Implementation of IoT based smart village for rural development

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ABSTRACT

Villages are considered the heart of our nation India and economic growth of villages along with cities is as important to us. Hence, for the development to percolate to the grass root level, focus must be devoted to the progress of the village. Enabling the concept of IOT (Internet of things) for increasing the possibilities of agriculture growth and productivity, sanitation and well maintenance of drainage which concerned cattle health and human health would lead growth of farmers for their smart lifestyle. Therefore, farmer’s need appropriate facilities and guidance in making their village smart, so this paper IoT implementation proposed for farmers where various data is collected regarding the weather, moist content in soil, blockage and clearance drainage along harmful gases and dairy products where this information is delivered. This system through Raspbian OS, taking input from sensors like IR, UV, LDR. The data is analyzed by collective information and auto-mechanism of some instruments which are connected to reach the target are initiated along sending appropriate messages through GSM to their phones, where Wi-Fi is by default feature included raspberry pi board as no internet connection is required again for communication.

Keywords— IoT, Raspbian OS, GSM and sensors

1. INTRODUCTION

This paper, we have explained implementation of IoT using software Raspbian OS and the workflow is explained in figure 1. This paper is divided into three modules. The first module is about drainage monitoring. Nowadays technology is increasing and people fail to take care of their surroundings. There are many types of pollution such as air, soil and water pollution. Out of these pollutants air pollution is the major problem since others can be identified virtually but air pollution can’t be identified since it is colorless and odorless. This pollution is mainly by the drainage breaks and blockage. In this project the harmful gases can be detected and the blockage can be cleared. IOT takes the major portion where the harmful gases are identified by the sensor and the blockage is detected by the IR sensor and using a shaft it is cleared automatically.

Next module is the field monitoring. If the farmers know the climatic condition of the environment, they can plan ahead about the crop yield. The climatic condition of the particular place is updated to the farmer through his mobile phone and acts according. If the farmer wants to water his crops, he/she need not go to the farm, the sensors will help. The soil moisture sensor will sense the amount of water present in soil accordingly it will pump the water. This takes place automatically that is on and off of the motor pump.

The third module is about dairy monitoring. Farmers can be cheated mainly in dairy because they may not know the amount for their quality of milk. Here the quality of milk is detected and the farmer will know for what amount the milk is sold. He/she need not maintain any records of it. They get the notification for every transaction. This can be done in every home instead of going to the dairy and finding it out.

2. IMPLEMENTATION

2.1 Field monitoring

Climate is more important for farmers since it can’t be predicted. Sensing module: It comprises humidity, moisture and temperature sensors. Figure 2 talks about field monitoring workflow. These sensors are used to sense temperature and humidity of the environment whereas moisture sensor is used to sense water content in soil, the sensing process is done by the sensors and the values are passed to the raspberry pi microcontroller.
Processing module: The humidity and temperature sensor are connected to raspberry pi and power supply. The soil moisture sensor is linked to the driver, this driver is connected to power supply and MCP which is used to convert analog to digital values. MCP is connected to microcontroller. And the microcontroller is linked to a 2-channel relay. Relay is then connected to the submersible water pump. The raspberry pi processes it and respective temperature, humidity and moisture values are displayed on 16*2 LCD. If the soil moisture level is less than the threshold value (200) this is explained in figure 5 then the water pump starts pumping water automatically to the fields. This information is given to the farmers through mobiles.

2.2 Drainage monitoring
Sensing module: It comprises MQ-3 and IR. Figure 3 explains the workflow of this model. MQ-3 is a low cost and semiconductors sensor, here it is connected to a raspberry pi board which detects alcoholic gases like methane, Carbon Monoxide and oxides of nitrogen particles respectively. TOXIC emission from DRAINAGE is passed to the sensor. The sensing process is done by the sensor and the values are passed to the Raspberry pi microcontroller. And in the same way IR detects for blockage, normally when light passed to the sensor it produces HIGH output and when no light passed to it, produces LOW output. When an area surrounded by blockage, no light can be detected, those values are passed to the Raspberry pi microcontroller.

Processing module: Microcontroller plays a main role in processing the emission values. Based on the data received from the MQ-3 and IR sensor, the Raspberry pi processes it compares the CO and NOx values with the threshold values. The threshold value for CO is 300 parts per million (ppm). If the emission is above the threshold value this is explained in the figure 6, then the value is displayed on 16*2 LCD and with respect to these values and light detected by the sensor, the motor with shafts automatically turned on and clears the blockage, along messages are also delivered to phones.

2.3 Diary monitoring
Quality of milk is the place where the farmers are misled.
• Sensing module: It consists of LDR (Light Decreasing Resistor) sensor. LDR is a passive component that decreases resistance with respect to receiving luminosity (light) on the component’s sensitive surface. This sensor with the help of LED can be used to check the quality of milk. Figure 4 explains the workflow of the dairy module. The LED transmits light that is received by the LDR. The amount of light passing through the milk gives the amount of fat present. The less the resistivity, less the fat present. These values are sensed and the values are passed to raspberry pi.
• Processing module: The LDR sensor is connected to the MCP. MCP is connected to the power supply and Raspberry pi. The LED is connected to the power supply. When the milk is placed between the sensor and LED, the resistivity of light determines the quality. The raspberry pi processes it and respective values are displayed on 16*2 LCD. The graph is explained in figure 7. The quality of milk and amount for the particular value is sent to the farmer through messages.

3. OUTPUT
4. CONCLUSION
Using the proposed system, the model can be made completely automated and hence the objective is to keep rural areas clean and avoid environmental pollution by Drainage Monitoring and Smart Weather system. Thus, it can be concluded with respect to the result obtained that the proposed prototype can be better and play a vital role in projects like “Economic development and Smart Villages” and in making Indian smart and clean. The proposed system can be further modified on different levels of designing and implementation. This project has enormous potential and may be used in various other ways due to its cheap and cost-efficient design.

5. REFERENCES