

Flood Alerting Structure for Parking Lots with Wireless Remote Monitoring Assistance

S.P.V. Subba Rao, T. Ramaswamy, Karanam Jaya Chandra

Abstract--- Modern coastal cities all around the world are affected due to flash floods and non coastal urban cities are of no exception, small drizzles can lead to a huge accumulation of water on the streets which submerge the vehicles in parking lots and in low lying areas causing huge loss of assets. The proposed system provides efficient real time monitoring of parking area and parking lots. In the proposed system to monitor the flood condition we are using water level sensor which is gives us actual water level in the parking area. Also we are using slot sensor for checking availability of vehicle slots, if slots are available then system will allocate that slot to the new user who wants to park their vehicle. For real time monitoring of parking area we are using camera, by using camera we can see live video stream of parking area at the time of flood. Here we are using IOT technology, so the system will feed the video stream to the cloud and user can easily see the live video stream of the parking area by using particular IP address.

Keyword--- Water level sensor, Slot sensor, Zigbee, Arduino, Bluetooth, IR sensor, Raspberry pi, camera etc.

I. INTRODUCTION

IoT (Internet of Things) was come up by EPC global. IOT interconnects human to thing, thing to thing and human to human. The goal of IoT is bring out a huge network by combining different types connected devices. IOT empowers people to carry out routine activities using internet and thus saves time and cost making them more productive. This paper proposing a unique and efficient system for timely monitoring of situation in parking lots for users by exporting the data to cloud by utilizing IOT. The proposed system contains two units one is transmitting unit and another one is main unit. The transmitting unit consist of water level sensor and slot sensor. The water level sensor is used to measure water level in the parking area and slot sensor is used to check availability of vehicle slot. In the transmitting unit arduino board is used to control all sensors, this unit need to continuously communicate with the main unit because transmitting unit acts as a sub system which is only monitor water level and slot availability, these sensor data have to send to the main unit so that purpose zigbee technology is used to communicate two units. The main unit consist of zigbee, Bluetooth, camera and motor etc. So for controlling these all devices we are using raspberry pi which is

continuously communicate with the transmitting unit and cloud. The main unit is receive sensors data from transmitting unit and status send to the cloud, also it contain camera when flood is occurs then this unit will gives live video stream and feed to the cloud.

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD-licensed product, OpenCV makes it easy for businesses to utilize and modify the code. The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms.

II. EXISTING AND PROPOSED SYSTEM

Existing system

This system was previously developed but they have some disadvantages:

1. The existing system is apt for only domestic places with registered users only.
2. The alert's to user are sent through messages where it is purely FIFO based so if no of users increases the last user gets alert only after all the users finished in queue.
3. Arduino Boards are used in existing system which has less capability for handling the server.

Proposed system

The proposed system will overcomes the problems present in the existing system by making it applicable to domestic as well as in commercial places.

III. BLOCK DIAGRAM

Transmitting unit

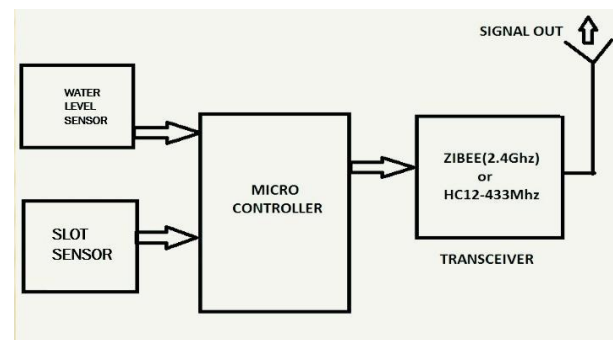


Fig 3.1: Block diagram of transmitting unit

Manuscript received February 01, 2019

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Main unit

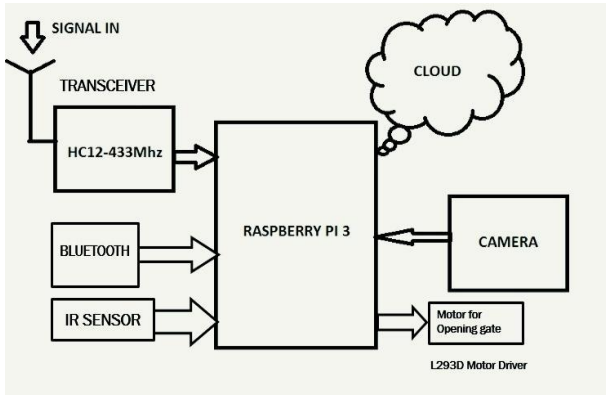


Fig 3.2: Block diagram of Main unit

BLOCK DIAGRAM DESCRIPTION

Water level sensor: The sensor used for measurement of fluid levels is called a level sensor. In this system the level sensor is used to monitor the water level in the parking place for detecting flood condition.

Slot Sensor: The slot sensor is used to check whether the vehicle is present or not in the parking place. Here in this system we are using IR sensor as a slot sensor.

ZIGBEE: Zigbee is new wireless technology guided by IEEE 802.15.4 Personal Area Network standard. It is primarily designed for the wide ranging controlling applications. In this system the zigbee is used to send sensors data to the main unit, here we are using HC12 Zigbee module.

Bluetooth: The Bluetooth is wireless communication device, by using Bluetooth we can communicate from one device to another. In this system the Bluetooth is used to communicate with the user. If user wants to park vehicle then he should register first with his email id by using mobile, so to communicate the user mobile and main unit we are using Bluetooth.

IR Sensor: The IR sensor is used to detect whether vehicle entered or not in the parking place. The IR LED is used as the IR transmitter, which is connected by using the resistor logic. The IR receiver is connected by using the transistor logic whose base of the transistor is connected to the photo diode through the resistor.

Motor Driver circuit: The motor is used to open and close the gate, for opening and closing the motor should rotate clockwise and anti clockwise direction for that purpose we are using motor driver circuit.L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

Microcontroller: This section forms the control unit of the whole project. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written. In the transmitting unit we are using arduino board, and in the main unit we are using raspberry pi.

IV. WORKING

- 1) The IR sensor is used to detect vehicle in the parking entrance. If any vehicle is detected in the entrance of parking then the IR sensor gives signal to the microcontroller. The microcontroller will turn ON Bluetooth to registration.
- 2) The LCD display is used to show the availability of parking slots. So the microcontroller is communicate with transmitting unit. The transmitting unit check availability of slots and that data will send to the main unit with help of zigbee. So the microcontroller of main unit will receive data from zigbee and display on LCD which placed at entrance of parking.
- 3) If slots are available the user will have to register with his email id through Bluetooth connectivity.
- 4) Once the user registration is completed then microcontroller will generate signal to the motor, and motor will open the gate so that vehicle will be allowed to park in slot.
- 5) In this system the camera is used to give live video of parking area which is interfaced to the microcontroller. Normally main unit is continuously communicate with the transmitting unit to check water level. If water level is high then transmitting unit will send the signal to main unit and then microcontroller of main unit will turn ON camera and live streaming will feed to the cloud. Also microcontroller will send alert message as email to the registered email id.
- 6) In this project we use PORT FORWARDING TECHNIQUE which is dependent on only private servers as commercial places will be having private servers allocated to them so we can make use of this private servers for port forwarding so that if a person parked his vehicle and went some ware i.e. out of LAN VICINITY then in that situation Port forwarding techniques will allow to upload feed to that user also who is in remote place i.e. out of LAN VICINITY can also view the live feed of camera.

V. FLOWCHART

Transmitting unit

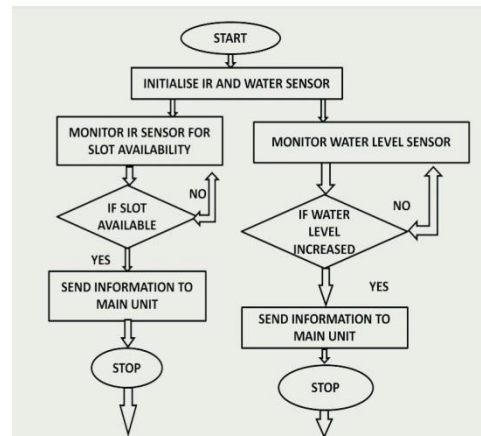


Fig 5.1: Flowchart of transmitting unit



The transmitting unit is continuously communicate with the main unit. The transmitting unit is used to monitor water level in parking area and vehicle slots availability and these data will send to the main unit. The working flowchart of transmitting unit is shown in fig(6.1).

Main unit

The function of the main unit is to check vehicle status and monitor water level. If vehicle is detected then check availability of slots and turn ON Bluetooth for registration and allocate particular slot to the user. If water level is high the it will gives the alert message as a email to registered email id. The working flowchart of main unit is shown in fig(6.2).

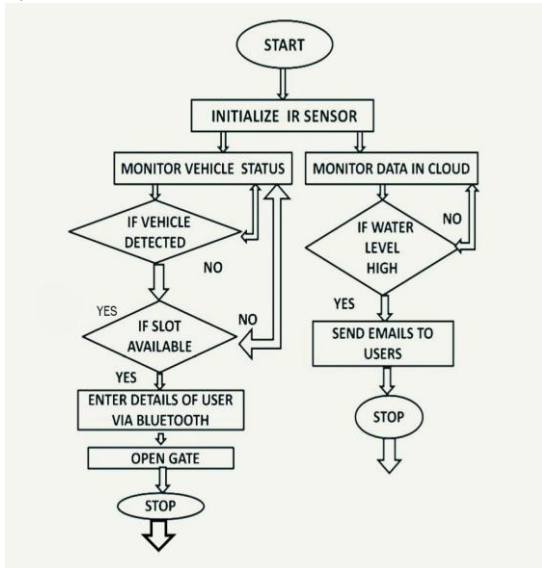


Fig 5.2: Flowchart of main unit

VI. RESULTS

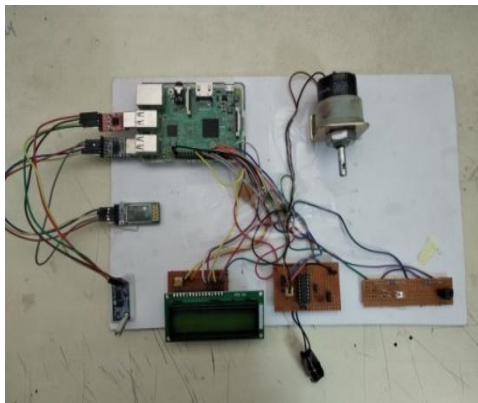


Fig 6.1: Hardware model of main section

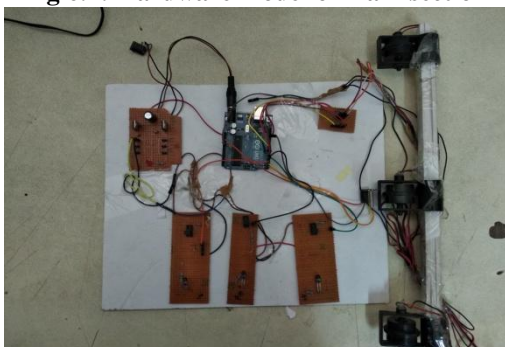


Fig 6.2: Hardware model of transmitting section

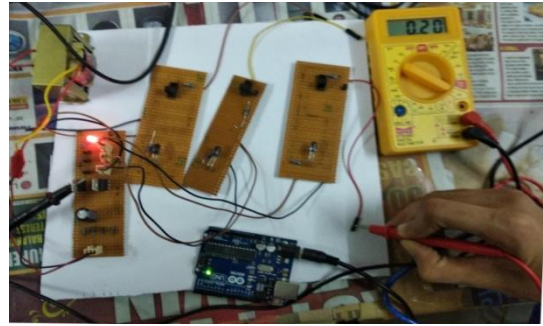


Fig 6.3: System hardware transmitting unit

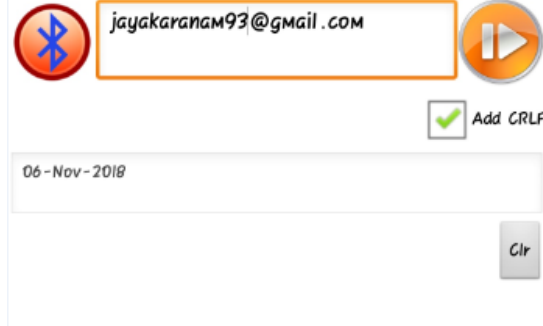


Fig 6.4: User registration via bluetooth



Fig 6.5: Dashboard which display water level & slots availability into the user mobile



Fig 6.6: dashboard which display water level & there is slots are not available



Fig 6.7: Dashboard which display water level is 50% & slots are not available

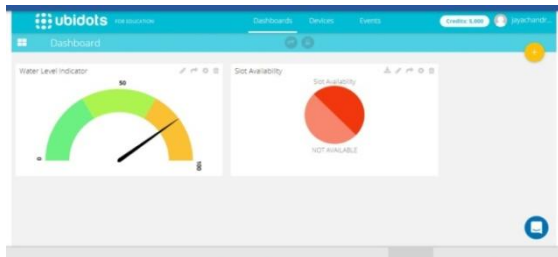


Fig 6.8: Dashboard which display water level is & slots are not available

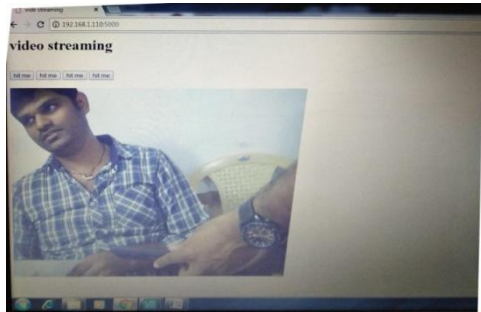


Fig 6.9: Live video streaming when water level is high

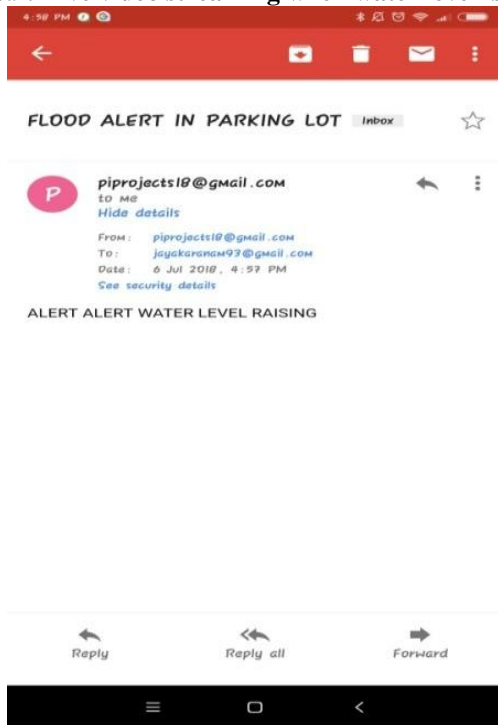


Fig 6.10: Email alert when water level is high

VII. CONCLUSION

A complete real-time flood monitoring system has been proposed in this paper. In this system there are two units, one is the transmitting unit and another one is main unit. The transmitting unit monitor the actual water level and vehicle slots availability. The main unit will receive the transmitted data from transmitting unit and slot is allocate to new user who wants to park his vehicle, also it will send the alert message as a email to only registered email id. This paper provide a real time system able to monitor sudden floods in parking lots, creating a personal opt-in alert that could reach an end user through their mobile phone.

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