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Development and Analysis of Coin Based Water Dispenser System

Namit Gupta, Assistant Professor,
College of Computing Sciences and Information Technology, Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, India
Email Id- namit.k.gupta@gmail.com

ABSTRACT: ***Coin-operated water dispensing machines are becoming more and more common because of how convenient and simple they are to operate. When a genuine coin is detected, such machines are meant to deliver freshwater or numerous kinds of drinking liquids in accordance with the availability in the machine. Water dispenser are special machines utilized to provide fresh water or other drinks which is good for people. The problem why the study is conducted is to provide knowledge and significances about the water dispenser which correctly organized in coin based which is beneficial in platforms like railway stations, roadways, shopping mall, and similar other places. The study focuses deal with reviewing and determination of coin-based water dispenser system. The findings of this study contribute to key knowledge as well as advancement of this technology by offering insights into the possible uses, constraints, and upcoming advances of coin-based water dispenser systems.***

KEYWORDS: ***Water Dispenser, Drinking Water, Coin, Water Management.***

INTRODUCTION

Water is a crucial resource for human existence, for solving and managing the water shortage is now one of the biggest issues for human existence. Currently, just about Humanity uses 0.08% of the freshwater on Earth for a variety of purposes. The need for high-quality water is growing every day as water supplies are being depleted, according to the International Water Management Institute, most of Central and South America, Asia, and all of Africa and the Middle East would either run out of water or be unable to purchase it by 2025 [1], [2]. Water was widely accessible in the past and provided for all of the requirements of the population, Since the basins are blocked and no one is able to draw water, it is now scarce. Changes in water management may be brought about by implementing new rules, such as those governing agricultural water access and managing rainwater.

The discipline of managing water resources will need to keep evolving to address both existing and foreseeable problems with water allocation. Since groundwater is the primary supply, relying only on it might lead to overexploitation. Today's difficulties need innovative approaches to water management, hence one must develop them. The "Coin Operated Water Dispenser" is comfortable and works effectively for its customers in the present period thanks to technological improvement. For both the economy and for human existence, water is a crucial resource. Solving and managing the water shortage is now one of the biggest issues. Only 0.08% of the freshwater on Earth is now being used by humans for a variety of purposes. The need for high-quality water is growing every day as water supplies are being depleted.

According to the International Water Management Institute, most of Central and South America, Asia, and all of Africa and the Middle East would either run out of water or be unable to purchase it by 2025. Water was widely accessible in the past and provided for all of the requirements of the populace. It was mostly used for food preparation. Since the basins are blocked and no one is able to draw water, it is now scarce. Changes in water management may

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be brought about by implementing new rules, such as those governing agricultural water access and managing rainwater. The discipline of managing water resources will need to keep evolving to address both existing and foreseeable problems with water allocation. Since groundwater is the primary supply, relying only on it might lead to overexploitation. Today's difficulties need innovative approaches to water management, hence one must develop them. The "Coin Operated Water Dispenser" is comfortable and works effectively for its customers in the present period thanks to technological improvement.

A machine that delivers water and often either cools or warms it using a refrigeration unit is referred to as a water dispenser or water cooler (if used just for cooling). Due to easier access to plumbing, it is often placed adjacent to the lavatory. Additionally, a drain connection into the sewage system is constructed for the water cooler [3], [4]. Water dispensers are available in many different configurations, including wall-mounted, bottle-filling water dispenser combo units, bi-level units, and other styles. Point-of-use (POU) water dispensers and bottled water dispensers are the two main kinds. While bottled water dispensers need the delivery (or self-pickup) of water in big bottles from vendors, POU water dispensers are linked to a water supply. Depending on the model, bottled water dispensers may be top-mounted or bottom-loaded. Bottled water dispensers usually use 11- or 22-liter (5- or 10-gallon) dispensers, which are normally situated on top of the appliance. Drinking water fountains and direct-piping water dispensers are under the umbrella of pressure coolers, a subtype of water dispensers. Another name for a water cooler is a crude water storage device.

LITERATURE REVIEW

Hommalee C [5] et al. proposed a cold and hot water dispenser with thermoelectric module systems which Consist a thermoelectric module system (TMS)-based cold-hot water dispenser. A cold-water loop, a hot water loop, a coolant loop, and a thermoelectric module make up the cold-hot water dispenser system. The thermoelectric cooling and heating modules are made up of nine and three thermoelectric plates, respectively, and four and two water blocks, respectively. The cold-hot water dispenser with TMS's chilling and heating capabilities are compared to those of a traditional cold-hot water dispenser with a compression refrigeration system (CRS). The cold-hot water dispenser with TMS may be operated at a minimum cold-water temperature of 10 to 13°C and a maximum hot water temperature of 65°C as opposed to the standard cold-hot water dispenser with CRS. The results of the study deals with recommendations for creating TMS-equipped cold-hot water dispensers.

Sateesh Kumar Kanagala et al in , developed an voice control hot-cold water dispenser system using Arduino contains solenoid valve which may completely automate the water distribution process using sensors and a solenoid tap. The device also detects the presence of glass at the counter panel in order to stop water degradation in the event that no glass is installed there. The system uses infrared (IR) sensors to recognize glass, after which the sensors send a signal to the microcontroller. The microcontroller is analysing the data that the sensors have supplied to check whether glass is there. The system has an RFID Reader that may be used to read certain tags and provide the microcontroller information about tags that are legitimate. Now that a valid tag has been located, the system sends a signal to the controller, which checks to see whether a glass is there before starting the motor to fill it with water while it is still there. The mechanism stops the water flow until the glass is discovered if it is removed while the procedure is ongoing.

Roselle Y. Pascual et al. in , proposed a low-cost dispenser-type water filtration system Although there are an increasing number of water refilling stations and a growing number of

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Filipino houses using commercial water, not everyone can adjust to this way of life. Another issue found is that not every location has access to such a system, such as the settlements on islands and close to the coast. The designed low-cost dispenser-type water filtration system (LCDTWFS) will provide households access to quickly clean drinking water. The apparatus is built of clay and has a 10 L volume capacity. When utilized as a ceramic filter, the clay used for filter construction contains no hazardous substances and has no impact on the filtered water. After going through the LCDTWFS, the tap water's quality was noticeably enhanced. The apparatus was put through its paces for six weeks in a row, and the results showed that the filtered water's characteristics still met PNSDW requirements. The filtered water is drinkable and safe for ingestion since its bacteriological/microbiological, chemical, and physical qualities are within the PNSDW's permissible limitations.

Mohd Huszaizzi Pengiran Hussin et al. in [6], explained automatic water/soap dispenser and self-tissue dispenser which states that The effort to develop an automatic water/soap dispenser and self-tissue dispenser aims to stop the spread of COVID-19. The COVID-19 virus may spread by contact transmission at the washbasin and a lack of community knowledge on proper hand washing techniques. The goal of the project is to create a touchless handwashing device that assists in solving the issue of shielding individuals from the virus. The project's soap, water and tissue dispensers satisfy the need for effective hand washing since the touch transmission occurs at the sink. After putting a hand close to the sensor without touching the washbasin, the soap has been released for 0.2 seconds, or 1ml of soap, and the water has been released for 15 seconds to wash hands.

Çağlar, Ahmet [7] explained design and experimental investigation of a novel thermoelectric water dispenser unit the simultaneous provision of both hot and cold drinking water is suggested via a unique thermoelectric water dispenser device. For this, the thermoelectric water dispenser's cold and hot water tanks are filled with heat sinks that are connected to the cold and hot surfaces of a Peltier module. The cold-water tank is chilled while the hot water tank is heated by powering the thermoelectric module. The system's cooling and heating capabilities are evaluated for three different scenarios: glass-walled tanks without insulation; polyethylene-walled tanks without insulation; and polyethylene-walled tanks with insulation. According to the findings, water tanks with polyethylene walls perform better thermally than those with glass walls. Additionally, insulation of the tanks significantly improves COP, particularly on the heating side. The study's findings also suggest that TE water dispensers may compete with traditional models, with the benefits of being more compact, quieter, and powered by renewable energy sources.

Zamberlan da Silva et al. in [8] explained comparison of the bacteriological quality of tap water and bottled mineral water The bacteriological quality of 20-L bottles of mineral water from water dispensers, tap water from municipal water sources, and samples taken from freshly opened 20-L bottles of mineral water were all compared. Escherichia coli, faecal streptococci, Pseudomonas aeruginosa, Staphylococcus spp., total coliforms, thermotolerant coliforms, and heterotrophic plate count were all counted. The findings revealed that at least one coliform or indicator bacteria and/or at least one pathogenic bacterium were present in 36.4% of the tap water samples from municipal water systems and in 76.6% of the 20-L bottles of mineral water from water dispensers. Municipal tap water had better bacteriological purity when compared to samples taken from freshly opened 20-L bottles of mineral water and 20-L bottles of mineral water collected from water dispensers.

Yonghwan Cho et al. in [9], explained smart water dispenser for companion animals numerous factors are contributing to the rise in the number of companion animals, and as a result,

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associated issues like feeding and caring for them are becoming worse. The primary issue is who will take care of the animals while their owners are away and remain outdoors. When their owner isn't home, the animals should be able to continuously and steadily drink fresh water. With the use of cutting-edge IoT devices built on ICT, this issue may be solved. In this study, we create a smart water dispenser system that delivers fresh water that is high in oxygen and regulates water supply from a distant location. Additionally, this system uses a smartphone at a distant location to monitor and alert the volume of water being kept as well as the condition of the water dispenser. We display the dispenser's prototype, a few conceptual illustrations of its essential parts, as well as the development of a special smartphone app.

DISCUSSION

By just entering a silver coin into an automated machine, a user of a coin-based water dispenser system may instantly get water or coke without spending any time. The delivery of water or coke is often a highly tough undertaking in isolated places, such as mountains or desert landforms, due to the lack of human life or power. Additionally, huge lines of customers make it difficult for anybody who only wants to drink water or soda to do so at shopping malls, restaurants, colleges, or community centers. If any automated equipment, such as a water or soda dispenser system, were placed in these locations, everyone would be able to save valuable time. There are a lot of systems on the market right now, but they are quite expensive, ineffective, and unreliable. The coin sensor, water pump, IR sensor, LCD display, single-phase step-down ac transformer, bridge rectifier, voltage regulator, and microcontroller PIC18F452 from the 8 bit pic family were used to construct this system. This system also contains a coin detection feature, which means that it will only operate if a legitimate coin is entered. Figure 1 represent the process of coin- based Water Dispenser system.

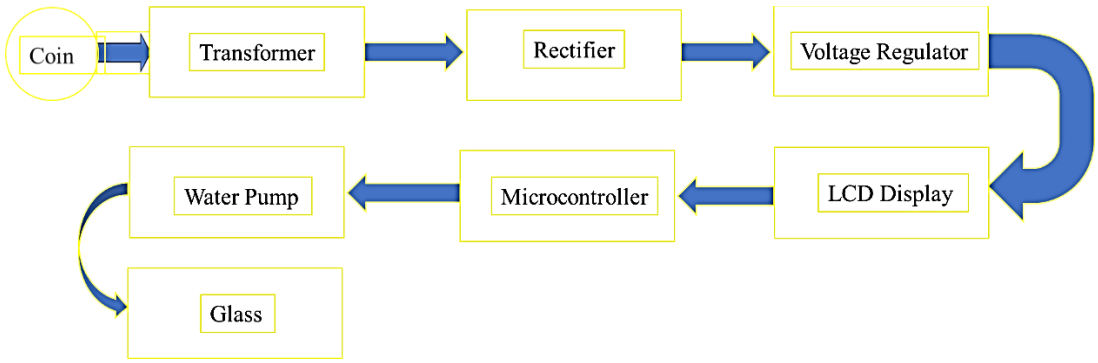

Figure 1: Process of coin-based Water Dispenser system.

3.1 Working of Coin-Based Water System:

Coin-operated water dispenser operates on the principle of a coin detector. When a user or customer places a coin in the sensor, it first detects the coin to determine whether it is valid or not. If the coin is invalid, the sensor will not provide the microcontroller with a logic high signal. Similar to that, if it is true, it will send a logic high signal to the microcontroller, which will then activate the water or soda pump. The glass will be filled when it turns on. This device will continually monitor the water or coke level in the glass as it is being filled using an IR sensor. When the water pump has finished filling the glass, the IR sensor sends a logic signal to the microcontroller, which subsequently shuts off the water pump. The presence of glass indicates to the IR sensor that it should instruct the microcontroller to start the water pump. Similar to that, it instructs the microcontroller to cut off the water pump if there is no glass accessible. The primary intelligent controller of the whole system is a microcontroller.

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It is interfaced with an LCD monitor, an IR sensor, a water pump, and a coin sensor and is programmed in the C programming language using the Mikro/C software. The whole operation of this device is shown on the LCD display, along with whether the coin you are inputting is legitimate or not. Because the majority of this system's components are electronic, it is directly attached to a 230V ac power source. drop down ac transformers drop down the ac voltages to 9 or 6 V ac, which are then converted to dc by bridge rectifiers. Then, with the aid of a voltage regulator here, the LM 7805 voltage regulator these are controlled to 5V dc. Using this voltage regulator, a microcontroller, LCD display sensor, and coin sensor are powered.

3.2 Application of Coin-Based Water Dispenser System:

The applications of coin-based Water dispenser system are illustrated in some positive points which are illustrated as follows:

3.2.1 Public Parks and Recreational Areas:

To provide people easy access to drinking water, coin-based water dispenser systems are often placed in public parks and recreational places. These devices enable people to relieve their thirst while participating in outdoor activities and encourage hydration while exercising.

3.2.2 shopping malls and Retail Centers:

In shopping malls and retail establishments, water dispenser systems equipped with coin-based mechanisms are often seen. They provide customers with a choice of cool drinks and may provide building owners a chance to make money. By lowering the usage of single-use plastic bottles, these systems also help to promote sustainable practices.

3.2.3 Public Transportation Hubs:

The installation of coin-operated water dispensers at bus and railway stations, airports and other public transportation hubs is on the rise. During their trip, travelers may find clean drinking water, offering a practical and economical choice to remain hydrated.

3.3 Advantages of Coin- Based Water Dispenser System:

Numerous benefits that coin-based water dispenser systems provide help to explain why they are so widely used and favored. Here are a few significant benefits:

1. Coin-operated water fountains in public areas make it simple to get access to clean drinking water. By just entering a penny, users may easily get water, doing away with the need to carry their own bottles or depend on local water fountains. This availability encourages people to drink enough water, especially in places where there may not be enough of it.
2. Safety and hygiene: Water treatment and purification systems are installed in coin-operated water dispensers to guarantee that the water is fit for human use. Filters, UV sterilisation, and other purification techniques are often used in these systems to get rid of pollutants, pathogens, and impurities. Users can rely on the water quality these dispensers provide, encouraging improved hygiene habits.
3. Coin-operated systems provide a cost-effective way to get access to drinking water. They also generate income. Users may refill their own containers for far less money than buying bottled water. Additionally, from a commercial standpoint, coin-operated water dispensers may bring in money for building owners by helping to defray maintenance and operating costs.
4. Environmental Sustainability: By decreasing plastic waste, coin-operated water dispensers support environmental sustainability. Users are motivated to refill their

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reusable bottles when access to clean water is accessible, which reduces the need for single-use plastic bottles. By doing this, the environmental effect of plastic manufacture, disposal, and recycling is reduced.

5. Customization and Control: Coin-operated water dispensers may be set up to deliver a certain volume of water for each coin, giving consumers the freedom to just use what they need. This customisation guarantees effective water use and lowers the likelihood of water waste. The devices may also be simply modified to accept other currency denominations or payment methods, increasing user convenience.
6. Maintenance and Monitoring: These systems often include monitoring and maintenance tools that let users keep tabs on water use, spot system issues, and plan routine maintenance tasks. This proactive strategy ensures the dispensers operate well, reducing downtime and increasing customer happiness. Promoting Healthy Habits: By making drinking water easily accessible, coin-operated water dispenser systems encourage people to stay hydrated. People are more likely to drink enough water throughout the day when they have access to clean, safe water, which improves general health and wellbeing.

3.4 Disadvantages of Coin-Based Water Dispenser System:

While coin-based water dispenser systems provide a number of benefits, it's vital to take into account any possible drawbacks and implementation difficulties. The following are some noteworthy drawbacks:

1. Inequitable Access and Affordability: People who lack the necessary coins or have financial limitations may have trouble using coin-based systems. Relying only on coin-operated systems may restrict access for individuals who cannot afford or do not have the requisite coins in instances when access to clean drinking water is essential, such as in public areas or during crises.
2. Needs: Coin-operated water dispensers need regular maintenance, which includes filter changes, cleaning, and system inspections. Inadequate or ignored maintenance might result in poor water quality, faults with the dispenser, and disgruntled customers. Operational difficulties may also arise from making sure there is a sufficient supply of coins for change and from fixing technical problems like coin jams.
3. Coin Recognition and Dispensing Mechanism Reliability: These systems' coin recognition and dispensing mechanisms are susceptible to faults due to technological problems. Users may experience trouble as a result of coin clogs or the dispenser's inability to recognise specific coin kinds. To reduce such problems, regular system inspections and maintenance are required.
4. Dispenser Systems: Coin-based water dispenser systems might be targeted for theft or attempted manipulation, raising security concerns. The coin collecting within the machine may draw unwanted attention, necessitating the use of suitable security measures to guard against theft or damage. Its continued functioning depends on ensuring the security and integrity of the system and the coins that have been gathered.
5. Dependency on Coin Currency: Systems based on coins depend on actual coins as their form of money. There is a chance that these systems may lose value or popularity in settings where cashless transactions are favoured as a result of the rising digitalization of payment methods. This problem may be solved by integrating alternate payment methods, including contactless payment systems.
6. Limited Water Dispensing choices: The versatility in water dispensing choices is often restricted by coin-based systems, which usually supply a predetermined amount of

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water per coin. If users need different quantities of water or if the normal dispensing quantity is insufficient for their requirements, then problems may arise.

7. Environmental Considerations: Although coin-operated water dispensers encourage the purchase of refillable bottles, which helps reduce plastic waste, they still need electricity to run their purification and dispensing processes. In the overall assessment of these systems, the energy consumption and related environmental effect should be taken into account.

CONCLUSION

Coin-based water dispenser systems offer numerous advantages in terms of accessibility, hygiene, cost-effectiveness, and environmental sustainability. However, addressing challenges related to equitable access, maintenance, security, and evolving payment preferences is crucial for their effective implementation. Future research and advancements should focus on enhancing user experience, incorporating smart monitoring systems, and further improving the efficiency and usability of coin-based water dispenser systems. By understanding the strengths, limitations, and potential improvements of coin-based water dispenser systems, stakeholders can make informed decisions regarding their adoption, ensuring the availability of clean drinking water and promoting sustainable practices in public spaces.

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