Automation In Water Taps

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***Abstract*—Traditional manual taps are significant contributors to water wastage, as they are often left running unnecessarily, and present hygiene risks in public settings due to cross-contamination through physical contact. This project aims to design and implement an automatic, touchless water tap control system utilizing sensor technology (infrared or ultrasonic) to enhance hygiene and reduce water consumption in households and commercial areas**

Water conservation has become an important global concern due to increasing demand and limited natural resources. This research paper focuses on the design and development of an automated water tap system that helps in reducing water wastage and improving hygiene. The system works using sensors such as infrared (IR) sensors to detect the presence of hands and automatically control the flow of water without manual operation

Automatic water tap is a sensor-based water tap which controls the impulsive flow of water. This paper presents the development of an Automatic water tap based on an industrial grade adjustable infrared sensor. A typical Automatic water tap can switch the device on and off continuously and mitigate the usage of water from wastage. The industrial grade adjustable sensor is used which can sense transparent or opaque with maximum sensitivity of about 80 cm. Active infrared sensor emits and receives infrared radiation, which detects the presence of objects nearby and bounces back to the receiver of the device. The high or low signal generated by the IC is used to control the water flow by switching the solenoid valve and vice versa. The overall design and unique feature an automatic water tap makes the product user friendly.

***Index Terms*—Infrared Sensor, Automatic tap, Solenoid Valve, IC, Switching.**

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I. INTRODUCTION

The concept of an Automatic water tap was first introduced by the Australian Inventor Norman Wareham. Norman Wareham in itiated electronic controls of water flow for domestic, commercial, medical and industrial sector. The automatic faucet is equipped with a proximity sensor. The working mechanis m helps to opens its valve to flow water in response to the presence of a user's hands in close proximity. The water tap closes its solenoid valve, after a few seconds when it no longer detects the presence of a user's hands. The developed system is able to control the water tap to protect the wastage of water. This device is low-cost compared to other commercial devices available in the market. 1. Benefits of Automatic Water Taps Hygiene: Automatic water taps is an hygienic option for washing hand. An increase in the growth of population, to avoid cross contamination automatic water tap plays an important aspect for everybody. Reliability: Automatic water taps is designed ideally and extensively tested to achieve the high levels of reliability. The Automatic taps can be more reliable with mitigation of price for the consumer. Save Water: Automatic water taps play a vital role to save the adequate quantity of water. Automatic water taps control the flow of water. It only run when the hands are placed under the spout, limiting the water use to the precise time

II. EXIS TING S YSTEM

Automatic sensor-based taps aid to improve hygienic by eliminating physical need to touch and turn the taps. Most of the automatic water taps follow the classical method of fabrication, where there is in

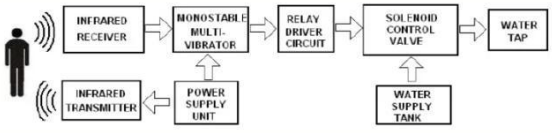
lack of proper hardware components and optimization. These automated taps mitigate the usage of water from wastage. The device needs a DC power source to power up the device. The initial investment to build the electrical infrastructure made the product litt le e xpensive. The existing technology which are available in the market are costly and can't be affordable by normal class people

III. PROCEDURE / METHODOLOGY

The sensor-based water tap that automatically turns on the solenoid valve when it detects a hand or object near it and turns off after when the object will be far from the sensor. The optical proximity sensor used in this device performs very well and helps to determine the distance between the tap and the users hands. The active infrared sensor emits and receives infrared radiation, which detects the presence of objects. The adjustable infrared sensor can sense transparent or opaque objects and has a maximum sensitivity of about 80cm. The device is powered by a 12V DC power supply and it also charges the battery parallelly. During the power cut the battery provides the power supply to switch the device. Trends in Electronics & Instrumentation Engineering This device is cost-effective and can be fabricated with low cost comparatively less than the market price.

The accurate pre-set control with precise time allows the correct quantity of liquid to be dispensed each time. The precise control of flow rate and time of flow combination, ensures the predetermined quantity needs to be dispensed, which avoids water being wasted. When users move their hands from basins, the sensor controlled the flow of water concurrently without wasting the water.

BLOCK DIAGRAM:



The user sets the desired goal (e.g., Target speed).
Controller PLC: The PLC receives this target. It constantly receives information from the sensor to calculate the difference ("Error") between the target and actual status.
Actuator: The controller sends a command to the actuator (e.g., "increase speed").
Process: The process (e.g., motor) acts on this, altering the output.
Sensor Feedback: A sensor constantly monitors the new output and feeds this data back to the controller.
Closed Loop: This loop repeats instantly and continuously, ensuring the automation system keeps the process on track, even with e xterna l disturbances
Sensors (e.g., IR, Ultrasonic): Detects environmental variables (heat, motion, distance).
Microcontroller/ PLC: Processes inputs and executes control algorithms.
HMI (Human Machine Interface): Allows users to input targets and monitor system status.

IV. ADVANTAGES

Fast sensor activation response. 2. Advanced infrared sensor technology. 3. This device helps in conservation of water. 4. The device can be installed easily and it plays a vital role to mitigate the power of electricity and save energy. 5. There is no cross- contamination. 6. Easily Operated by providing external power supply. 7. Cost-Effective, 3 times less compared to market price. 8. It operates on 12v DC
supply. 9. The liquid pressure does not affect the switching operation of solenoid valve and won't damage the operation mechanism of it. 10. The outer structure of solenoid valves is fabricated by plastic, it protects the device from the corrosion

V. DISADVANTAGES

1. Initial investment is little more compared to traditional taps. 2. Maintenance is mandatory for its long run.

VI. CONCLUSION

The block diagram of an automation system illustrates the seamless integration of hardware and software designed to ma ximize operational efficiency while minimizing human intervention. By utilizing a closed-loop system—where sensors

provide continuous data to a controller to manage actuators — the system guarantees precise monitoring and regulation of processes, such as HVA C in buildings or manufacturing in factories

Increased Efficiency and Accuracy: Automation provides consistent, 24/ 7 performance, reducing human error.

Cost and Energy Management: Optimized control results in lower operational costs, such as reduced energy wastage in HVAC systems.

Scalability and Safety: Automated systems can adapt to changing production needs while keeping human workers out of dangerous environments

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