us a lot of Libraries which can be directly used to make this a lot simpler. You will search a few libraries and found that the Adafruit_SSD1306 Library is very easy to use and had a handful of graphical options; hence you can use the same in this lab. Here you also need to install one more library in Arduino IDE which can be downloaded from here GFX Graphics Library.

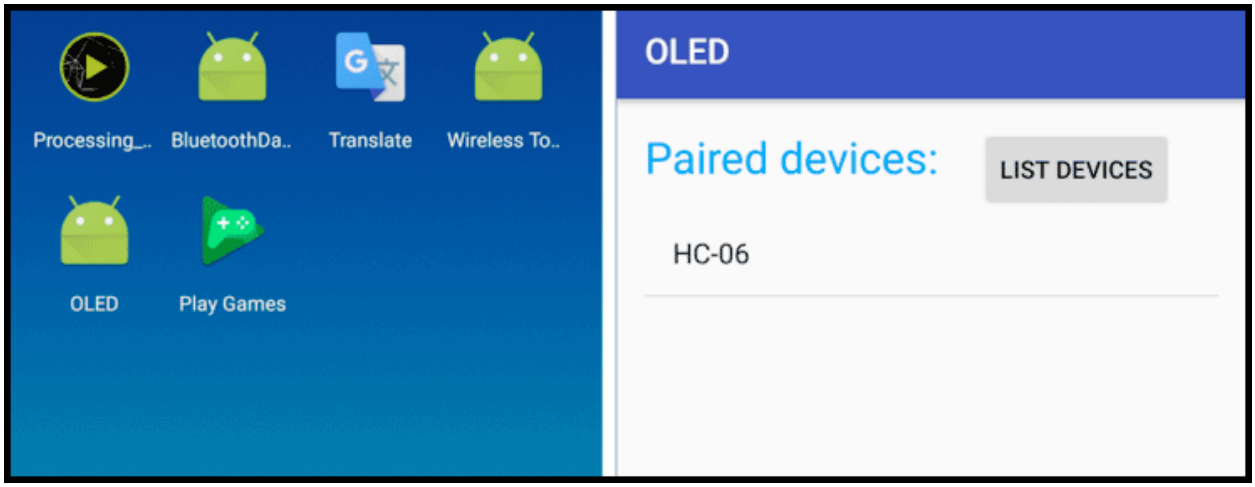
1.5 Procedure

- The block diagram for using 4 pin SSD1306 OLED with Arduino is simple. In the following, OLED is connected to ESP 32, which is highly-integrated with in-built antenna switch; just to provide you an idea.

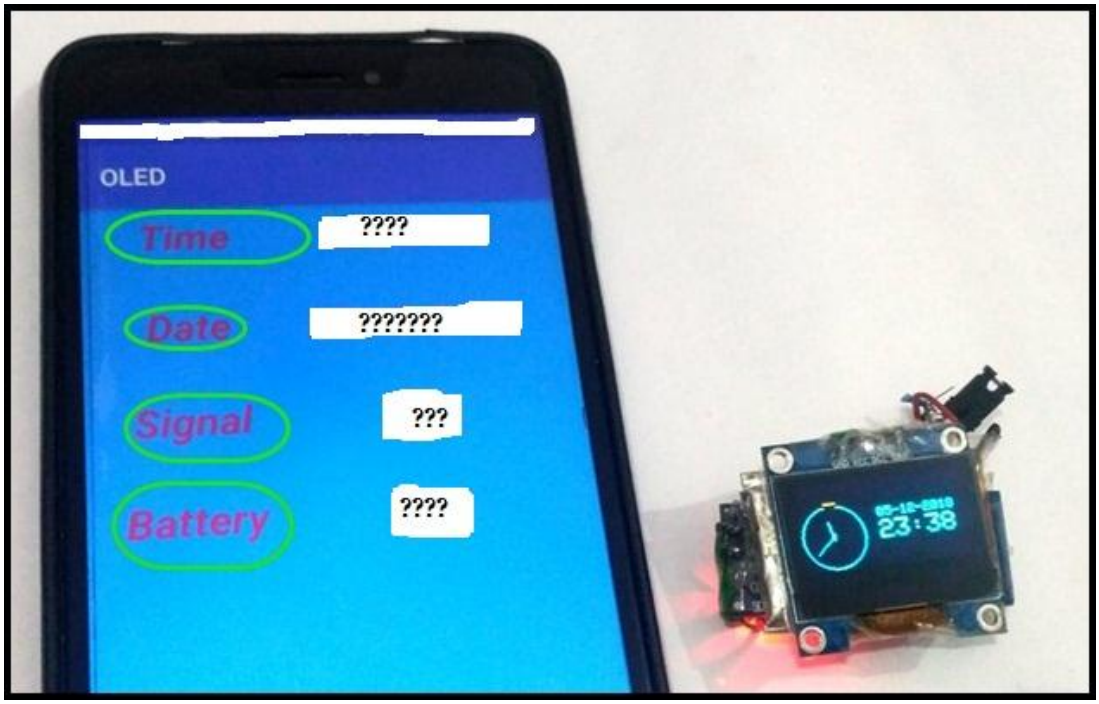


- Open the Arduino IDE
- Open a new window by clicking "File→New" and write the code of your program.
- After write the code, verify it (by clicking on the verify icon (√) or "Sketch→Verify/Compile".[N.B.: If you write the code perfectly, "Done compiling" message will be appeared on the Arduino IDE. If you do not write the code perfectly, error message will be appeared on the Arduino IDE .Check you code and try again]
- Upload the code into the Arduino IDE by clicking the upload icon (→) or "Sketch→Upload".[N.B.: if everything is ok then "Done uploading" message will be appeared on the Arduino IDE. If error message shown on the Arduino IDE then check, (1)the connection between Arduino board and the computer or Laptop from which you are uploading the code, (2)Go to the "Tools→Board", make sure "Arduino/Genuino Uno" option is selected, (3) Go to the "Tools→Port", make sure the proper Port is selected]

- Android App for sending data to Arduino over Bluetooth. For this Arduino based Smart Watch, an Android App is available in Android Studio, this app can be downloaded from anywhere. So just download and install this app in your Android Smart phone and then enable the Bluetooth and pair the HC-06 module with your phone. It may ask for passcode to pair the HC-06 bluetooth module, default passcode is 1234 or 0000. Now open the OLED app and select paired Bluetooth device HC-06, as shown in the below image:



- Now *OLED app* will display the data fetched from the android phone as shown below
- Observe the output and remark what you achieve. The result may vary depending on your smartphone LED Display.



1.6 Post Lab Task:

1. Analyze your result by answering the following questions:
    i. Why you are getting different results compare to other groups?
    ii. Why the temperature is not stable in your OLED?
    iii. Why the signal you are generating is fluctuating?

2. Write down the total process from interfacing to achieving the result.