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Analysis, Design and Development of an IoT Based Water Management System for Residence

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Key Words

Water Management System, IOT, WiFi, Mobile apps, Pump Motor, Filter, Arduino, Sensor, Filter, water heater and Solenoid valve.

ABSTRACT

Water is an essential resource for life and it is now a matter of important day. This problem affects various processes such as water management, water consumption, distribution, system detection and equipment maintenance. Based on this measurement, we offer a smart water management system by connecting the Internet of Things technology with the combination of business process and decision support systems. We provide architecture to detail physical scene where we will examine our implementation, allowing water management processes. It is uncomfortable and often effective for periodic human intervention to maintain for the traditional water measuring system. For lack of existing models and radio data for public use of wireless systems. This paper presentation will present the system's complete working process. In the introductory, there describe the details of the system, the purpose of the system, scope and justification of the system. There have some literature reviews about the relevant projects in relevant fields, which are reviewed and described soon. There are detailed descriptions of the work flow of the procedure section which are strictly followed during the project completion. Also describe the justification to use here as well as the alphabet. Need Analysis, design and development hardware needs, software requirements, block drawing, description of the material used in the project, circuit diagrams and flotation discussions. Finally, we re-established the project and described why this project would be important to the user. Also effective in discussing how effective the projects are in the real life. Here have some statements about the limitation and the opportunity for future growth of the project.

Introduction

Water is an essential resource for all life on earth. Accommodation in general water management system inconvenience. System management requires human intervention. Water management is now a major problem in housing. This issue affects various processes such as water management, water consumption, distribution, and maintenance of system detection and equipment. Sometimes the water tank is filling and water overflow. In the previous method, the employee will go there and open the valve for a fixed period, then the employee will go to the same place and stop the valve and the time will be lost. The proposed system is fully automatic. Here people are saved in the work and time. So we provide an automatic water management system which acts as an automated system. Also measure the quality of the water distributed for each family by filtering. To ensure the safe delivery of drinking water, the design of IOT base water filtering should be a quality filter. It will support automatic hot and natural water supply, which is controlled by mobile applications. Mobile applications connected to the system by WiFi. Using Arduino, sensor, filter, heater, cables, solenoid valve and other hardware. Hot water option will be automatically controlled by the mobile app. Main objectives are: **(1)** To design and develop an IoT based water management system , **(2)** To maintain normal, hot and filtered water supply by using mobile application, **(3)** To check the water level in the tank and fill up water tank automatically, when the tank will be empty.

Related Works

Nowadays, one of the most serious challenges to solving is to manage water shortages. Current water management ICT systems are supported by equipment of specific vendors without considering any interchangeable value. The lack of quality of the producer's water ICT tools prevents proper monitoring and control, which reduces water distribution and cost, system maintenance and improvements and detection of a failure. This paper making a decision that the decision-making system resolves decision-making and a smart water management model that combines the Internet of Things Technology for monitoring business processes and for subsistence implementation. The proposed Smart Water Management model makes devices of specific vendors manageable in an interactive and manageable manner in a water management domain in an individual way. (IEEE Xplore, 2014).

In the last decade, water demand has increased in India. The rising demand for water supply has become a big challenge for the world. The use of water, climate change and misuse of the city also reduced resources. Reservations and management of resources are of great importance. In this paper, we present an IOT design for water monitoring and control systems that support Internet-based data collection on a real-time basis. This system deals with new challenges in the water sector - the need to conduct a water supply survey to measure the flow rate and to control water conservation and encourage its conservation. We also measure the quality of water distributed by each family by establishing ph and conductive sensors. It is uncomfortable and often effective for periodic human intervention to maintain for the traditional water measuring system. The lack of existing models for wireless access to wireless systems and wireless data communication for monitoring smart quality. (International Journal of Advanced Research, Innovation in Ideas and Technology, 2017).

Water management is considered the best way to plan, develop, distribute and manage water resources. It affects people's life, food production, water consumption, irrigation, nutrition, energy generation, and various important issues. Based on this quality they offer smart processing models that combine business processes with Internet Things technologies. Decision Support System We provide an architecture for details of sub-system interaction and physical scene detailing that we will examine our implementation, especially the vendors' vendor's tools are manageable and can be interactive, in the special context of the water management process. There are various important issues of living and water management impact on different situations like cities, natural areas, agriculture etc. Some tasks focus on the lack of ICT services and tools for water management, which will enable policy revision and reuse of the information available to the organization. Observation. (Raman Alcariya, 2016).

This paper constitutes the model of residential water needs and estimates relevant parameters from cross-sectional data. For the first time, in addition to internal (internal) and fungal uses, it was possible to differentiate between meters, flat rates, septic tanks, and apartment areas. The main results are that the internal demand is relatively uncomfortable, price-resilient compared to price-spraying requirements, but less than in the west compared to the demands of the past maximum demands, so important for system design, unreasonable but relatively eastern elastic in the west. The results indicate that the total elasticity of the total demand, which is found around this and other studies -0.4, is the weighted average of domestic and throttle elasticity. Long-term combinations of pricing are examined experimentally and discuss the cost and effectiveness of system design claims. (C. W. Howey, F.P. Linewire Junior, 2010).

The global mobile communication revolution represents new opportunities to address the challenges of water security and poverty reduction. In Africa, the number of people in the range of GSM signals has already crossed the number of corrected water supply and by 2012, the number of mobile subscriptions will pass the same benchmark. Barriers to stabilization of rural water supply can also be resolved with remote surveillance and mobile banking management standards, which continue with mixed success as an alternative to community management paddism. Needed bold thinking and innovative partnerships to run this technological advancement to achieve water security and poverty reduction. The quick and more efficient meter read. Ft and leak detection. Greater Billing Accuracy Increasing reading increases, as a result of debt collection. Remotely monitor the use of resources. (Hope R., Foster T., Money A, Rose M., Money N. and Thomas, 2011).

Methodology

The project is the combination of hardware and software. So the working procedure of the project is not the same as a software or hardware. So we've followed some features of the software model and we've presented our method with our own strategy. We've divided our project method into six steps and we showed it by a work flow diagram.

These are given as follows:

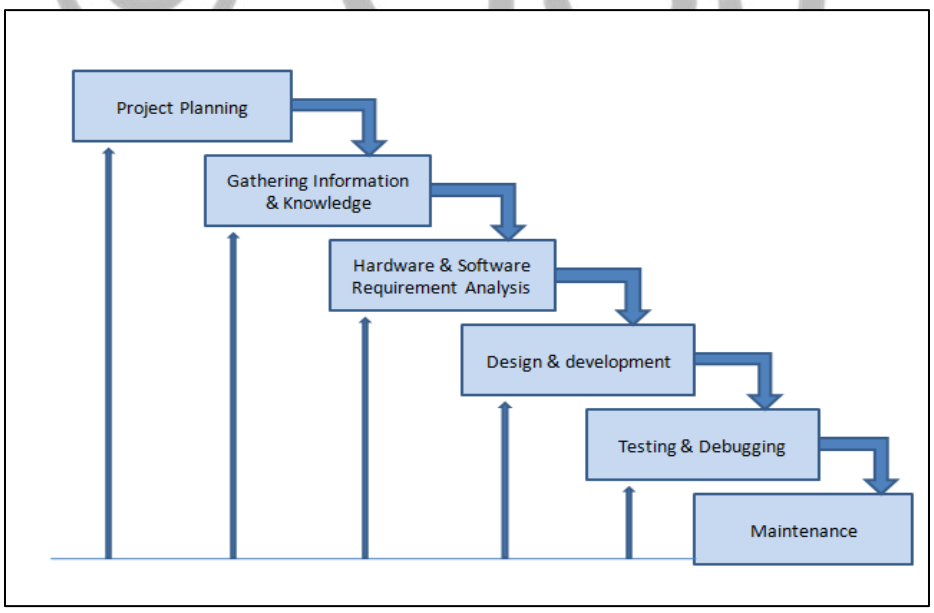

Fig 1: Workflow diagram

Justification of Methodology

We have divided our entire work into some stage, which is the project flow of our project. Using this workflow we've done our project very smoothly because it is a serial process. For solving any problem or for any system development,

the whole work should be handled in that segment so that accuracy can be provided. So, we have followed the workflow to increase accuracy. Due to the six-stage features and feedback scope system, our system used workflow. Our workflow feature can return it to the previous step. We can return and correct the system at any time according to the requirement. In this workflow, before completing the next stage, each stage must be completed completely. Such a workflow is basically short and no uncertain requirements for the project. At each stage of determining whether the project is going on in the right direction and whether to continue or cancel the stage.

Block Diagram

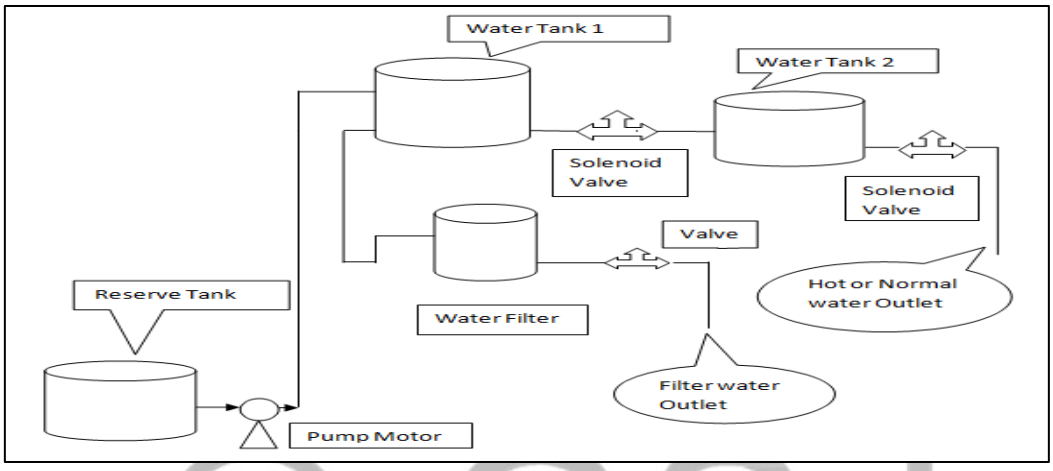

Fig 2: Block diagram

Flowchart

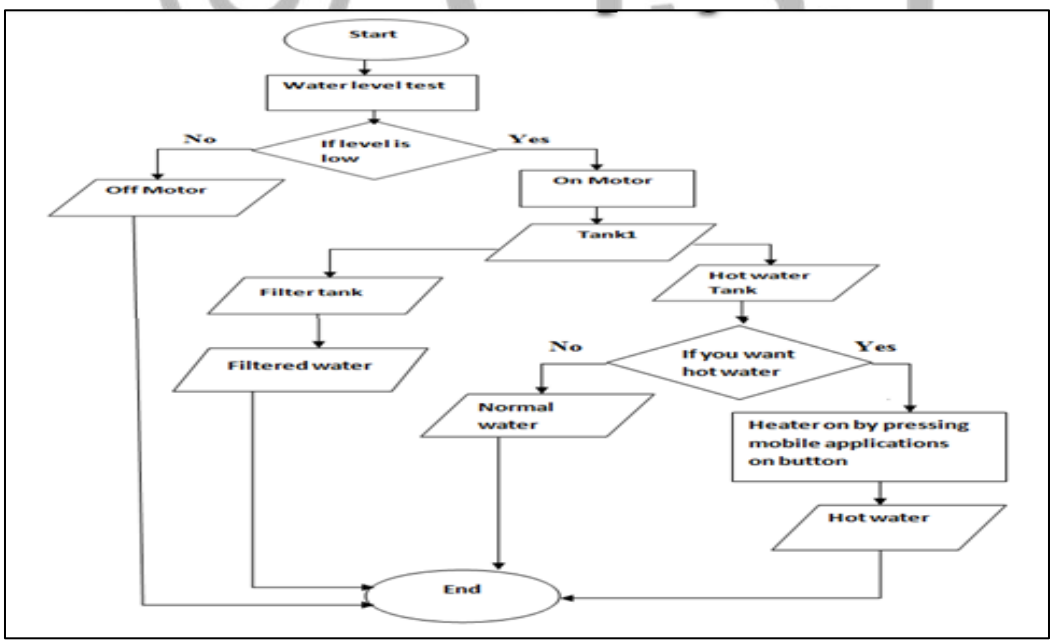

Fig 3: Flowchart of the project

Demo of Project

Fig 4: Demo of Project

Description

(1) The water level sensor in the water tank1 is submerged; it understands the high and low level of water and sends the data signal which connects the Arduino digital pin 2, 3, 4, 5. Then the water pump switch on the reserve tank based on the sensing of the water level reading which switching the relay module for the on / off switch and then switches on the relay module swing valve for water flowing on / off. Water pump connect to the ardino digital pin 12. **(2)** Wifi Module's pin Arduino connectsthe digital pins 0, 1 for wireless communications. It connects the mobile app. pressing the button on the mobile app sent for the water heater which connects to the arduino digital pin 13 and the system instructions were sent**. (3)** An IC LM 35 is used for the temperature sensor project, which takes temperature from the current water temperature, which interacts on the Adobe board's analog pin A0, it creates an ADC that converts the reading to display in LCD which is connected to the pin with Arduino analog pin A4, A5 and then the relay module connected heat switching to 35 degrees Celsius. Open/Close the solenoid valve connect digital pin 11 which automatically in the flowing water. **(4)** It always gives normal water without pressing the button on mobile applications**. (5)** Water filter from the water tank1 and flow of the water is supplied depend on use of water.

Limitations & Future Works

There are some limitations of this system that is **(1)** There are no features for water quality measurement, **(2)** Water cooling properties are absent in this project.

In future, simulating this system there are several improvements can be made in order to upgrade the features such as- **(1)** Temperature increment/decrement features can be added, **(2)** pH meter can be used to determine the water quality.

Conclusion

This paper describes a water management system design and construction details. Tank1 from the reserve tank automatically turns the pump motor on / off. Tank 1 has two solenoid valves which automatically flows water in two ways. Go to one water filter tank and go to filter water and another tank2. Tank2 has a heater that on by pressing mobile apps button when it needs and turned off automatically, the temperature reaches 35 degrees Celsius and is displayed on the LCD display. It always gives normal water without pressing the mobile app on button. Using Arduino successfully using C / C ++ language, the program automatically allows the water level to be automatically turned on / off by sensing, stopping temperature, WiFi connected with mobile applications. As a conclusion, the system designed in this work is well performed.

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