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Review on Smart Thermoware - A Development in Assistive Self-Health Care Manangement

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Abstract: ***Numerous applications and uses for thermal flasks are found by millions of people across the world. In this article, the developments of the vacuum flask's design and construction are covered. It now has technology to perform other tasks in addition to serving as a receptacle holding liquids, such as controlling temperature and serving as an alarm system. Consumers now anticipate that their vacuum vessel will preserve the freshness of the stored beverages. The vacuum flask should be able to sustain both hot and cold temperatures so that users can enjoy their beverages wherever they are and whenever they choose. People who have demanding and unpredictable work schedules are increasingly looking for reminders about how much fluid they should be consuming at all times to maintain a balanced diet.***
Keywords: Thermoware, vacuum flask, pH sensor, Temperature sensor, fluid intake monitoring, self-health care.

I. INTRODUCTION

Earlier glass containers were predominantly used for the preservation of beverages due to its resistance to permeability of microorganisms and other external contaminants thus maintaining the shelf life for a period of time. Later, due to its greater fragility and increased cost, steel or metal were used in the construction of the flask.

Recently, vacuum vessels are being used due to its greater efficiency in keeping up the quality and temperature. These vessels are sealed with vacuum so that heat cannot escape – this is largely because industry professionals agree that heat does not travel through vacuum[3]. In our everyday life, vacuum flasks are indelible among the numerous goods that improve the comfort and effectiveness of lifestyle. Applications of vacuum flasks include heaters, freezer boxes, warm milk containers, etc. [6]

Dehydration is a serious problem that can lead to a variety of complications, including confusion, falls, hospitalisation, and even death. It is critical for people with conditions that affect fluid regulation to have enough fluids on hand, so tracking their intake can help them determine if they are getting enough. There are numerous reports in the literature about attempts to develop systems or devices to track and manage fluid intake.[4]

Nowadays, paediatric and elderly patients are particularly susceptible to a condition known as acid reflux[11]. This is because modern lifestyles frequently involve different dietary changes, such as eating processed foods and beverages. Most vacuum flask versions feature an inner chamber and a plastic or metal casing that separates the glass. Some models are coated with reflective metals to increase durability. The stopper part is conventionally made from stainless steel screws that will secure it tightly.[13]

Thermoware are often used as thermal insulators due to their vacuum space, which is known as a thermal insulation. As the temperature inside the flask is required to remain consistent, this type of insulation is ideal. Thermally insulated containers are now an emerging trend as it is essential to maintain the freshness and quality of products with greater perishability factor especially beverages and milk. Thermal flask with vacuum mechanism is now greatly preferred by nurses in hospitals, lactating mothers due to its quality of keeping hot and cold liquid for longer period of time.[3]

II. DEVELOPEMENTS

A. History of Flask

The use of flasks dates to the 18th century, when they were typically constructed of pricey silver and glass. There were also less expensive versions made of pewter. These had a significant role in the storage of liquids like milk, wine, etc. [5]

Then, in 1892, Scottish scientist Sir James Dewar invented the vacuum flask. Through his work in the cryogenic field, he identified the need to maintain a chemical placed in a vial at a constant temperature. To do this, Dewar placed a glass bottle inside another larger glass bottle and sucked air between the two walls of the bottle. In doing so, Dewar created a partial vacuum to keep the internal temperature stable. Hiring a professional glassblower to create a more durable vase led to the commercial production of the "Dewar Vase" in 1898.[12]

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The insulation of the Dewar flask is done by vacuum. As a result, the freshness of the drink is retained for a certain period of time regardless of changes in the external environment.

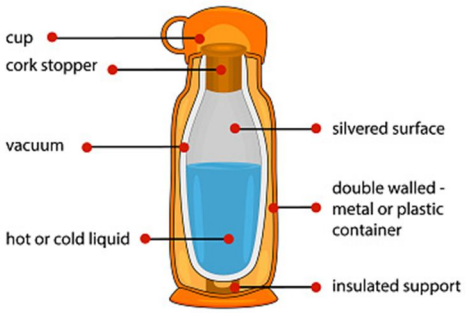


Figure 1. Dewar flask

B. Glass – Stainless Steel Insulation

The inside of the thermos uses glass material as a liner, and there is a vacuum around the glass. Glass maintains temperature longer than stainless steel because glass is very resistant to heat conduction to the environment. In addition, beverages contained in glass do not change their characteristic taste and do not react with glass materials. Meanwhile, steel or any other metal tends to react with the beverage and make it acidic and more susceptible to corrosion due to prolonged exposure to moisture. However, the glass envelope is fragile, so it is wrapped in a plastic or metal container. In many thermos, the glass cover can be removed and removed.

Later, stainless steel was used in the manufacture of thermos flasks due to its high strength and due to its non-corrosive properties during storage. Thermos flasks have an inner layer made of high-gloss stainless steel, making them virtually unbreakable. These thermos flasks are also coated with an insulating material to keep substances warm by reducing heat loss. [13].

For this, aerogel blankets are used as means of insulation instead of vacuum. [2]

In the modern world, the economy of a product is paramount, as is the quality. The cost of a product depends on many different factors such as the process, materials and time taken to manufacture the product. Current models of thermos flasks are analyzed for efficiency and cost.

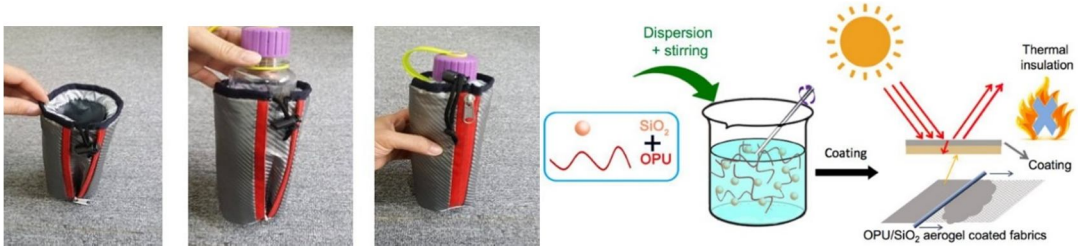


Figure 2. Aerogel Blanket

C. Modernization of Lifestyle

Due to the challenge of motivating users to regularly drink water or liquids to maintain a healthy and balanced diet, a smart water bottle can monitor water drinking behavior and notify users about this behavior. Through feedback around is currently consumer demand. Feedback from the bottle design from the point of view of the user and the designer must be analyzed. By analyzing different visualizations, the best indicator of representation fidelity, level of notice, aesthetic emphasis was selected. People love to receive personalized, accurate, playful, and prompt comments.

The potential implications of the results for the job as well as for ambient screen design to support user water consumption monitoring activities are discussed.

Drinking plenty of water is important to prevent dehydration and reduce recurrent kidney stones. In recent years, there has been a tendency to develop tools to track fluid usage using “smart” products such as smart bottles. Several commercial smart bottles are available, mainly targeted at health-conscious adults.

D. Current Advancements

Later, with the advancement of AI and IOT, smart water bottles are now widely used to display the temperature of the water contained in the tank. This can be achieved using a temperature sensor. The acidic nature of the water or any liquid contained in the bottle is required by the consumer to analyse the freshness of the product. Therefore, it is important for these people to know the pH level of common beverages before consuming them. This allows consumers to be informed about liquid consumption. This smart pitcher displays the pH for all types of mainly fruit drinks as well as milk. This can be achieved using a pH sensor. [1]

The smart water bottle becomes an aid that allows consumers to control their water intake and helps them monitor their hydration levels. Since the importance of consuming enough water has not yet reached everyone, technologies like IoT have been used to raise awareness and reach people easily. [13]

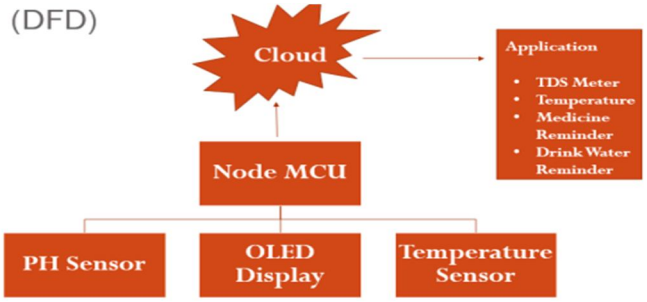


Figure 3. Design setup

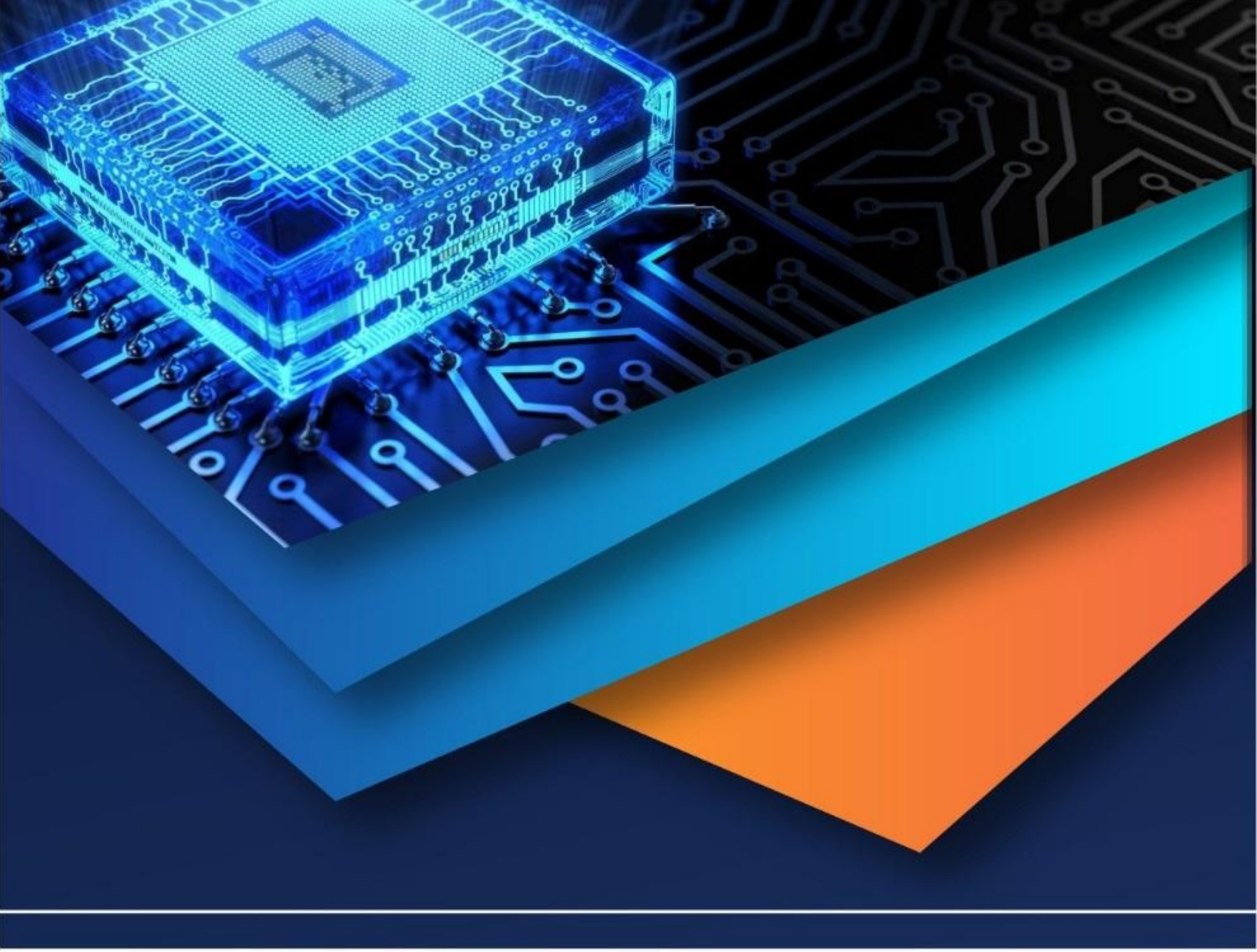
This technique is also implemented in various water monitoring systems in different industries to monitor pH, TDS and water flow where data is uploaded to the cloud and periodically monitor fluctuations. The acquired data is continuously fed into the cloud system describing the state in the form of a graphical representation. Any noted anomalies or fluctuations are the subject of immediate attention to remedy a major impact on consumption.

III. CONCLUSION

Commercially available smart flasks that can display the temperature and acidity level of the beverage they contain are currently in urgent need in the market. Smart thermos that remind consumers of their liquid levels with sounding alarms is more marketable. Furthermore, to inform consumers about the quality of the beverage contained inside the bottle, sensors that indicate the quality of the drink can be used. The development uses current technologies to help consumers lead a systematic lifestyle. This will encourage consumers to have the directed fluid intake. In this article, the evolution of the basic thermos model into a smart device due to the advancement of IoT and AI as well as its effective use as a support tool to help people take care Personal health was discussed.

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