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IOT FLOOD MONITORING AND ALERTING SYSTEM USING RASPBERRY PI-PICO MODEL

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Abstract - *The loss of properties and living population is getting enhanced by every year due to the dynamic alterations in weather conditions which results in heavy floods. Therefore, implementation of an intelligent analysis of flood risk is necessitated for the field of research in Disaster management. This project implements an intelligent IoT-based flood monitoring and alerting system using Raspberry Pi model, where water sensors and rain sensors are utilized to alert the authorities regarding the heaviness of rain and monitoring of water level in a lake or river. This system alerts the people in nearby villages since it utilizes IoT system for notifying the village people.*

Key Words: Disaster, Raspberry Pi, IoT, water sensor, rain sensor, framework.

1. INTRODUCTION

To build up A Real Time Solution to Flood Monitoring Using IoT we proposed a flood cautioning framework which expects regard for three essential variables: Data assortment by means of gaging, information preparing, and the equipment and programming required, and the dispersal of flood notice data. While robotized flood cautioning frameworks are frequently shockingly cheap to carry out, the essential factor deciding expense for any such framework is the quantity of gage site areas. Extreme flooding influenced Indian province of Kerala because of strange high downpour during rainstorm season. It was the most noticeably terrible flooding in Kerala in almost a century. In which more than 373 individuals passed on inside fortnight. 35 out of 42 dams inside the state open without precedent for history. Kerala got hefty rainstorm precipitation on the midevening of August and bringing about dams completely filling in the initial 24 hours of precipitation the state got 310 mm of rain.Flood is an unavoidable cataclysmic event in everywhere on the world, causing weighty progression of water and furthermore serious harm to properties and lives

Catastrophic events have become a significant worry all through the world. particularly in the agricultural nations, for example, Bangladesh, Malaysia and so on Flood is likewise one of the regular disasters. To forestall the overwhelming impacts of floods before such occasions happen, early admonition for individuals to clear in the close by zones can be successful in saving lives and to forestall debacles. Generally, flooding cannot be stopped and unavoidable, but early detection or warning system can be used to reduce losses faced by the citizen and government. For this reason, we need to create flood sensing devices which will detect the water and rain. This system is integrated to the microcontroller board which will help to send the data each time the water reaches the threshold value.

The Raspberry Pico module will help to connect the Wi-Fi device for internet and keep track of data on a daily basis. The data through the esp8266 module will be stored in a cloud. If water reaches threshold value, people will get alert messages on their phone through online notification. This system can also predict the possibility of flooding before flooding takes place.

2. RELATED WORK

2.1. IoT Enabled Water Monitoring System.

IoT based water observing framework that action water level progressively. The model depends on thought that the degree of water can be vital boundary with regards to the flood events particularly in catastrophe inclined territory. A water level sensor is utilized to distinguish the ideal boundary and if the water level arrives at the boundary the sign will be liberated progressively to interpersonal

organization like Twitter. A cloud worker was designed as information store. The estimation of water level is shown in far off dashboard. The proposed arrangement with coordinated tactile framework that permits inward checking of water quality. Cautions and significant information are communicated ludicrous to a cloud worker and can be gotten by client terminal possessed by customer. The result of water estimation is shown in online distant dashboard.

2.2. Wireless Sensor Network Using Flood Monitoring.

A neuro-fluffy regulator dependent on flood checking framework utilizing remote sensor organization. The appropriated sensor hubs utilized IEEE 802.15.4 convention, to gather sensor data, for example, water level information from the stream. The Sensor data is ship off circulated alarms focus by means of Arduino microcontroller and Xbee Transceiver. At the conveyed ready focus, XBee handset and Raspberry pi microcomputer are utilized to produce flood alert dependent on sensor data and to recognize flood information and this information are put away in data set. This isn't practical framework. Furthermore, execution likewise powerless when contrasted with our framework.

2.3. Deep Learning-based unmanned surveillance systems for observing water levels.

Another examination used the actual estimating ruler alongside various computational models in PC vision, including the differencing strategy, word reference learning and convolutional neural organization (CNNs).

2.4. Design of FIR filter for water level detection.

In a comparable methodology, Udomsiri et al. proposed the edge indicator limited motivation reaction (FIR) channels alongside bandpass channel to discover the limit among water and ground. The water level was identified by discovering highlights of even straight lines. The blunder of the discovery was determined by estimating the water level physically and contrasting the outcomes and the yield of the calculation.

3. PROPOSED SYSTEM

In this proposed system, the raspberry pi-pico model is used.It gets the values from rain and water sensors and compute the values .The data will be sent to Wi-Fi device which is then sent to the LCD screen for display purpose. Further the WIFI device sends all the sensed information to the client people through wireless communication. The water level and rain readings will be stored in the cloud. For Prediction purposes we need the data in csv format. From the cloud we can convert the data in csv format because we need historical data for prediction purposes. Processed data will be sent to the cloud using ESP8266 module. Cloud will store the data and can be further used to predict the chances of flood priorly.

4. METHODOLOGY

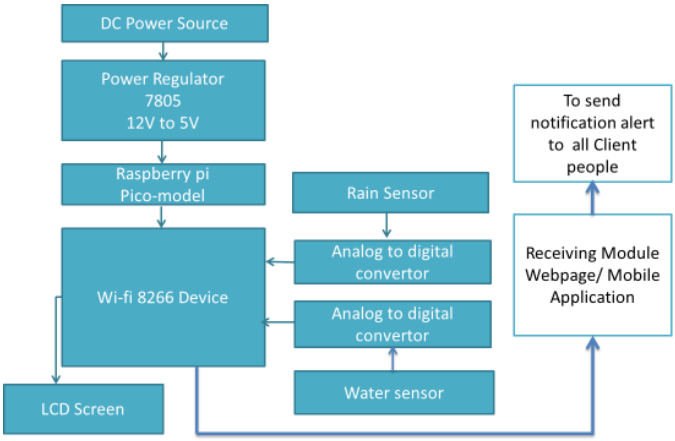

Fig 1: Block Diagram

In this block diagram dc power supply is given to the power regulator (7805) in this regulator is used to convert 12v to 5v. This power is given to the raspberry pi Pico gets the values from rain sensor and water sensor through analog to digital conversion. Further the values are sent to Wi-Fi device which will then sent to LCD screen for display purpose. The Wi-Fi module sends all the sensed information to the client people through wireless communication. The readings were stored in the cloud, processed data will be sent to the cloud ESP8266 module and can further used to predict The Chances Of Flood Priority. Finally, It Alerts The clients or people who are nearby lake or river through warning alerts.

4.1. ESP8266 Wi-Fi Device

Hub MCU is an open-source Lua based firmware and improvement board uncommonly focused for IoT based Applications. It incorporates firmware that sudden spikes in demand for the ESP8266 Wi-Fi SoC from Espressif Systems, and equipment which depends on the ESP-12 module. The Node MCU ESP8266 improvement board accompanies the ESP-12E module containing ESP8266 chip having Tensilica Xtensa 32-digit LX106 RISC microchip. This chip upholds

RTOS and works at 80MHz to 160 MHz flexible clock recurrence. Hub MCU has 128 KB RAM and 4MB of Flash memory to store information and projects. Its high preparing power with in-assembled Wi-Fi/Bluetooth and Deep Sleep Operating highlights make it ideal for IoT projects.

4.2. LCD Display

A model depicted here is at its negligible exertion and fantastic possibilities generally a large part of the time used before long. It relies upon the HD44780 microcontroller (Hitachi) and can show messages in two lines with 16 characters each . It shows all of the letters all together, Greek letters, highlight marks, mathematical pictures, etc Moreover, it is doable to show pictures that customer makes up in isolation. Modified moving message on display (move left and right), appearance of the pointer, background brightening, etc are considered as accommodating ascribes.

4.3. Power Supply

The current part presents the activity of force supply circuits assembled utilizing channels, rectifiers, and afterward voltage controllers. Beginning with an AC voltage, a consistent DC voltage is gotten by redressing the AC voltage, at that point sifting to a DC level, lastly, managing to acquire an ideal fixed DC voltage. The guideline is generally acquired from an IC voltage controller unit, which takes a DC voltage and gives a fairly lower DC voltage, which stays as before regardless of whether the info DC voltage fluctuates, or the yield load associated with the DC voltage changes.

4.4. Rain Sensor

The rain sensor module/board is shown below. Basically, this board includes nickel coated lines and it works on the resistance principle. This sensor module permits to gauge water through analog output pins & it gives a digital output while water threshold surpasses.

4.5. Water Sensor

This water sensor module is used to detect the waterof the soil. It measures the volumetric content of water inside the soil and gives us the waterlevel as output. The module has both digital and analog outputs and a potentiometer to adjust the threshold level.

4.6. Raspberry Pi-Pico Controller

The Pico is basically a PCB with Microcontroller, miniature USB Port, some significant segments and fortified edges. PCB with edge fortifications permit you to weld this board on another PCB. How could this be helpful?

Consider you are planning an item with RP2040 Microcontroller. On the off chance that you utilize an uncovered microcontroller chip n your equipment, you need to plan the force supply circuit, the clock circuit, the USB circuit and so on This is the base necessity for RP2040 to work.

Since the Pico as of now has every one of these hardware ready, you can utilize the Pico as a baseboard in your equipment and plan just the fundamental piece of the application like a LED Control Circuit or a Motor Driver Circuit. This methodology lessens the exertion of equipment engineer and furthermore an opportunity to-market of your item.

4.7. Python Idle

Inactive (Integrated Development and Learning Environment) is a coordinated advancement climate (IDE) for Python. The Python installer for Windows contains the IDLE module as a matter of course.
Inactive isn't accessible as a matter of course in Python disseminations for Linux. It should be introduced utilizing the particular bundle supervisors.

4.8. Thing Speak Web Page

Thing Speak is an IoT examination stage administration from MathWorks®, the producers of MATLAB® and Simulink®. Thing Speak permits you to total, picture, and dissect live information streams in the cloud. Thing Speak gives moment perceptions of information posted by your gadgets or gear. Execute MATLAB code in Thing Speak, and perform online examination and preparing of the information as it comes in. Thing Speak speeds up the improvement of evidence of-idea IoT frameworks, particularly those that require investigation. You can construct IoT frameworks without setting up workers or creating web programming. For little to medium-sized IoT frameworks, Thing Speak gives a facilitated arrangement that can be utilized underway.

4.9. ThingSpeak Widget

The widget features:

- Create widgets to monitor actual Fields' values in your Channel – one or two in every widget.
- Monitor many Fields from different Channels creating several widgets in one screen.
- Monitor Private Channels using Read API Keys.

- Set higher and lower alert thresholds to recieve alerts if monitored field's value exceeds these thresholds.
- View and customize charts, set up period or results count, average, sum or median the values there.
- Set up the URL of your own Thingspeak server instance to monitor data from it.

5. RESULTS AND DISCUSSION

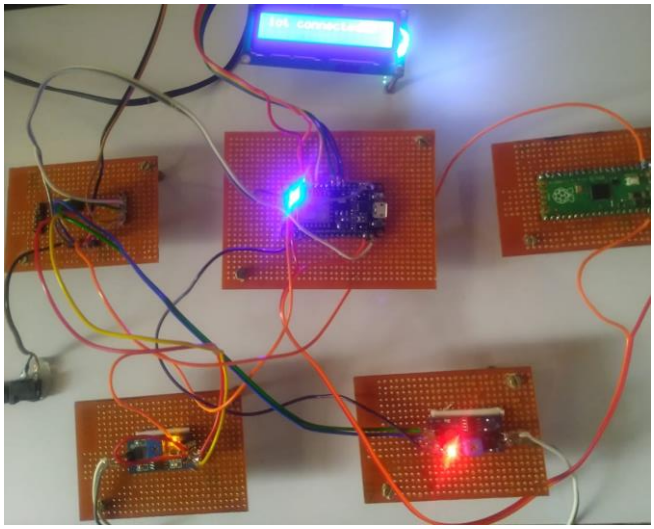

FIG 2: Experimental Setup

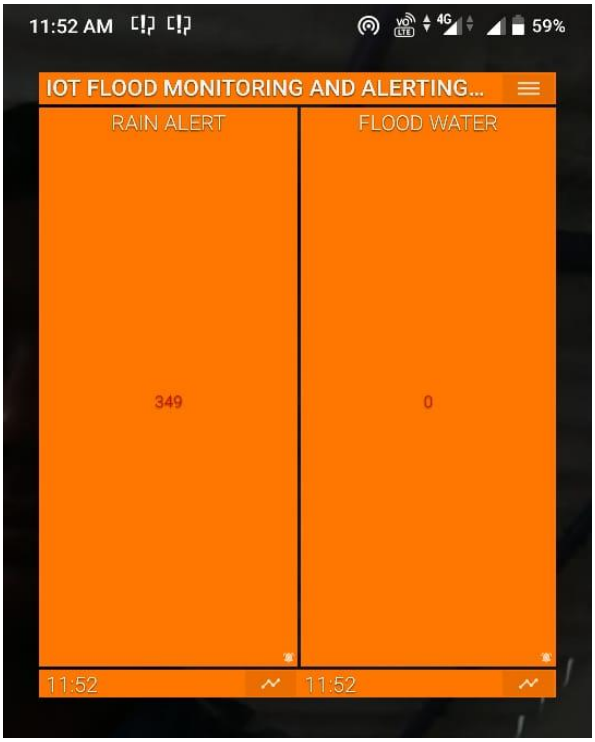

FIG-3: ThingSpeak Widget

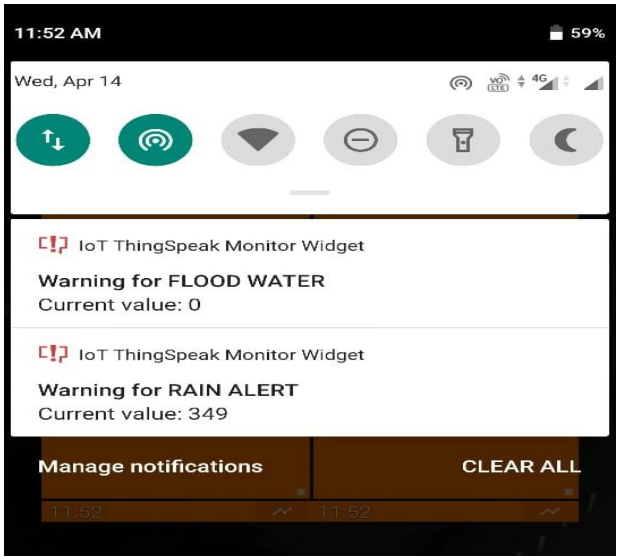

FIG 4: Alert and Warning

Proposed methodology is implemented on raspberry pi pico processor with python idle. The above figures shows that the results of flood monitoring ,fig 7.1 shows the experimental setup of flood monitoring and alerting, fig 7.2 shows the ThingSpeak widget it is used to see the alert of flood and fig 7.3 shows the alerting and warning. For example, it gives alerting by the way of displaying message like flood water alert and rain alert.

6. CONCLUSIONS

As India confronted ongoing wrecking flood in tamilnadu, there emerge a need of proficient flood observing frameworks. Flood anticipating and the giving of flood alerts are powerful approaches to decrease harm. The proposed framework will be productive in light of the fact that it has better coordination of checking, correspondence and transmission advancements which are versatile to foundation condition. The proposed framework additionally guarantees expanded availability for evaluation of crisis circumstances and improves adequacy and productivity in reacting to disastrous episodes. In rundown, the proposed framework would be gainful to the local area for dynamic and arranging purposes.

7. FUTURE ENHANCEMENT

- The flood alert information can be displayed onLED display boards for road users and for safety reasons could be placed at strategic locations.
- Such information should be in real time and transmitted wirelesslyfrom the measured location.

- The flood observatory system will be easy to install and maintained if it is powered by solar cells.

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