FLOOD CONTROL WITH WATER LEVEL PREDICTION SYSTEM USING MACHINE LEARNING

Sukhwinder Singh[1], Vinit Kakade[2], Vineet Mehta[3], Dr. Reena Gunjan[4]

[1]Sukhwinder Singh, Dept. of Electronics Communication Engineering, Pune
[2]Vinit Kakade, Dept. of Electronics Communication Engineering, Pune
[3]Vineet Mehta, Dept. of Electronics Communication Engineering, Pune
[4]Professor, Dept. of ECE, MIT School of Engineering, Pune, Maharashtra, India

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Abstract - The disasters due to floods affect millions of people across the globe by causing damage to property and severe loss of life. In the areas like flood prediction, flood monitoring, and flood detection, the solutions have been provided by using the Internet of Things. Although the IoT technologies are not able to stop the occurrence of flood disasters but can predict the flood in advance. Artificial Neural Networks (ANN) can be used to predict floods. This is enhanced by a system for flood prediction using IoT and ANN. In this system, flood prediction is carried out by a device consisting of sensors placed at three different locations of the rivers and catchment areas feeding to the dam. The system monitors the water in real-time by a water level sensor and ANN to predict ahead of time. The system uses low-power IoT devices and communication technology and can be operated on a battery. The application of ANN with IoT improves the efficiency of the flood prediction system and can give early warning to the dam. The prediction accuracy is also utilized to compare the performance of the model.

*Key Words***:** Raspberry Pi, Arduino, Machine Learning, Internet of Thing (IoT), Jupyter Notebook, Prediction Analysis.

1. INTRODUCTION

To design and implement a system for a real-time short-term flood prediction that uses data from IoT sensors and makes a forecast of a flooding event using Artificial Neutral Network (ANN). In this system, IoT sensing is used to collect environmental parameters in real-time and make a short-term forecast of the water level using the ANN algorithm. While designing and implementing the system the focus is on two major aspects. One is the application of ANN for ahead of time flood prediction implemented on the low power edge device. The second aspect is to design the flood prediction system to operate on low power through the utilization of ultralow-power IoT wireless communication technology. Additionally, with the help of sensors, IoT, and cutting-edge technologies the implementation can be more suffice and up to the mark. The system implemented will be tested in a lab setting and not on real flooding events is predominantly measured by mechanical and electronically also.
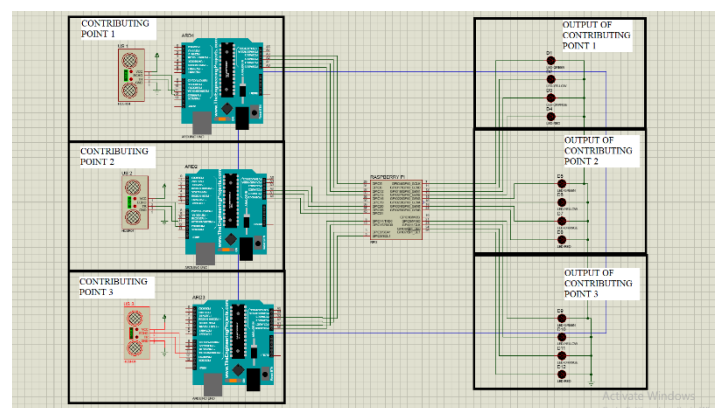
2. SYSTEM DESIGN

Fig -1: System flow

In the above figure, there are three contributing points which consist of Ultrasonic Sensor and Arduino. The Ultrasonic Sensor will detect the water level of the particular area i.e., Dam, and send the output signal to the Arduino. The output of the three contributing points will send to the Raspberry Pi. According to the output received by Raspberry Pi, the LED will glow from each contributing point i.e., Green, Yellow, Orange, and Red.

3. FLOWCHART

The flowchart of the system is shown in Fig -1. In this flowchart, we can see that the ultrasonic sensor detects the level of the water and sends the output to the Arduino. If the water level is above 25% then Led green will turn on. If the water level is above 50% then Led yellow will turn on. If the water level is above 75% then Led orange will turn on and if the water level is above 100% then Led red will turn on.
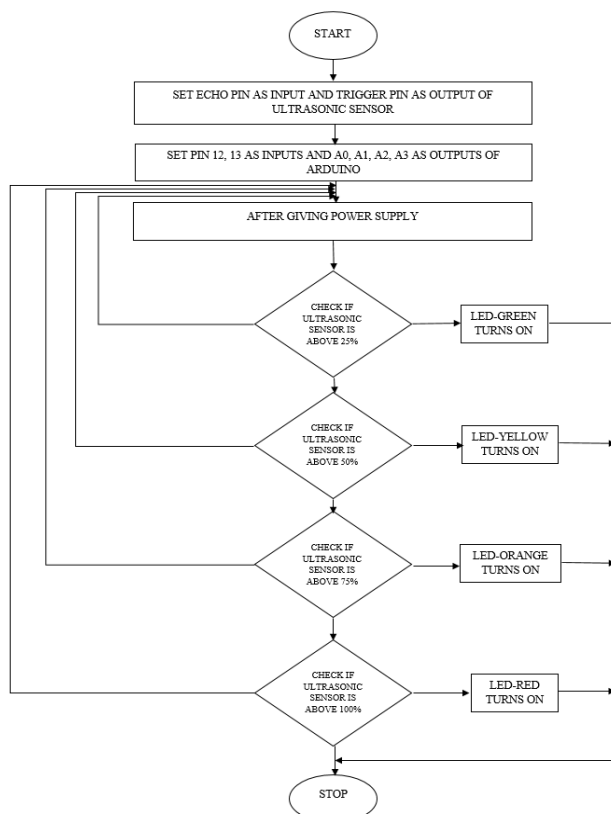
Fig -2: Flowchart

4. BLOCK DIAGRAM AND WORKING

Below, figure 3 shows the block diagram of the flood control with a water level prediction system using machine learning.
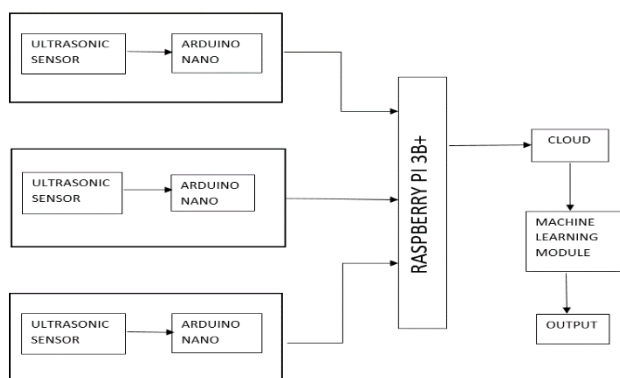

Fig -3: Block Diagram

The Raspberry Pi i.e., Raspberry Pi 3B+ and Arduino i.e., Arduino Nano 33 BLE. The power supply is provided to Raspberry Pi and Arduino. In the input, we are using an ultrasonic sensor that detects the water level of particular areas. If the water level detects above the threshold value, then with the help of Arduino we will send the signal to raspberry pi, and using machine learning we can predict the occurrence of the flood from anywhere. This system is reliable as there is no data loss and it can access easily.

5. SOFTWARE IMPLEMENTATION

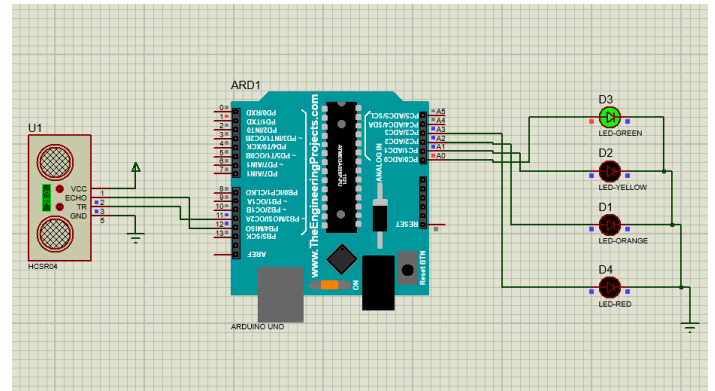When the ultrasonic sensor is above 25%, the led green turns ON. We can see that Fig -4.

Fig -4: Simulation when the ultrasonic sensor is above 25%

When the ultrasonic sensor is above 50%, the led yellow turns ON. We can see that Fig -5.
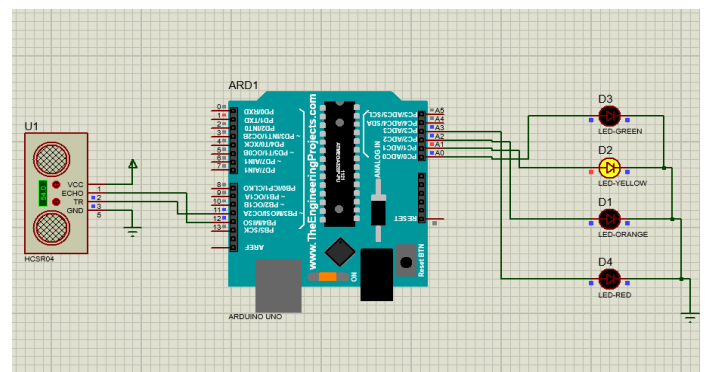

Fig -5: Simulation when the ultrasonic sensor is above 50%

When the ultrasonic sensor is above 75%, the led orange turns ON. We can see that Fig -6.
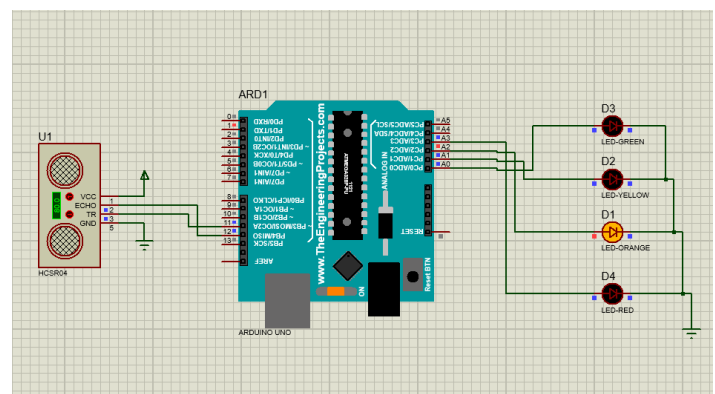

Fig -6: Simulation when the ultrasonic sensor is above 75%

When the ultrasonic sensor is above 100%, the led red turns ON. We can see that Fig -7.
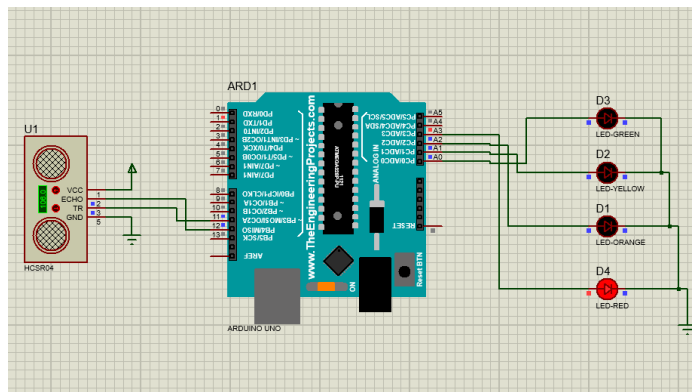

Fig -7: Simulation when the ultrasonic sensor is above 100%

Here, the amount of rainfall that occurs in the month of June-September is indicated by a blue dot. The amount of rainfall that occurs in the month of May is indicated by a green star. The amount of rainfall that occurs in the month of June is indicated by an orange star.
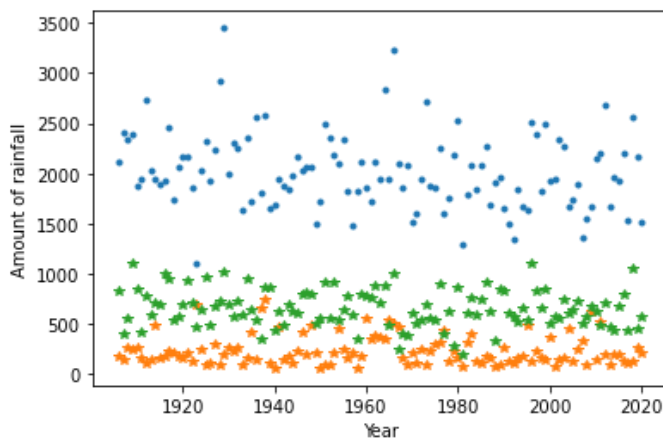

Fig -8: Amount of rainfall occurs in the particular year

6. CONCLUSIONS

The objective was to design and implement flood control with a water level prediction system. As described in this report a system has been successfully implemented. With the requirements of the flood control with water level prediction system, the following things can be concluded.

1. The system can detect the water level of the object within the range.
2. The device can interact with the devices like pc /laptops through its serial port.
3. It offers low cost and is very efficient for a wireless type of prediction system.

There are many advantages of a system with flood control and water level prediction system that is, it's flexible and versatile, etc.

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