Village Sanitation System

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Abstract - **Health is an important component for ensuring better quality of life. Large masses of the Indian poor continue to fight hopeless and constantly losing the battle for survival and health. In rural India, where over 50 percent of families are living in poverty, it is not only food security but also ill-health, which causes serious distress. Even after 50 years of Independence, we have an infant mortality of 87 per 1,000 with most babies dying due to diarrhea and other minor diseases related to portable water, hygiene and sanitation Less than 10 percent of the rural population uses toilets and such lack of sanitary conditions and shortage of clean drinking water are directly affecting the health of most of the rural people. We present the working model of "VILLAGE SANITATION SYSTEM". This project is a prototype of embedded Arduino, which utilizes Humidity Temperature Sensor to obtain Environment details like Temperature & Humidity. The main aim of this prototype is to study about the implementation of temperature and humidity system, which will perform the live observation and monitoring in it through the LCD which constantly displays the details provided and processed by the microcontroller. If any change in input from sensor, then relay will start the spraying pump also buzzer will get ON.**

Keywords: Village, Sanitation System, health, Temperature, Humidity.

I. INTRODUCTION

Health is an important component for ensuring better quality of life. Large masses of the Indian poor continue to fight hopeless and constantly losing the battle for survival and health. The war begins even before birth, as malnourishment of the mother reduces life chances of the fetus. Only the sturdiest survive the subsequent onslaughts of unsafe and unhygienic birth practices, unclean water, poor nutrition, subhuman habitats and degraded and unsanitary environments. With little or no access to health care, the grim battle continues into adulthood, until precarious survival once again spawns a fresh cycle of birth and struggle. In rural India, where over 50 percent of families are living in poverty, it is not only food security but also ill-health, which causes serious distress. Even after 50 years of Independence, we have an infant mortality of 87 per 1,000 with most babies dying due to diarrhea and other minor diseases related to portable water,

hygiene and sanitation Less than 10 percent of the rural population uses toilets and such lack of sanitary conditions and shortage of clean drinking water are directly affecting the health of most of the rural people. While the world is concerned with emerging diseases like AIDS, rural India is still highly affected by the age-old problems of TB, malaria and diarrhea on the one hand.

The idea of this thesis & it's prototype is to build an Arduino-based embedded system for monitoring environmental variables: humidity and temperature and to study its performance in different temperature and humidity for small rural area. The prototype is built using the microcontroller Arduino and sensors, which could sense the temperature and amount of moisture in a village and provide information in a serial monitor and a liquid crystal display (LCD). Out of many clones and different available microcontroller boards, Arduino is used in this project.

This system deals with an innovative idea of Humidity & Temperature Monitoring. Which provides best measurement of two common Environmental Parameters i.e. Humidity & Temperature using Arduino based on microcontroller and sensors. This project consists of three sections - one senses the humidity and temperature by using temperature humidity sensor DHT11. The second section senses the gas by using gas sensor MQ2. And the third part of the system displays humidity and temperature on LCD.

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II. LITERATURE REVIEW

[1] Greenhouse Using an Arduino system, a monitoring and control system, 2019 this study aims to support small-scale farmers' convenience and ease of plant growth. Small

farmers will be able to grow healthy crops all year long with little oversight according to the suggested method. Monitor changes in temperature, humidity, and light intensity using this system.

[2] The creation of an automated system for managing a greenhouse. The automation system demonstrates how it might reduce yearly water usage. Automation must also take into account the needs of the plants and not merely focus on lowering water usage. Only the benefits of the automated system in terms of lowering consumables, like water, have been mentioned in this study.

[3] Microcontroller-Based Intelligent System for Monitoring and Controlling the Environment in Greenhouses. The monitoring and control system for greenhouse farming is described in this research as being straightforward and intelligent. With a sensor array and autonomous operation, the system tracks crucial greenhouse parameters in real-time.

[4] Design and prototyping of an Internet of Things system for greenhouse monitoring. This study has been successful in creating a working prototype of an internet of things (IoT)-based system for tracking greenhouse environmental conditions.

[5] Automated greenhouse monitoring system powered by IoT. In a closed greenhouse setting, the ideal circumstances required for the growth of the SPINACH crop are automatically maintained.

[6] The International Conference on Control, Automation, and Robotics Design of Greenhouse Environment Monitoring System Based on Wireless Sensor Network. This study offers a design for a greenhouse environment monitoring system that uses temperature, humidity, and light intensity sensors to combine detection, communication, alarm, display, and other tasks into one.

[7] In 2019, the International Conference on Computing, Control, Networking, Electronics, and Embedded Systems Engineering presented a paper titled "Greenhouse Monitoring and Control System Based on Wireless Sensor Network. "In a greenhouse, wireless sensor nodes equipped with temperature and humidity sensors were used to create a WSN.

[8] Analysis and Prediction of Crop Greenhouse Parameters Journal of Computer Applications International, IEEE.The parameters of the crops' greenhouses are examined using a variety of sensors. Cucumber, tomatoes, brinjals, papaya, and other crops were chosen for analysis. The necessary ideal range of greenhouse characteristics for each of these crops is also taken into account simultaneously.

III. PROBLEM STATEMENT

The present scenario is 30% of villages in Maharashtra are without toilets having the entire problem listed above. Even though there is a continuous effort toward rural sanitation either it is viewed secondary or a neglected aspect of life without really knowing the effect of such a sanitation system. Therefore, there is a need that alternative and appropriate methods of designing the rural sanitation systems, like sustainable methods construction of rural toilets, use of alternative materials, economy etc.

IV. OBJECTIVES

- To design and develop village sanitation system based on temperature humidity.
- The aim of our project is to measure environmental conditions i.e. Humidity & Temperature both in single module. Also, we are going to build an Arduino based embedded device for monitoring of small industrial Unit (monitoring environmental variables temperature and humidity) and to study the characteristics of its performance.
- To observe different environmental conditions by using the prototype in NTP (normal room temperature/humidity), outdoor temperature/humidity and the insulated wooden box inside the given industrial Unit.
- This includes practical steps to follow for this developing prototype that can measure temperature and humidity of building or surrounding and display readings in a LCD display (liquid crystal display) and serial monitor as well using Arduino board and sensors.

V. METHODOLOGY

The system uses an Arduino as the microcontroller to control all of the components. It is using software Arduino IDE as a platform to make the coding.

The theme of this project is to monitor the environment of the village and sanitize it if any change in input value.

The methodology is divided into three parts.

The first part is on the design structure, followed by hardware description and the finally on the programming design.

All these three parts were assembled together and experiments were then performed to build a system that can observe and monitor the environmental changes in village in order to provide better sanitation system.

VI. SYSTEM DESIGN

The main components of our project are ATMEGA 328, DHT11 Sensor, Gas Sensor, LCD Display, Buzzer, Relay, Pump, Nozzle and Power Adapter, etc. This system deals with an innovative idea of Humidity & Temperature Monitoring. Which provides best measurement of two common Environmental Parameters - Humidity & Temperature using Arduino based on microcontroller and sensors.
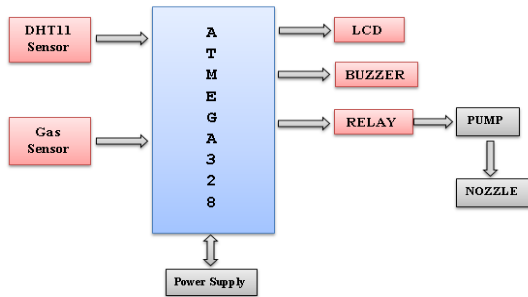

Figure 1: Block Diagram

This project consists of three sections - one senses the humidity and temperature by using temperature humidity sensor DHT11. The second section senses the gas by using gas sensor MQ2. And the third part of the system displays humidity and temperature on LCD and switch ON relay. System will perform the live observation and monitoring in it through the LCD which constantly displays the details provided and processed by the microcontroller. If any change in input from sensor, then relay will start the spraying pump also buzzer will get ON. Thus, the system is very effective.

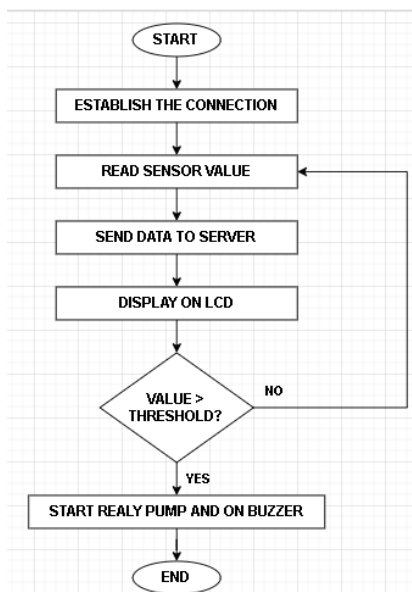Following figure shows the flowchart of the system:

Figure 2: Flowchart

VII. ADVANTAGES AND APPLICATIONS

Advantages:

- Enhances Safety and Security
- Low cost
- Easy to use
- Portability
- Reliability
- Reconfigurable and Reusable

Applications:

- Village
- City
- School
- Colleges
- Hostel
- Hospital
- Organizations, etc.

VIII. CONCLUSION

The project "VILLAGE SANITATION SYSTEM" is successfully implemented which works as a thermo-hygrometer for measuring temperature and humidity; it is capable of measuring humidity and temperature both indoors and outdoors (Fields). Compared to expensive sensor, the Arduino-based recording system successfully reduces the power consumption, cost and complexity of the process. It achieved logging of the data in real time. it also facilitated remote recording of the data in a memory card without need of a laptop or a computer. The performance of the sensor with regards to recording temperature was acceptable with minor modification of code in future to compensate for the deviation of its readings as compared to commercial sensors. Same condition is applicable for the humidity readings.

Arduino- based devices are the new possibilities for developing smart devices freely with small budget and simple work. The accelerating race of advanced technology outdates the technology used in Arduino in no time; advanced software working similarly is available. The project was interesting and was practically helpful to learn to use microcontrollers (Arduino), programming language C and basic electronics. This was a very helpful project in learning and understanding the world of microcontrollers and use of microcontrollers in day-by-day life along-with Arduino in real time application.

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