DRAIN BLOCKAGE DETECTION MODULE

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ABSTRACT- In India adoption of drainage system is very important. There are many uncleaned and blocked open drain due to careless of drain cleaners. Smart and subversive drainage system is an imperative element of a multiple infrastructure. It is undoubtedly forming an integral part of our daily life. Nowadays people are facing many problems regarding drainage system. It is very important that this system should work in a proper manner to keep the city clean, safe and healthy. There are many unclean and blocked open drains due to the careless of drain cleaners. If they fail to maintain the drainage system the pure water may get contaminated with drain water, can spread infectious diseases. This leads to increase the quantity of mosquitoes which can cause dengue, malaria and some other health issues. By using ultrasonic sensor, the information will send to an ESP32 microcontroller whenever block is detected. If the level reached to the threshold level, the problem will be indicated and displays the messages on the 16x2 Liquid Crystal display (LCD) this information is sent through Global System for Mobile Communication (GSM) to the nearby municipalities service for the further corrective action

KEYWORDS — Drainage, Sensor, SMS

I.   INTRODUCTION

The world is growing rapidly into smart cities but the problem faced are still the ones from primitives. The modern world as a great need of modern advancements and sophistication in its planning system. The drainage system is an important component of urban infrastructure. The infectious diseases may spread more, if the drainage is not maintained properly. During rainy reasons, the drainage blocks due to heavy floods. This causes serious threat to humans. Drain, a fixture that provides an exit point for a waste water or for water that is to be recirculated on the side of a road. Drainage system are also in place to remove waste water effectively, and this referred as sewage system. If the drainage management system is not maintained properly, then results in low-lying area flood, causing severe damages to environments. An efficient drainage is one which removes unwanted water without disturbing the environment and producing health issues. If the drain is blocked completely, it becomes difficult to handle situation. So, because of that public face inconveniently. Detection of drainage water level and blockages in the drainage. Checking water flow rate continuously, as well as sending automatic mail, display on the monitor if the water level is outside of an expected normal range. The main objective is to obtain an effective low-cost and flexible solution for condition monitoring and infrastructure management in the city.

II.   RELATED WORKS

The Smart Underground Drainage Monitoring and Detection System using IOT has been published on February 2020 by Ankita Karale, Snehal dhurjad, Seema Lahamage, Mansi Chaudhari proposed the intelligence of sensors and where we are able to simply monitor and rectify the issues in real time.The Smart Drainage System using Zigbee and IOT has been published on November 2019 by V. vani, M. Mohana, D.Vanishree, K.S.Subiksha, M.Sushanthika proposed the monitoring of drainage lines in the underground drainage system and infrastructure management in the city by detecting drainage water level and clogging in drainage using Zigbee.The Smart Sensors and Arm Based Drainage Monitoring System has been published on September 2019 by Arulananth T S,Ramya Laxmi G,Renuka K, Karthik proposed using ARM7 processor.The Smart Drainage Monitoring and Clog Removal using IOT has been published on September 2018 by M.Joseph Marcian,S.Sabarishwaran ,D.Sudhagaran, DR.S.Sathiyapriya proposed the removal of clog from the

sewage system using chemicals in the drainage pipes to monitor and eradicate the clog automatically.Underground Drainage Monitoring System Using Water Flow sensor has been published by Dr. Gunasekaran, M. Pavithra, Priyanka, R. Reeya M, IOT May 2019 which is used to monitor underground water flow level using IOT.

III. EXISTING METHOD

3.1 Arm Based Drainage Monitoring Method

This system is implemented to maintaining the proper health, neatness and safety of the city and also in reducing the work of government personnel. Different types of sensors like flow, level and gas detecting sensors are interfaced with microcontroller Advanced Risc Machine (ARM7). ARM7 updates the live values of all sensors to the web server using Internet of Things (IOT). The entire information regarding sensors will also be displayed on the 16*2 LCD [5].

3.2 Zigbee Based Monitoring Method

The Sewage of domestic and industrial sites is disposed of together on to the drainage system. During heavy rainfall, the excess rain water will increase the flow rate of water which will exceed the range of the drainage pipe line which in turn causes overflow [2]. The Raspberry pi could refresh with live information under the particular region utilizing ZigBee and trigger a caution.

IV.   PROPOSED SYSTEM

The working principles series of drain blockage detection module of above is, the main concept is to detect any blockage in the drainage.

After detecting the block in drain, exact venue of the block will be shared to the municipality using GSM module. Stepdown transformer has been used whose ranging is 230 V.A step-down transformer which converts high voltage to low voltage and low current to high current from the primary side and secondary side of the transformer. This process is known as step-up transformer. Rectifier is used to rectify the block in the drain [1]. A rectifier which converts AC, that reverses direction to DC, flows only in one direction. Rectifier used here is full wave rectifier, Full wave rectifier rectifies the full wave.

ESP32 Microcontroller is used to reveal the drain block. ESP32 is in the series of low power and low cost on chip microcontroller. It comes up with bound dual mode Bluetooth with Wi-Fi. It provides utility, strength and accuracy in huge applications. GSM module distinguish drain blockage and it has an inbuilt GPRS in order to indicate the location, with the help of GSM module the blockage areas of drain. In order to indicate the level of the drain the ultrasonic sensor is used and it is intimated on LCD display[8]. Depending upon the distance of the block that can becomes close to the ultrasonic senor the drain level changes. The level goes either higher or lower. The Threshold level is fixed as 10 cm. If the drainage level goes below 10cm, it will alert the municipality using the blynk application. The LCD display shows immediately threshold level reached and drainage block detected using the GSM module the location of the module has been sent to corresponding municipalities.

This block diagram contains stepdown transformer as power supply unit, Rectifier, Regulator, ultrasonic sensor, GSM module, LCD display and antenna. Whenever the flow of water is normal there is no problem but when the water flow is disturbed or blocked by any object immediately the ultrasonic sensor sends the signal to microcontroller. With the help of microcontroller, the block that is detected is displayed in an LCD. The detection message is sent to corresponding municipality with the help of GSM module with the signal that is received from the antenna as shown in figure 1.
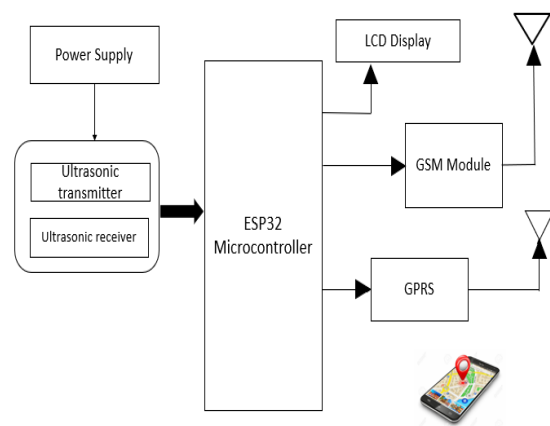

Figure 1 Block Diagram of Drain Blockage Detection Module

V. SYSTEM ARCHITECTURE

A. Step down Transformer

A step-down transformer is a passive device that transfer electrical energy from one circuit to another or multiple circuits. The following figure 2 shows the stepdown transformer.
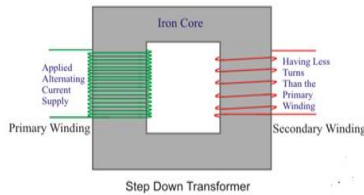

Figure 2 Stepdown Transformer

The step-down transformer which is used to convert power supply from primary side to secondary side. Here 230V is converted and supplied as 12V and supplies power to the whole circuits.

B. Rectifier

A rectifier is a device which converts the alternating current AC, which reverses the direct current and flows only in one direction. Inverter performs the reverse operation. The process is known as rectification, since it straightens the current direction as in figure 3.
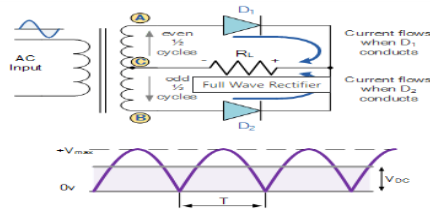

Figure 3 Full wave rectifier

It consists of two power diodes connected to a single load resistance (R_L) in which each diode supply current to the loads, when transformer point is positive with respect to point C.

C. Regulator

A regulator is a device which controls pressure, temperature and fluid flow. Voltage regulator keeps the stabilized power level. The structure of regulator is shown in below figure 4.

Figure 4 Regulator

Regulator gives a constant voltage for output in a varied input voltage. It is the regulator can also act as an adjustable voltage regulator.

D. Ultrasonic Sensor

It is a device which measures the space of the targeted objects by emitting the ultrasonic sound waves, and converts the sound reflected into an electrical signal [10]. It emits short high frequency sound pulses at regular interval. Ultrasonic sensor propagates in the air. If once they strike an object, they reflected back as echo signals to the sensor. The structure of ultrasonic sonic as shown in figure 5.

Figure 5 Ultrasonic Sensor

E. Microcontroller

ESP32 is setup and progressed by Espressif Systems. It is a replacement of ESP8266 microcontroller [4]. ESP32 is of low-cost, low-power system on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth as shown in figure 7.

Figure 7 ESP32 Microcontroller

VI. EXPERIMENTAL RESULTS

When flow of drain water is blocked by any objects the water level of drainage will increase. If it reaches the certain level, sensor will detect and pass the information to the ESP32 microcontroller. The GSM module and GPRS module which is connected with the microcontroller will send the information immediately to the corresponding municipality as shown below in figure 10 and 11.
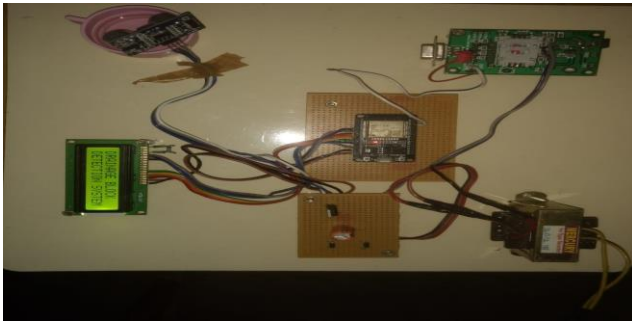

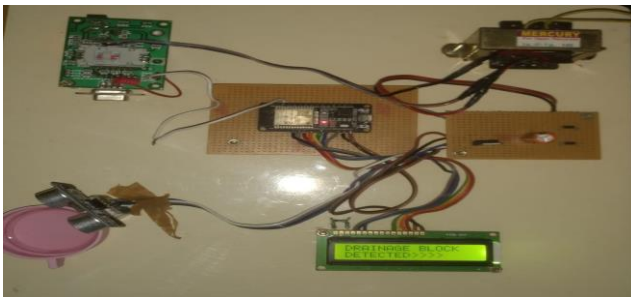Figure 10 Hands on Kit of DRAINBLOCKAGE DETECTION MODULE without blockage

Figure 11 Hands on kit of DRAIN BLOCKAGE DETECTION MODULE with blockage

VII. CONCLUSION

Thus, aim of our project is to create a safe and healthy environment by creating a smart drain track system. This paper contains about smart and real-time drainage tracking system with the help of IoT applications for metropolitan cities. This system avoids or eliminates the issue of drainage overflow on roads which is being a vital problem in many cities. The advantage of the project is that clogs in drainages can be revealed as soon as it is formed rather than detecting it after the drainage water starts overflowing into the roads causing serious disruption to the public and revenue loss to the government.

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