International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 11 Issue: 04 | Apr 2024 www.irjet.net p-ISSN: 2395-0072

SMART SANITARY SOLUTION FOR VILLAGES

Prof. Sandip Buradkar[1] , Shital Wakodikar[2] , Ritika Gokhale[3] , Sakshi Ambhore[4]

[1] Assistant Professor , Department Of ETC, Guru Nanak Institute of Engineering and Technology, Nagpur, India
[1234]Department of ETC, Guru Nanak Institute of Engineering and Technology, Nagpur, India.

Abstract - In rural villages, access to proper sanitation facilities is often limited, leading to various health hazards. To address this issue, a smart sanitary solution is proposed, leveraging modern technology to improve hygiene and health outcomes. This solution incorporates user-friendly toilets equipped with sensors for monitoring usage and cleanliness. Additionally, waste management systems are implemented to ensure proper disposal and recycling of waste materials. By integrating these smart technologies, the aim is to promote better sanitation practices, reduce disease transmission, and enhance the overall well-being of village communities. The toilets are designed to be easy to use and maintain, catering to the needs and preferences of the villagers. They are built with sturdy materials to withstand the rural environment and are designed to be easily accessible to all members of the community, including children, elderly, and people with disabilities.

1.INTRODUCTION

In 1986, India started its first big plan to improve cleanliness in rural areas, called the Central Rural Sanitation Program (CRSP). The goal was to make life better for people living in villages. This program focused on building toilets and was mostly funded by the government. It aimed to provide toilets to as many rural households as possible. The smart sanitary solution is designed to be scalable and adaptable to varying community needs and resources. It takes into account factors such as population density, water availability, and infrastructure constraints to tailor the solution to each village's unique circumstances. Furthermore, efforts are made to ensure the sustainability of the project through local capacity building, partnership with local authorities, and leveraging available resources effectively.

Alongside the infrastructure, community engagement and education programs are essential components of the solution. Villagers are educated about the importance of sanitation and hygiene practices through workshops, training sessions, and awareness campaigns. By involving the community in the implementation and maintenance of the facilities, a sense of ownership and responsibility is fostered, ensuring the long-term sustainability of the project. Proper waste management is a key aspect of the solution. Waste from the toilets is efficiently collected and treated to prevent environmental contamination and public health risks. Innovative waste management techniques, such as composting or biogas generation, may be implemented to maximize resource recovery and minimize environmental impact. The smart sanitary solution includes a centralized management system that allows for remote monitoring and management of multiple toilet facilities.

This enables authorities or designated personnel to keep track of the status of the facilities, schedule maintenance tasks, and respond promptly to any issues that may arise. Sensors are installed in the toilets to monitor usage patterns and detect when maintenance or cleaning is required. This ensures that the facilities remain in optimal condition and are always ready for use. The data collected from these sensors can also help in identifying areas for improvement and optimizing resource allocation. Overall, the smart sanitary solution for villages aims to not only provide access to improved sanitation facilities but also empower communities to take charge of their health and well-being through sustainable practices and technology-driven solutions.

2. LITERATURE REVIEW

This paper talks about turning villages into smart villages quickly by giving them essential facilities, based on previous studies. By using digital technology in a smart way, the aim is to make a big positive difference in many areas like health, business, education, and farming. This is done by making sure that everyone in the village can benefit from digital solutions. Smart village plans help rural communities try out new ideas and solutions to the problems they have, and also explore new ways of doing things.

Some studies say that using sensors in toilets can help keep them clean and working well. These sensors can tell when the toilet needs cleaning or fixing, so things stay in good shape. They also give helpful information to make sure the toilets are used properly. It's not just about the technology. Studies show that when people in the village are involved in deciding how to set up and use these smart toilets, it works better. This means talking to people in the village and teaching them why clean toilets are important. Research has found that having these smart toilets can make people in villages healthier. They can reduce sickness caused by dirty water and improve the overall health of the community. To keep things going well, we need to make sure these smart toilet systems can keep working for a long time. This means making sure they're affordable, that people in the village take care of them, and that the whole system can be used in other villages too.

Using smart toilets in villages can make a big difference in people's health and cleanliness. By using technology, getting everyone involved, and making sure things can keep going, we can make villages cleaner and healthier places to live. But we still need more research to make sure these smart toilet systems work well everywhere. This paper talks about a new way to send information in medical wireless networks, which are used for monitoring people's health from far away. Journal of Healthcare Engineering, 2014, 5(5):95–122[5].

3. BLOCK DIAGRAM

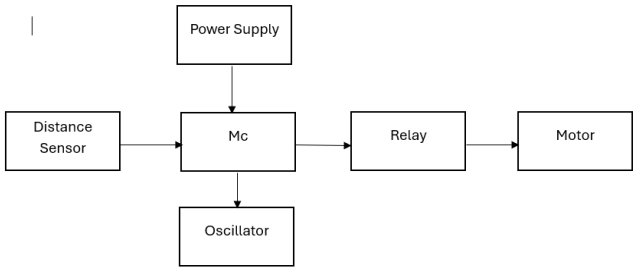

Fig -1: Proposed System Block Block Diagram

4. CIRCUIT DIAGRAM

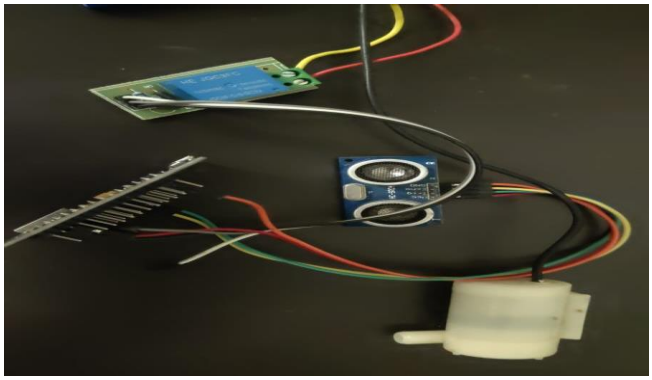

Fig -2: Hardware of Circuit Diagram

5. WORKING

- **Placing Sensors:** Put ultrasonic sensors in places like toilets and handwashing areas. These sensors work like ears, listening to what's happening in these places.
- **Checking Usage:** The sensors can tell us when toilets are used or if people are washing their hands. This helps us know how often these facilities are used and if they're being used properly.
- **Keeping Things Clean:** Ultrasonic sensors can also help us check if things are clean. They measure things like water flow and soap use. If things aren't clean, they can alert us to clean them up.
- **Fixing Problems:** If something goes wrong, like a toilet gets clogged or a sink isn't working, the sensors can tell us so we can fix it quickly.
- **Using Data:** The information from the sensors helps us understand how often things are used, how clean they are, and if there are any problems. We can use this information to make decisions and improve the facilities.
- **Teaching People:** We can use the sensors to teach people about hygiene and why it's important to keep things clean. This helps everyone understand why smart sanitization is important.
- **Component Needed :**

Power Supply , Node MCU , Single Channel Relay , Mini Water Pump Dc , 6V Submersible Motor , Ultrasonic Sensor(HC-05) .

1 . Power Supply

Power supply refers to the provision of electrical energy to various devices and systems for them to function. In simple terms, it's like providing fuel to a car so that it can move. Let's dive deeper into understanding power supply in simpler language.

Power is the energy that makes things work. Think of it as the force that pushes electricity through wires to make your gadgets and appliances function.

2. Node MCU

Node-MCU is a type of software that's open for anyone to use and modify. The name combines "node" and "MCU" (microcontroller unit). Strictly speaking the term "Node-MCU" refers to firmware rather than the associated kits. Sure! Node MCU is like a tiny, affordable, and open-source

toolbox for connecting things to the internet. At first, there was a system that operated on a component called ESP8266, which is a type of chip that handles Wi-Fi connections. This system was built on hardware that used a specific module called ESP-12.

3 . Single Channel Relay

A single-channel relay is a device that helps control the flow of electricity to various electrical appliances or systems. Think of it as a traffic controller for electricity, deciding when to let it flow and when to stop it. Let's break down what a single-channel relay does in simpler terms. Now, let's focus on a single-channel relay.

"Single-channel" means it controls one electrical circuit or channel. It's like having one lane on a road where cars can either pass through or be stopped. In this case, the "cars" are electricity, and the relay decides whether to let them flow or not.

4 . Mini Water Pump Dc

A mini water pump DC is a small device that uses electricity to pump water from one place to another. It's like a tiny engine that moves water, but instead of using fuel like a car, it runs on electricity. Let's break down what a mini water pump DC does in simpler terms. Now, let's focus on a mini water pump DC. "Mini" means it's small in size, like a handheld tool or a small gadget. "DC" stands for direct current, which is the type of electricity it uses. Direct current flows in one direction, like a steady stream of water, unlike alternating current (AC), which flows back and forth.

5. 6V Submersible Motor

A mini water pump DC is a small device that uses electricity to pump water from one place to another. It's like a tiny engine that moves water, but instead of using fuel like a car, it runs on electricity. Let's break down what a mini water pump DC does in simpler terms. Now, let's focus on a mini water pump DC. "Mini" means it's small in size, like a handheld tool or a small gadget.

"DC" stands for direct current, which is the type of electricity it uses. Direct current flows in one direction, like a steady stream of water, unlike alternating current (AC), which flows back and forth.

6. Ultrasonic Sensor(HC-05)

An ultrasonic sensor, specifically the HC-05 model, is a device that uses sound waves to detect objects or measure distances. It's like a bat using echolocation to navigate in the dark. Let's break down what an ultrasonic sensor does in simpler terms. The HC-05 ultrasonic sensor is a specific model of ultrasonic sensor. "HC-05" is just a name given to this particular sensor model. It's like how different cars have different model names, such as "Toyota Corolla" or "Ford Mustang." The HC-05 ultrasonic sensor is commonly used in various applications, including robotics, automation, and distance measurement.

6. CONCLUSIONS

In conclusion, smart sanitization offers a promising solution to improve hygiene and health outcomes in villages and communities. By leveraging modern technology such as sensor-based monitoring systems and innovative waste management techniques, we can enhance the effectiveness and efficiency of sanitation practices.

7. REFERENCES

[1] C.D. Nugent, D.D. Finlay, P. Fiorini, Y. Tsumaki, and E. Prassler, "Home Automation as a Means of Independent Living," IEEE Trans. On Automation Science and Engineering, vol. 5, no. 1, pp. 1-9, 2008 M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.

[2] Nikhil Agrawal Engineering Manager, Siemens,Noida nikhil.pa@gmail.com, SmitaSinghal ASET, Amity University, Noida singhal.smita@gmail.com, Smart Drip Irrigation System using Raspberry pi and Arduino, International Conference on Computing, Communication and Automation (ICCCA2015) ISBN:978-1-4799-8890- 7/15/$31.00 ©2015

[3] H Katano, K Yokoyama, Y Takei, H Matsuki et al.(2011)The study of the bacterial contamination in the spray water of electronic toilets and in the gluteal and inguinal regions due to splashing following spray water. Microbial Ecology in Health and Disease. vol. 25, pp. 8-14.

[4] F Zakaria, J Ćurko, A Muratbegovic et al.(2018) Evaluation of a smart toilet in an emergency camp. International Journal of Disaster Risk Reduction .vol. 27, pp. 512-523.

[5] Sundararajan T V P, Sumithra M G, Maheswar R. A Novel Smart Routing Protocol for Remote Health Monitoring in Medical Wireless Networks. Journal of healthcare engineering, 2014, 5(1):95–122.