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REAL TIME ACCESSING SENSOR USING GUI AND SENDING DATA TO MAIL

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ABSTRACT

Accessing or reading analog data from sensors is sometimes a tedious task, adding to this is the hassle of storing and sending the data. sensor operation through a graphical user interface (GUI) which provide efficient manner to read data from the sensors. The data is stored in a text file in those values, which are determined from sensor.

This project is executable using single-board computer Raspberry pi 3B+ which is powerful as well as price efficient. In this, the sensor data from the sensor is read through GUI with Python and choose to transmit the data through the mail.

Codes are used basically in Raspberry Pi as onetime runnable form, but due to this interface mechanism helps to reuse the sensors without changing the values of inputs pin numbers or depends this GUI interface helps to create and develop a simple understandable blocks consisting of different buttons which is supported using PyQt5

In this project we use a basic sensor called as Ultrasonic sensor which is used to detect distance and objects near it, which is used for different purposes such as level Identifications, distance from a specific object identification of different modules or objects near it. The code that we usually read or write or develop need to be changed for one sensor to another sensor but in this case, we have provision to write code for itself. That is a small block. Block of the core code can be written in it.

INTRODUCTION

The main objective of this project is to Accessing Sensors with GUI Using Raspberry Pi And Sending Real time data variations through Mail.We are using Raspberry Pi 3B+ as our main processor to build the project . With the help of HC-SR 04 Ultrasonic Sensor and Passive Infraded sensor we made project easy to build. How interesting if we can control Raspberry using some GUI controls (for example Buttons) or represent the sensor results to the screen in graph or slider or textbox or knobs. It would be very nice. Isn't it? Codes are used basically in Raspberry Pi as onetime runnable.

this interface mechanism helps to reuse the sensors without changing the values of inputs pin numbers or depends on this GUI interface helps to create and develop a simple understandable blocks consisting of different buttons which is supported using pyQt5. In this project we use a basic sensor called as ultrasonic sensor which is used to detect distance and objects near it, which is used for different purposes such as level identifications, distance from a specific object identification of different modules or objects near it. The code that we usually read or write or develop need to be changed for one sensor to another sensor but in this case, we have provision to write code for itself. That is a small block. Block of the core code can be written in it.

These device is used to calibrate multiple pins at time such as dht11(Humidity Sensor) and other multiple pin sensor in this we use as an example Ultrasonic sensor which is 2 data pin i.e, Trig and Echo pins.

WORKING

Project takes data from sensor and stores them, sends the real time the data to mail based on required parameters as instructed, Project provides a Interface that helps to deal with access the sensors, storage etc.

BLOCK DIAGRAM

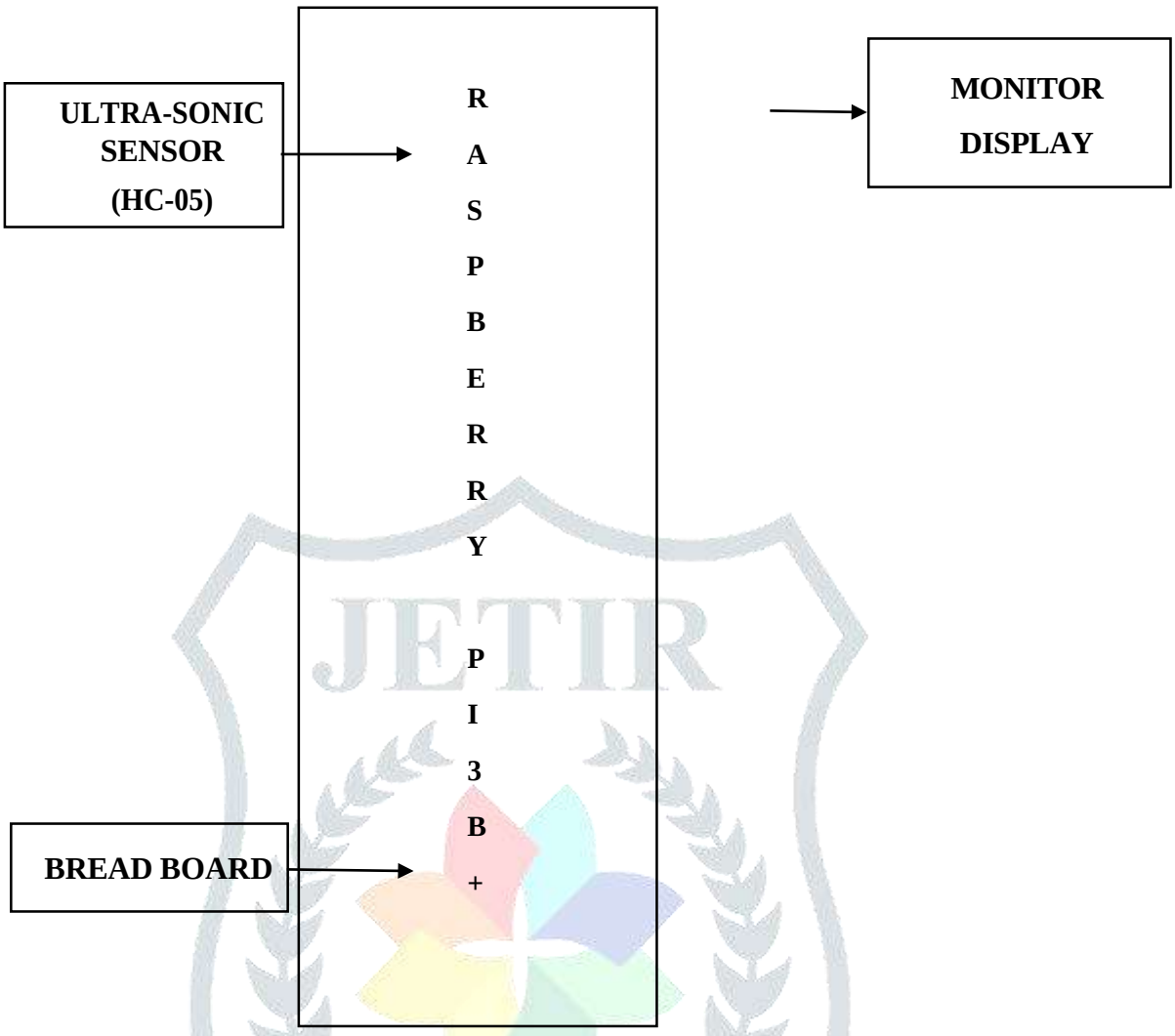


Figure: Block diagram of Accessing Sensors with GUI using Raspberry Pi and sending Real time data variation through Mail

EXPLANATION OF EACH BLOCK

RASPBERRY PI

Raspberry Pi is a series of small single board computers (SBCs) developed in the United Kingdom by the Raspberry Pi foundation in association with board com. The Raspberry Pi project originally leaned towards the promotion of teaching basic computer science in schools and in developing countries. The original model became more popular than anticipated in selling**.**

Raspberry pie is a portable, powerful and minicomputer. The board length is only 85mm and width is only 56mm.Its size only as big as a credit card but it is a capable like little PC

There are three series of Raspberry Pi, and several generations of each have been released. Raspberry Pi SBCs features a Broadcom System on a chip (SoC) with an integrated ARM -compatible Central processing unit (CPU) and on-chip graphics processing unit (GPU), while Raspberry Pi Pico has a RP2040 system on chip with an integrated ARM -compatible central processing unit

MONITOR

A computer monitor is an output device that displays information in pictorial or text form. A monitor usually comprises a visual display, some circuitry, a casing, and a power supply. The display device in modern monitors is typically a thin film transistor liquid crystal display (TFT-LCD) with LED backlighting having replaced cold-cathode fluorescent lamp (CCFL) backlighting. Previous monitors used a cathode ray tube (CRT) and some Plasma (also called Gas-Plasma) displays. Monitors are connected to the computer via VGA, Digital Visual Interface (DVI), HDMI, DisplayPort, USB-C, low-voltage differential signalling (LVDS) or other proprietary connectors and signals.

ULTRASONIC SENSOR(HC-SR04)

HC-SR04 ultrasonic is a distance sensor. This economical sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm. Each HC-SR04 module includes an ultrasonic transmitter, a receiver and a control circuit.

There are only four pins that you need to worry about on the HC-SR04: VCC, Trig, Echo and GND. We Will find this sensor very easy to set up for our next range-finding project. An HC-SR04 ultrasonic distance sensor actually consists of two ultrasonic sensors, one acts as a transmitter that converts the electrical signal into 40KHz ultrasonic sound pulses. The other acts as a receiver and listens for the transmitted pulses. When the receiver receives these pulses, it produces an output pulse whose width is proportional to the distance of the object in front.

This sensor provides excellent non-contact range detection between 2cm to 400cm with an accuracy of 3mm. Since it operates on 5 volts, it can be connected directly to an Arduino or any other 5v logic microcontroller. The HC-SR04 ultrasonic sensor uses sonar to determines the distance to an object. This sensor reads from 2cm to 400cm with an accuracy of 0.3cm, which is good for most hobbyist projects. In addition, this module comes with ultrasonic transmitter and receiver modules.

BREAD BOARD

A breadboard, or protoboard, is a construction base for prototyping of electronics. Originally the word referred to a literal bread board, a polished piece of wood used when slicing bread. In the 1970s the solderless breadboard (a.k.a. plugboard, a terminal array board) became available and nowadays the term "breadboard" is commonly used to refer to these. Because the solderless breadboard does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. For this reason, solderless breadboards are also popular with students and in technological education. Older breadboard types did not have this property. A stripboard (vereoboard) and similar prototyping printed circuit board, which are used to build semi-permanent soldered prototypes or one-offs, cannot easily be reused. A variety of electronic systems may be prototyped by using breadboards, from small analog and digital circuits to complete central processing unit

(CPUs).

JUMP WIRES

A jump wire (also known as jumper, jumper wire, DuPont wire) is an electric wire, or group them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment. Although jumper wires come in a variety of colours, they do not actually mean anything. The wire colour is just an aid to help you keep track of what is connected to which. It will not affect the operation of the circuit. This means that a red jumper wire is technically the same as the black one

RESISTORS

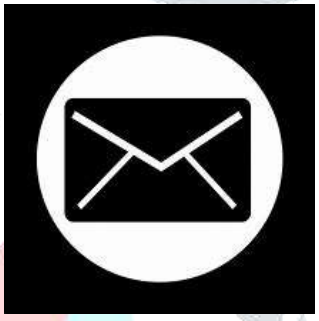
A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.

10 W CHARGER

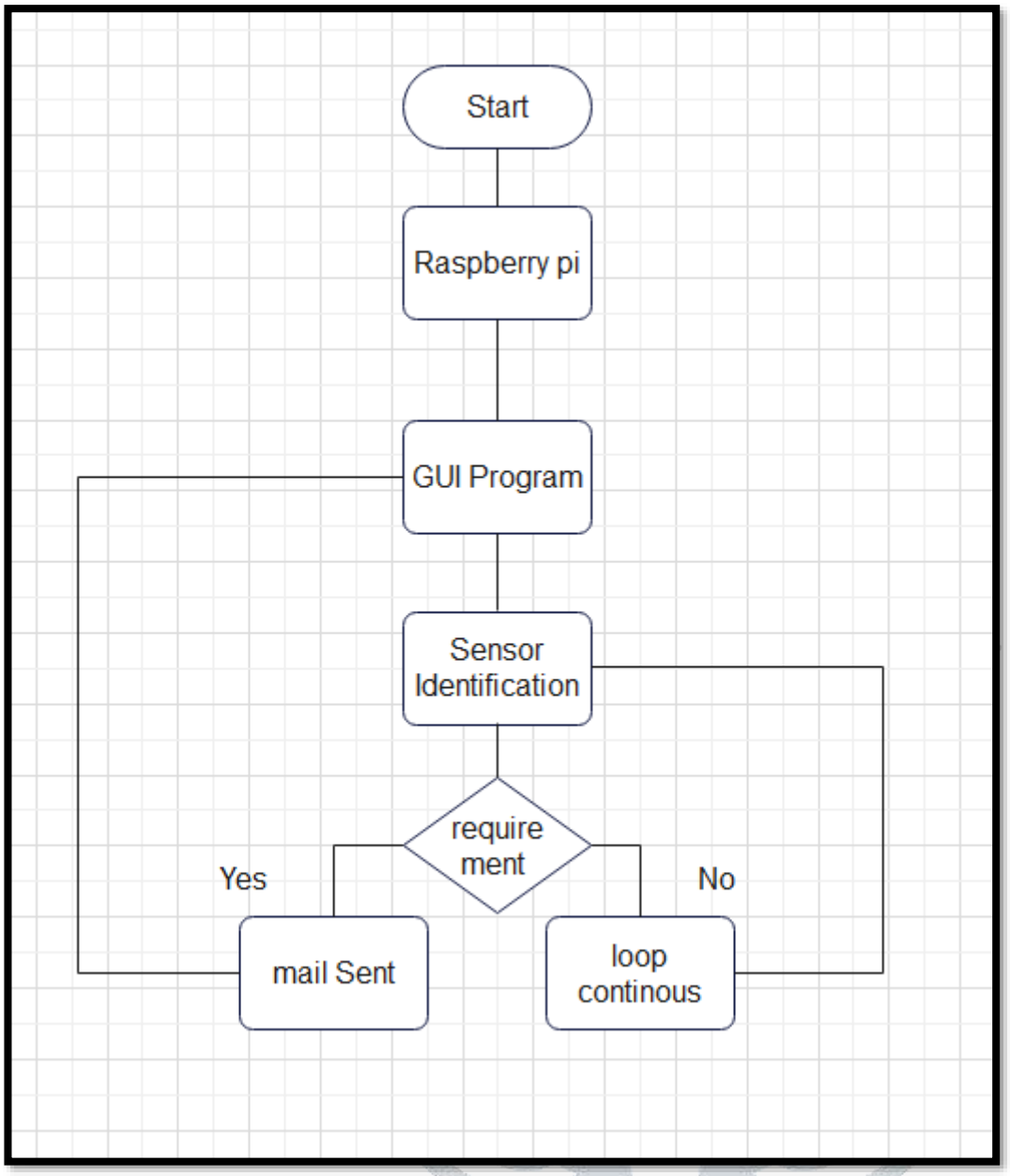
A battery charger, or recharger, is a device that stores energy in a battery by running an electric current through it. The charging protocol (how much voltage or current for how long, and what to do when charging is complete) depends on the size and type of the battery being charged. Some battery types have high tolerance for overcharging (i.e., continued charging after the battery has been fully charged) and can be recharged by connection to a constant voltage source or a constant current source, depending on battery type. Simple chargers of this type must be manually disconnected at the end of the charge cycle. Other battery types use a timer to cut off when charging should be complete. Other battery types cannot withstand over-charging, becoming damaged (reduced capacity, reduced lifetime), over heating or even exploding. The charger may have temperature or voltage sensing circuits and a microprocessor controller to safely adjust the charging current and voltage, determine the state of charge, and cut off at the end of charge. Chargers may elevate the output voltage proportionally with current to compensate for impedance in the wires

FLOW CHART

Raspberry Pi 3b+ Sensor



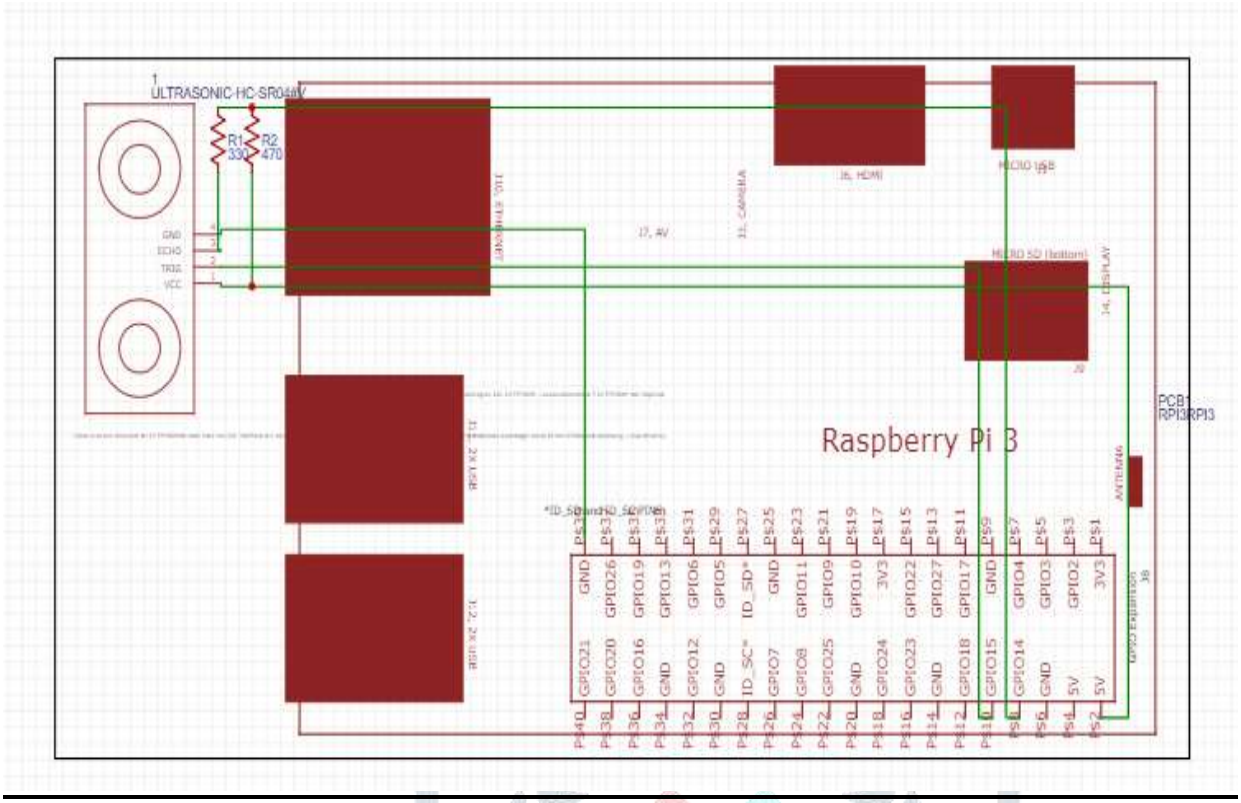
Requirement Sending Mail


Start
Raspberry pi
GUI Program
Sensor Identification
require ment
Yes
No
mail Sent
loop continous

COMPONENTS OF PROJECT

1. Raspberry pi 3b+
2. Ultrasonic sensor (HC SR-04)

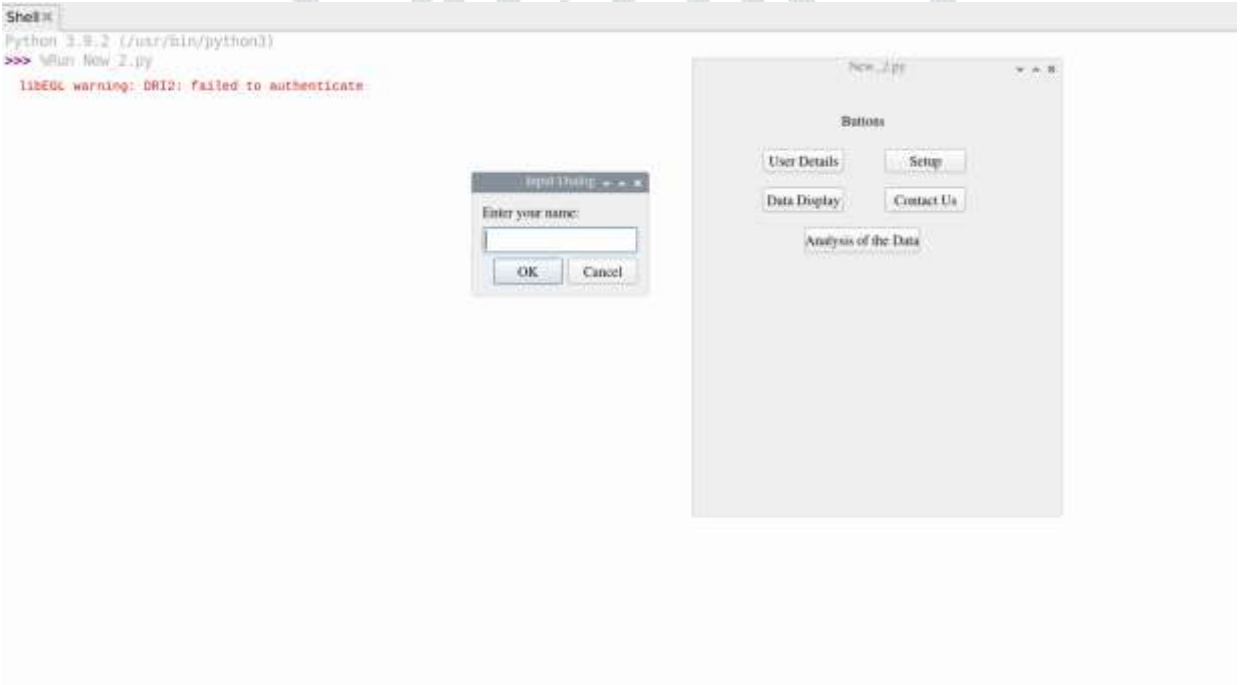
RESULTS



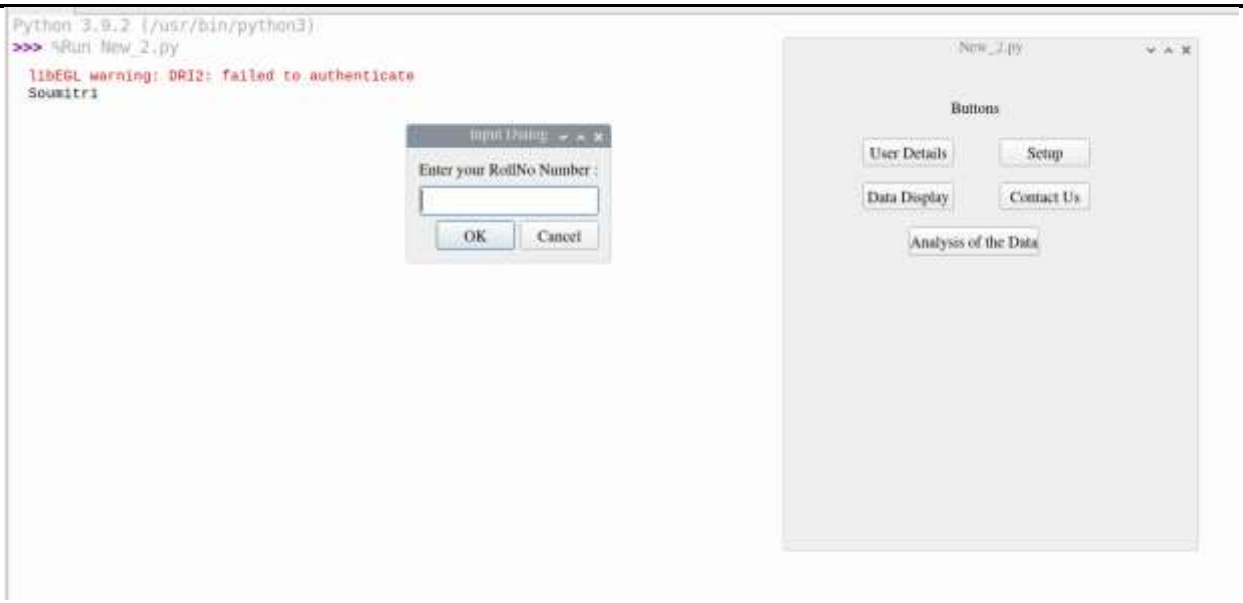
Circuit diagram

Result photo 1

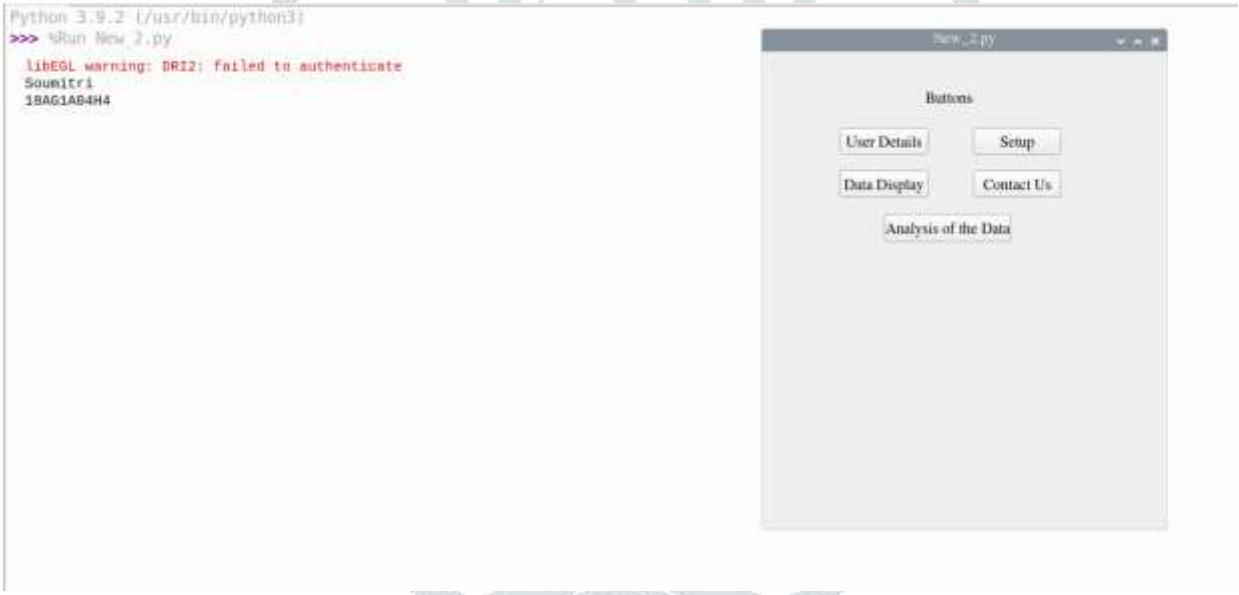
INTERFACE



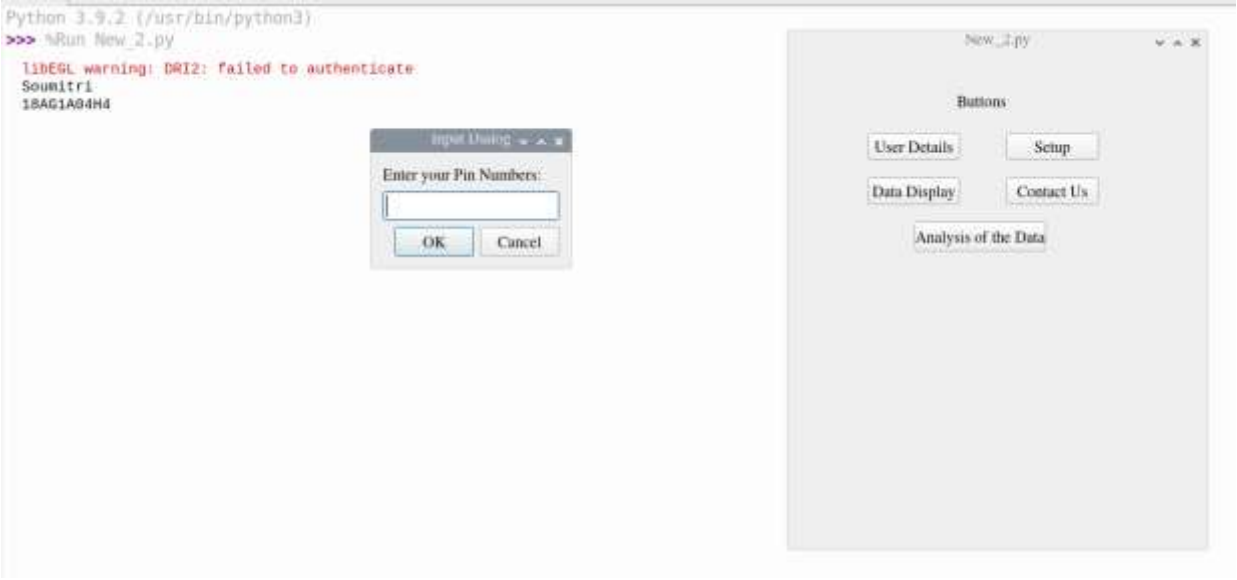
AFTER PRESSING USER DETAILS



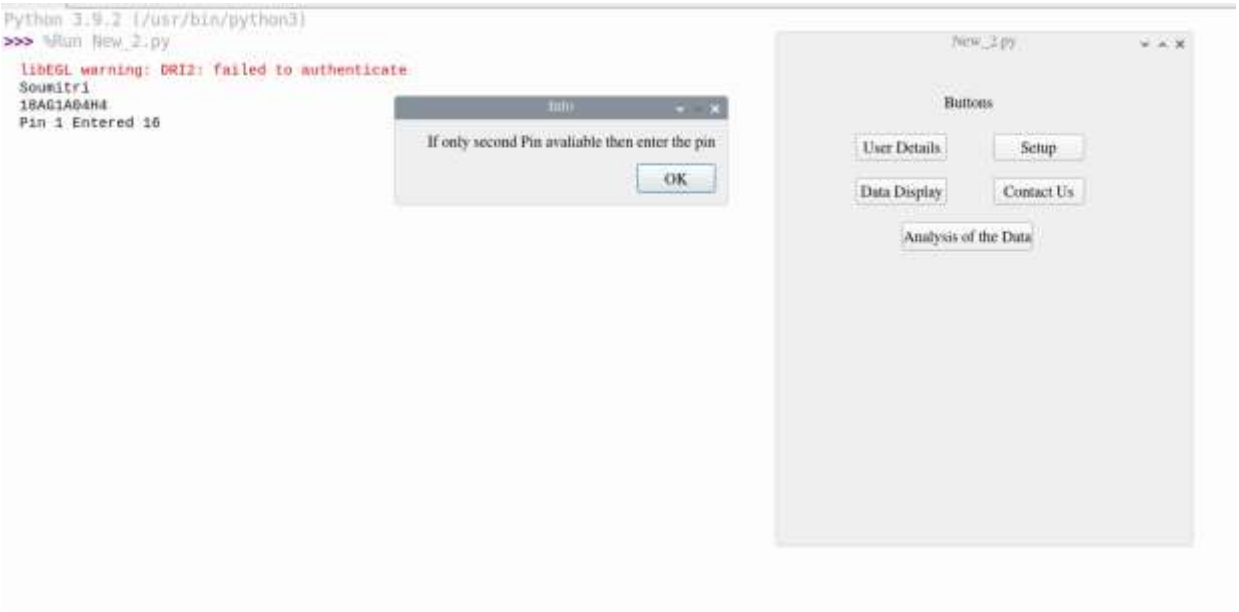
AFTER ENTERING NAME IN INPUT DIALOG



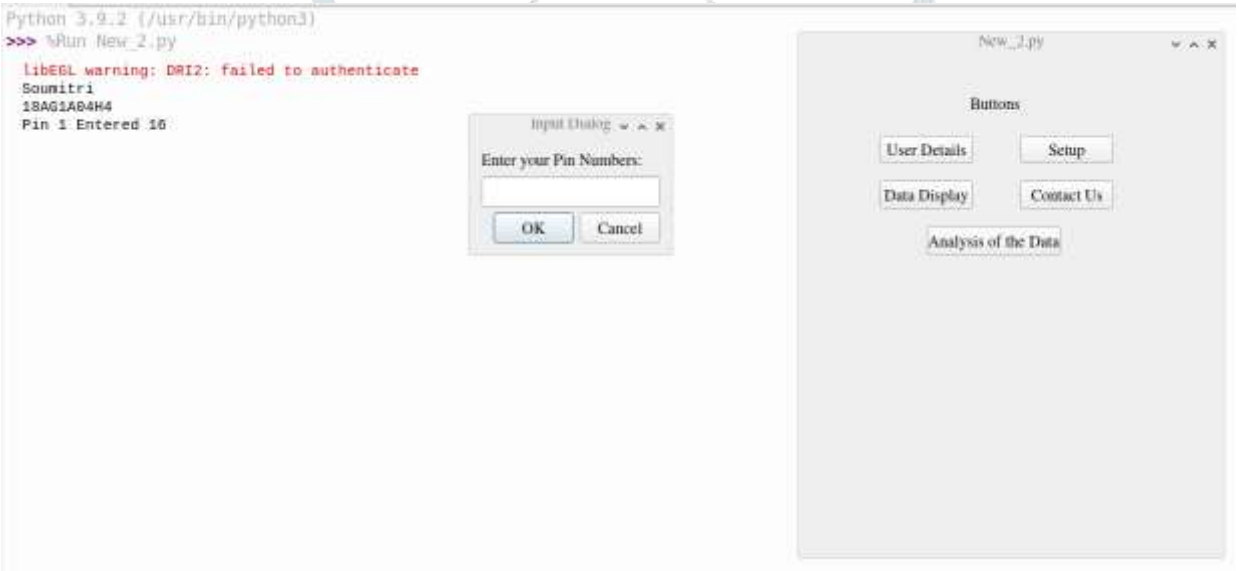
AFTER ENTERING NAME AND ROLLNO IN INPUT DIALOG OF "USER DETAILS"



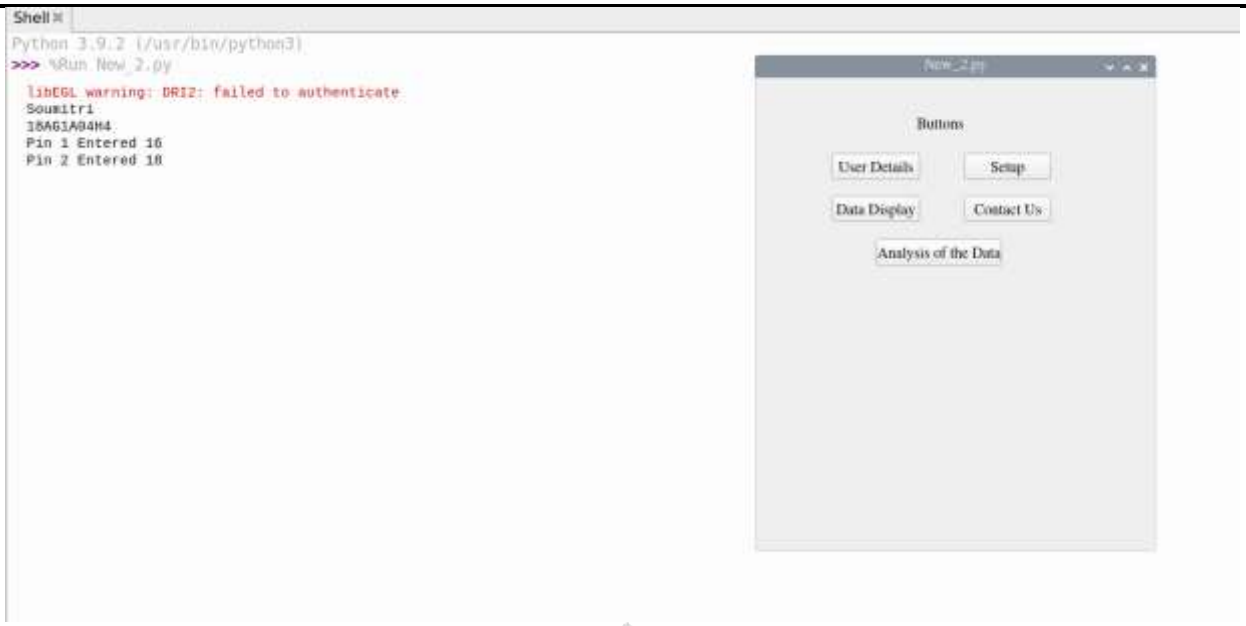
AFTER PRESSING "SETUP"



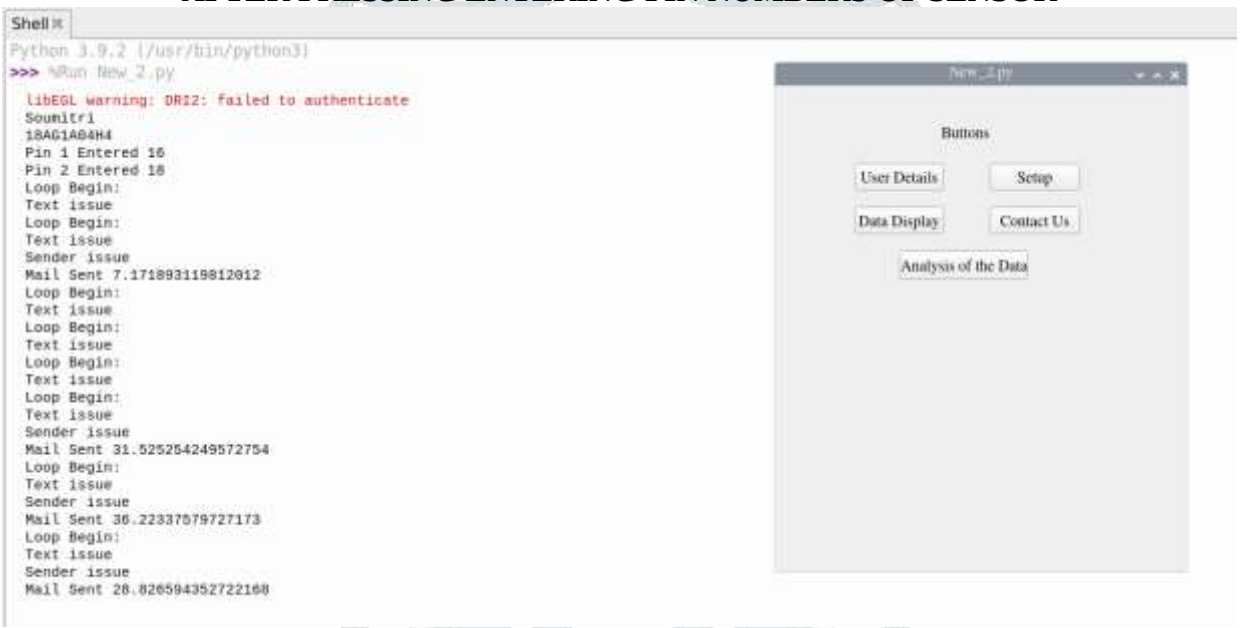
AFTER PRESSING PIN NUMBER IN DIALOG A INFO DIALOG APPERED



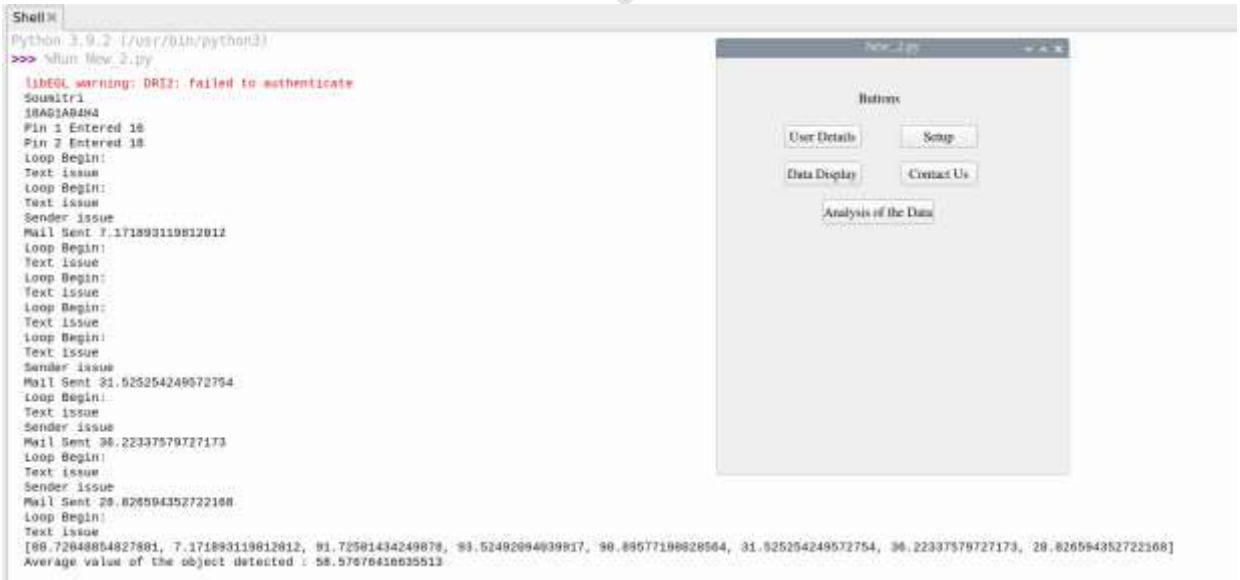
AFTER PRESSING "OK" IN INFO DIALOG



AFTER PRESSING ENTERING PIN NUMBERS OF SENSOR

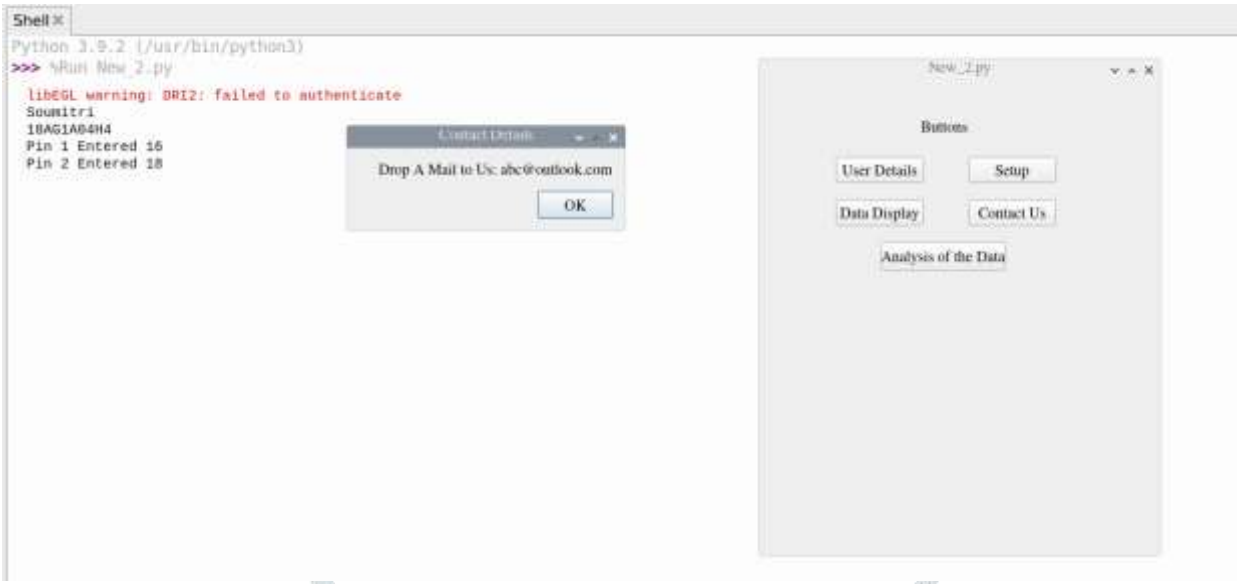


AFTER PRESSING DATA DISPLAY BUTTON FOR 10 TIMES



AFTER PRESSING ANALYSIS BUTTON

VALUES STORED IN A TEXT FILE FOR FURTHER ANALYSIS



AFTER PRESSING "CONTACT US" BUTTON

CONCLUSION

Designing a good user interface is critical to the success of a system. A good user interface encourages an easy and natural interaction between a user and a system. We can easily access the sensors and store the data and check as per requirements.

FUTURE SCOPE

- It is used to develop complete graphical analysis.
- By developing high process mechanism reduces processing time.
- By using cloud services we can control automatic object detection and also

will be easy to understand to unskilled workers or people

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- Flow Chart Modelling from WonderDraw EdrawMax
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