FLOOD EARLY DETECTION AND AVOIDANCE BY IOT

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Abstract – For our final project for experimental engineering we will design, calibrate and implement a flood detection machine. We will sample data from four sensors collecting four distinct types of data. The first sensor is ultrasonic sensor which measure the distance to the target by measuring the time between the emission and reception.. The temperature sensor LM35 is used to measure the temperature of the environment accurately. LM35 sensor is an integrated circuit in which the voltage output is directly proportional to the temperature Celsius. Water flow sensor is used to provide information of water flow stability. A water rotor along with a hall effect sensor is present the sense and measure the water flow. When water flows through the valve it rotates the rotor. By this, the change can be observed in the speed of the motor. This change is calculated as output as a pulse signal by the hall effect sensor. Thus, the rate of flow of water can be measured. All the values can be collected and sent to the Arduino to process these values and then shown on the screen with the help of WIFI module and with the use of IOT gecko.

INTRODUCTION

Floods can also occur in rivers when the flow rate exceeds the capacity of the river channel, particularly at bends or meanders in the waterway. Floods often cause damage to homes and businesses if they are in the natural flood plains of rivers. While riverine flood damage can be eliminated by moving away from rivers and other bodies of water, people have traditionally lived and worked by rivers because the land is usually flat and fertile and because rivers provide easy travel and access to commerce and industry. This system is to detect a flood the system observes various natural factors, which includes humidity, temperature, water level and flow level. To collect data of mentioned natural factors the system consist of different sensors which collects data for individual parameters. The first sensor is ultrasonic sensor which measure the distance to the target by measuring the time between the emission and reception.. The temperature sensor LM35 is used to measure the temperature of the environment accurately. LM35 sensor is an integrated circuit in which the voltage output is directly proportional to the temperature Celsius. Water flow sensor is used to provide information of water flow stability. A water rotor along with a hall effect sensor is present the sense and measure the water flow. When water flows through the valve it rotates the rotor. By this, the change can be observed in the speed of the motor. This change is calculated as output as a pulse signal by the hall effect sensor. Thus, the rate of flow of water can be measured. All the values can be collected and sent to the Ardiuno Uno to process these values and then shown on the screen with the help of WIFI module and with the use of IOT gecko.

1. LITRATURE SURVEY

Research [1] Wireless sensor networks for flash-flood alerting. Paper presented at the Devices, Circuits and Systems, 2004. Proceedings of the Fifth IEEE International Caracas Conference on.

More research [2] has been conducted on Urban flash flood monitoring, mapping and forecasting via a tailored sensor network system. Paper presented at the Networking, Sensing and Control, 2006. ICNSC'06. Proceedings of the 2006 IEEE International Conference on.

More research [3] has been conducted with reference of the Urban flash flood monitoring, mapping and forecasting via a tailored sensor network system. Paper presented at the Networking, Sensing and Control, 2006. ICNSC'06. Proceedings of the 2006 IEEE International Conference on.

Next research [4] has been conducted a flood detector was made using Arduino and temperature sensor the project was working but we used LM35 since The LM35 boasts a slightly higher temperate range at -55°C to 150°C versus the 40°C to 125°C range of the TMP36.

2. SYSTEM DESIGN

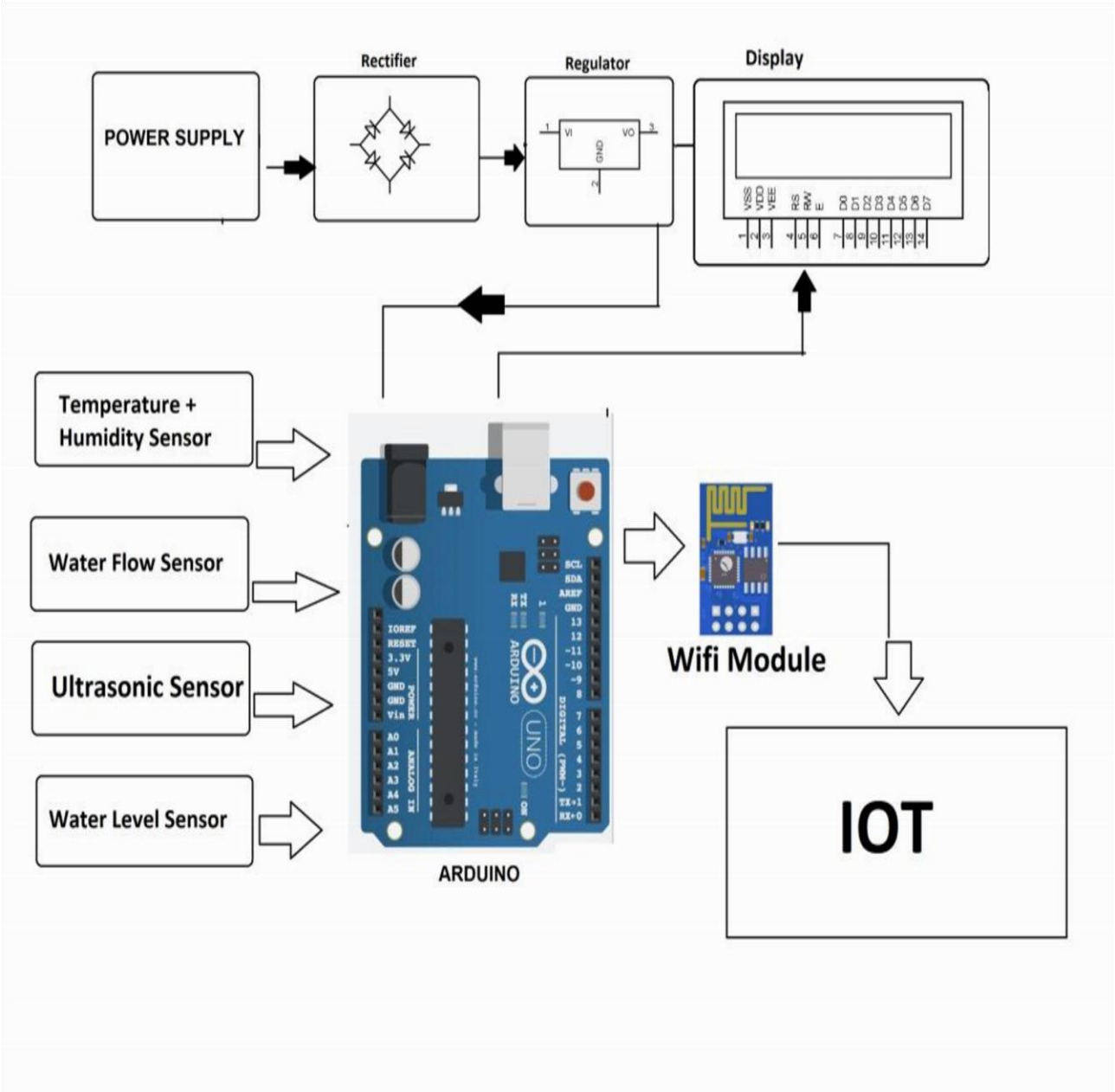


Figure 1: System Design

3.1 HARDWARE DESIGN

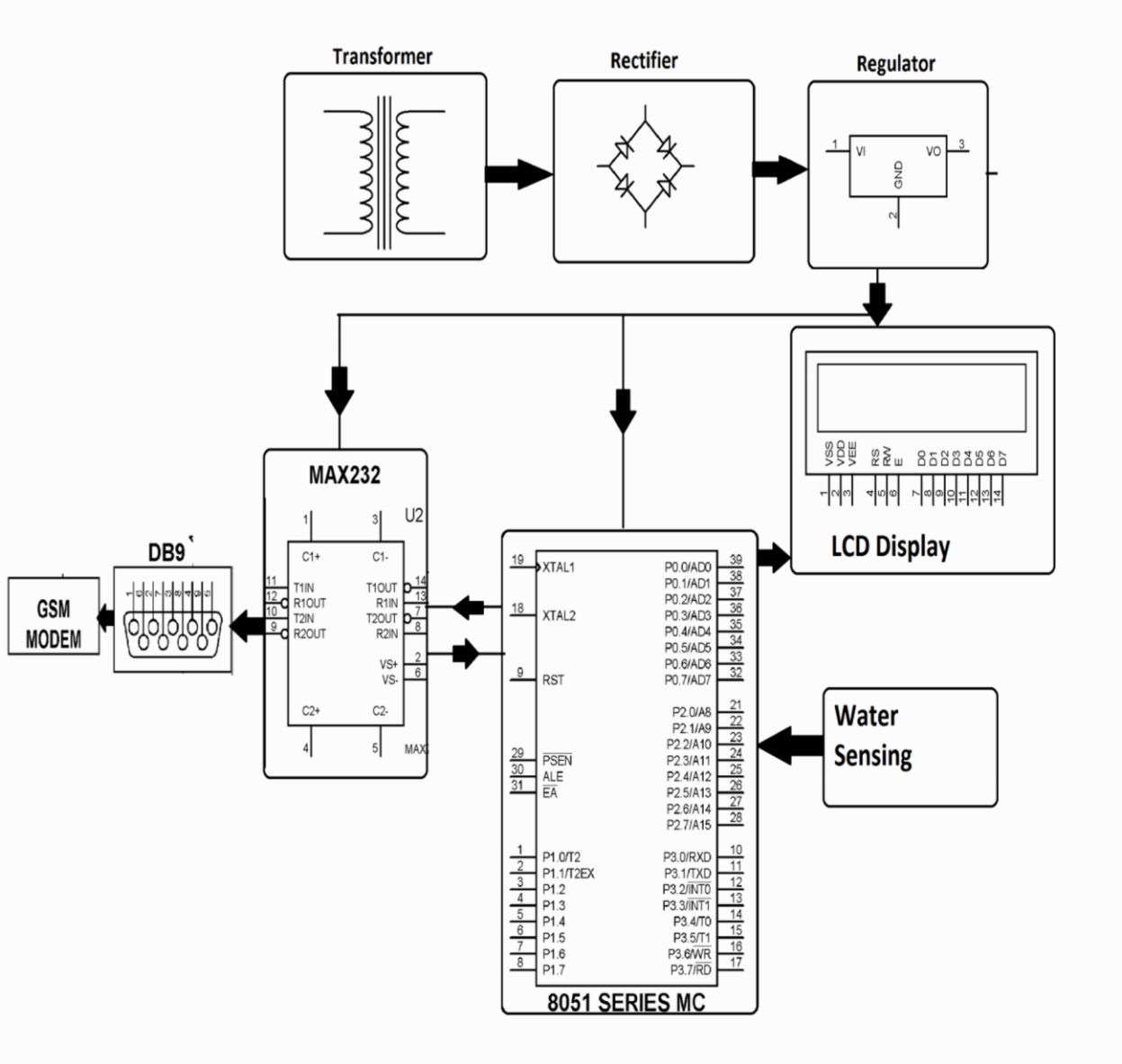


Figure 2: Hardware System Design

ARDUINO UNO

The main hardware tool that we are using is Arduino Uno which is a microcontroller board based on the ATmega328(as shown in Fig 5.1.) . It has 14 digital input/output pins, 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Temperature sensor: A temperature sensor detect the hotness and the coldness of the environment. The sensing of the temperature can be done with the directly contact or an indirect contact. The temperature sensor LM35 is used to measure the

temperature of the environment accurately. LM35 sensor is an integrated circuit in which the voltage output is directly proportional to the temperature Celsius.

Water level: The water level is always under observation by a float sensor, which work by opening and closing circuits (dry contacts) as water levels rise and fall. It normally rest in the closed position, meaning the circuit is incomplete and no electricity is passing through the wires yet. Once the water level drops below a predetermined point, the circuit completes itself and sends electricity through the completed circuit to trigger an alarm.

LCD

LCD stands for liquid crystal display. It is an output device used to display output. They are commonly used in LED TV, smart phone and instrument panels. It has a total of 16 pins, here we will interface the LCD in 4 – bit mode. It has a register select pin which when low the input is command and when high the input is data. The read and write pin when low write to LCD and when high read from LCD. The last configuration pin is enabling pin which should come from high too low for writing to LCD.

3.2 SOFTWARE DESIGN

IOT gecko

The internet of things, or IOT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to computer interaction.

Simulink

Simulink is a MATLAB simulation tool developed by math work. We would need the Arduino package, Simulink package and legacy package to interface the Arduino using MATLAB(R2018). The communication between MATLAB and Simulink is done with the help of serial communication. The serial communication port is used to communicate Arduino and MATLAB.

Arduino IDE

It is basically an open source software used to program Arduino microcontroller board. The programming is done in embedded c language. The IDE contains serial window and serial monitor to see the Real-time output of the system.

4. IMPLEMENTATION

The implementation of our project is done using Arduino .

4.1 HARDWARE IMPLEMENTATION

To detect a flood the system observes various natural factors, which includes Humidity, temperature, Water level and Flow level. To collect data of mentioned natural factors the system consist of different sensors which collects data for individual parameters. For detecting changes in humidity and temperature the system has a DHT11 Digital Temperature Humidity Sensor.

It is a advanced sensor module with consists of resistive humidity and temperature detection components. The water level is always under observation by a float sensor, which work by opening and closing circuits (dry contacts) as water levels rise and fall. It normally rest in the closed position, meaning the circuit is incomplete and no electricity is passing through the wires yet.

Once the water level drops below a predetermined point, the circuit completes itself and sends electricity through the completed circuit to trigger an alarm. The flow sensor on the system keeps eye on the flow of water. The water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. The system also consist of a HC-SR04 Ultrasonic Range Finder Distance Sensor.

The Ultrasonic sensor works on the principle of SONAR and is designed to measure the distance using ultrasonic wave to determine the distance of an object from the sensor.

All the sensors are connected to Arduino UNO, which processes and saves data. The system has WIFI feature, which is useful to access the system and its data over IOT.

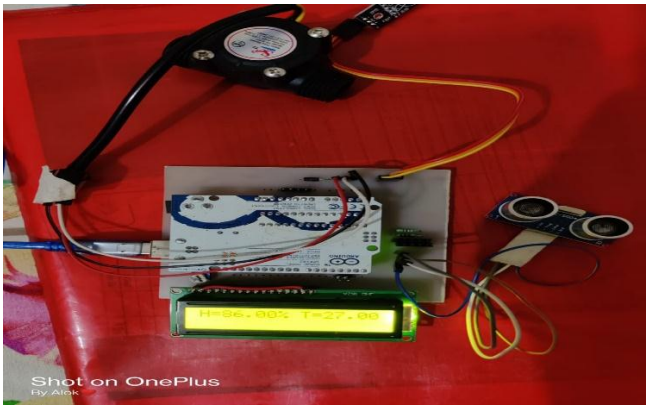
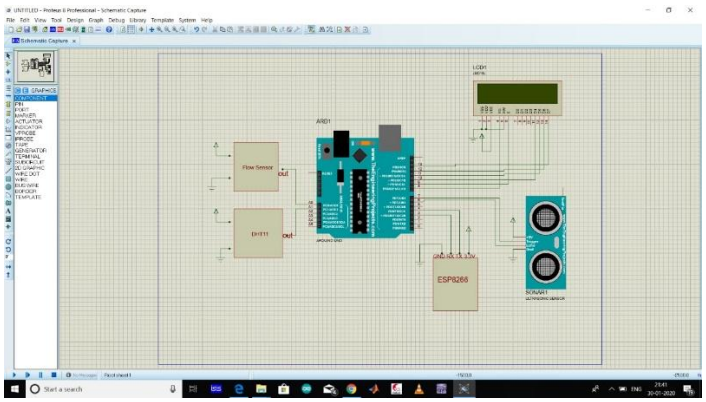


Figure 3: Hardware implementation

4.2 SOFTWARE IMPLEMENTATION



5. RESULT AND OUTPUT ANALYSIS

The project when implemented produces various outputs using various inputs from the sensors which are shown in the table 1.

INPUT	OUTPUT
Temperature Sensor	It detects the change in temperature in the individual's body and gives the output in the form of analog voltage.
Ultrasound sensor	It detects the change in the range and gives the alert signal on the LCD
Water level sensor	The sensor detects the pressure through which the water is flowing and after a range set in the coding it will give alert signal.

Table no: 1

5.1 HARDWARE AND SOFTWARE OUTPUT OF TEMPRATURE SENSOR

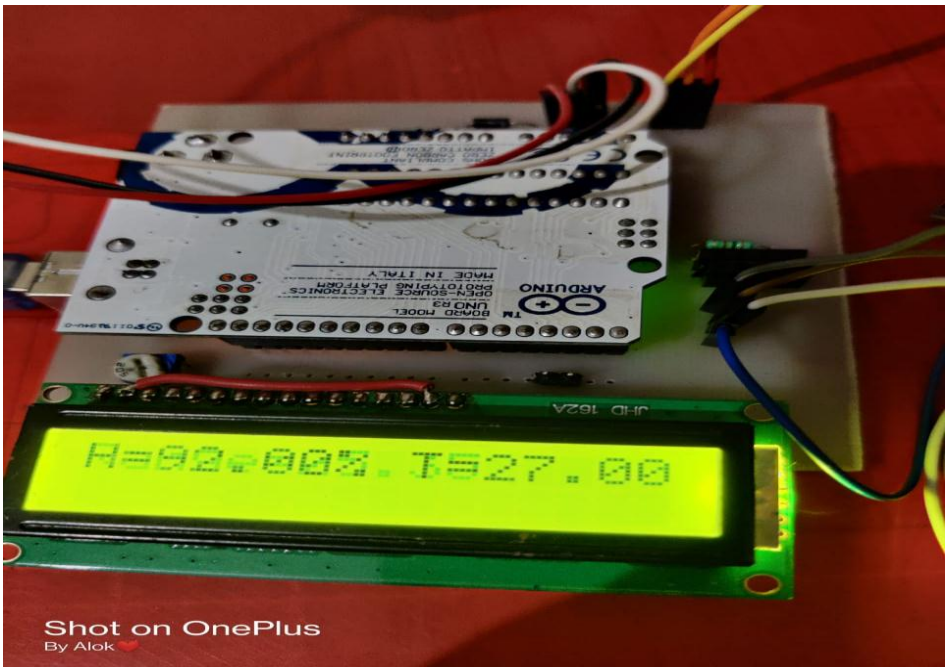


Figure 5: Temperature sensor hardware result

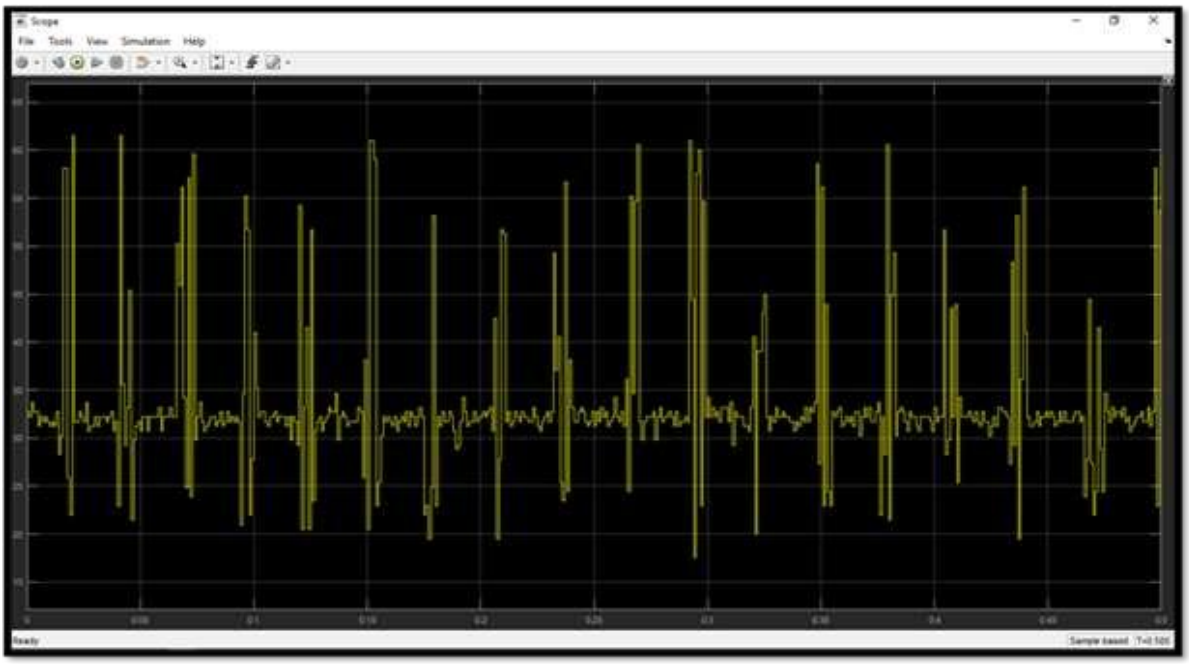


Figure 6: Temperature sensor Software result

6. HARDWARE AND SOFTWARE OUTPUT

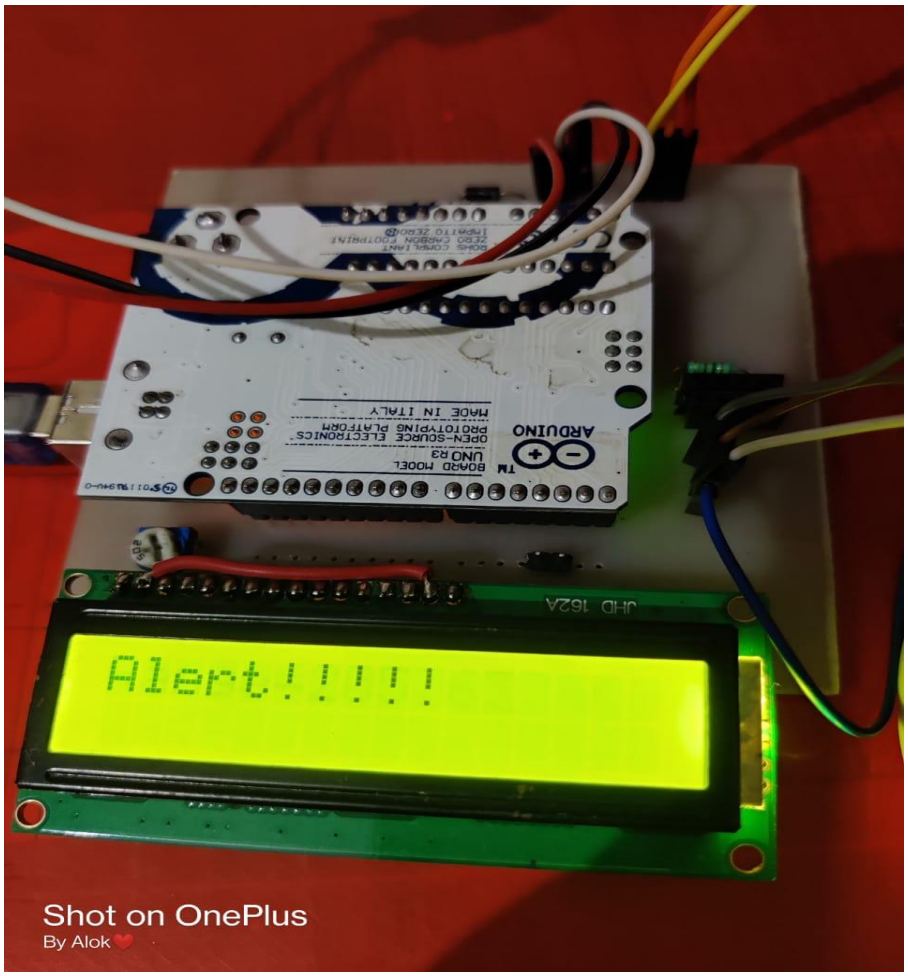


Fig 7 alert signal output

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BIOGRAPHIES

PHOTOS	BIOGRAPHY
	Mr. Prasad D. Kadam is Assistant Professor in Department of Electronics and Telecommunication at B.V(D.U)C.O.E. Pune. He completed his M.Tech in Electronics. He was the project guide throughout the project.
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