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IoT Based Smart Water Bottle

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Abstract: ***The origin of life is water, and harmonious water consumption is essential for the proper functioning of mortal organs. But with busy schedules of humans and endless distractions, it's hard to flash back to drink enough water by the humans. So, in order to make a healthy water drinking habit, it's important to track our water input every day. The Smart Interactive Water Bottle conception combines technology with a abecedarian health need – proper hydration. It uses detectors and IoT capabilities to give druggies with precious information about their water consumption habits and monuments to drink water. Such a device can be a helpful tool for those who have busy cultures and need backing in staying doused . This helps the user to trace his quotidian amount of water consumed, average amount of water consumed, last water input time and also advise the user reminding him to drink water. Further the Adafruit Io operation which is an IOT predicated platform is used for monitoring and helping user to assay his water input habits.***

Keywords: Hydration Tracking, Level Detection Monitoring, Temperature Monitoring, Water Quality Sensors, Solar Charging Technology, Bottle Locator, Mobile App Integration.

I. INTRODUCTION

Water is the source of life, and it's necessary for the correct functioning of mortal organs to drink enough water on a regular base. Humans, on the other hand, have excited schedules and are constantly distracted, making it delicate to flash back to drink enough water. In a study of professionals and university scholars under the age of 50, further than 70 said they forgot or may forget to drink water owing to their agitated schedule. So, to develop a good water drinking habits, we must keep track of our water consumption on a quotidian base. The IoT- predicated Smart Water Bottle will be fairly useful in this regard. The design's major thing is to help the user in maintaining an respectable and controlled water input.



Fig.1.1 Prototype of a Smart Water Bottle.

The IoT- grounded Smart Water Bottle allows the stoner to track the quantum of water he drinks on a diurnal base, as well as the time he last drank water. It also reminds the stoner to drink water and refill the bottle when it's empty. This bottle is designed to track and help the stoner in analysing and perfecting his water drinking habits.

An IoT-based smart water bottle is a technologically advanced water container that incorporates Internet of Things technology to provide various features and functionalities related to monitoring and enhancing the user's water intake. These smart bottles can help individuals stay hydrated and track their daily water consumption more effectively. Here are some of the key features and components commonly found in IoT-based smart water bottles:

1) *Water Intake Monitoring:* Smart water bottles are equipped with sensors that track the amount of water consumed by the user. This data is often transmitted to a mobile app or cloud-based platform for real-time monitoring.
2) *Mobile App Integration:* A dedicated mobile app allows users to set hydration goals, view their water intake history, and receive reminders to drink water at regular intervals. The app may also provide insights and recommendations based on the user's hydration patterns.

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3) *Hydration Reminders:* The bottle can be programmed to send notifications or reminders to the user's Smartphone or smart watch when it's time to drink more water.
4) *Leak Detection:* Some smart bottles come with leak detection sensors to prevent spills and water wastage. These sensors can notify users if the bottle is not properly sealed.
5) *Temperature Control:* Some smart bottles can maintain the temperature of the water, either keeping it cold or hot for an extended period, ensuring that the user enjoys the preferred water temperature.
6) *UV-C Sterilization:* Smart bottles are equipped with UV-C light technology to sterilize the water, ensuring it is safe to drink.
7) *Connectivity:* Smart water bottles connect to the user's Smartphone via Bluetooth or Wi-Fi, allowing for real-time data synchronization and remote control of features through a mobile app.
8) *Battery and Charging:* Smart bottles typically come with rechargeable batteries, and they can be charged via USB or wireless charging.
9) *Material and Design:* Smart bottles are often designed to be durable and eco-friendly, and they can be prepared using materials like stainless steel or BPA-free plastic. They may also include a smart cap or lid with a display for easy access to information.
10) *Social and Gamification Features:* Some smart water bottles incorporate social elements, such as the ability to share hydration progress with friends or participate in hydration challenges and gamification to make the process of staying hydrated more engaging.
11) *Integration with Health and Fitness Apps:* Smart water bottles may sync with health and fitness tracking apps like Fitbit, Apple Health, or Google Fit to provide a more comprehensive view of the user's overall well-being.
12) *Water Quality Monitoring:* In addition to tracking the amount of water consumed, some smart bottles can also monitor water quality, checking for impurities and notifying users if the water is not safe to drink.

IoT-based smart water bottles are part of the broader trend of smart devices that aim to improve various aspects of daily life through data collection, connectivity, and automation. They can be particularly useful for individuals who are health- conscious.

II. LITERATURE SURVEY

A. *Market Adherence*

Dana De Meo and Michael Morena have worked to break one of the major problem in healthcare center, that's cases nottaking drugs capsules at specified time and missing it due to colorful reasons which causes detention of results in treatment.
Around 60 of the people face this problem and have trouble in getting well. This bottle can be connected to the pall andtransfers data about the volume content outside and also the cap open/ close timing. Lights and chimes are actuated at theright/ correct/ prescribed time of input. These signals can be fluently visible and audible. It can also be customized according tothe assiduity and client as per the operation.

1) *Hydration Reminding Smart Bottle: IoT Experimentation*

Dr.P.B. Pankajavalli,Mr.R. Saikumar,Mr.R. Maheswaran have proposed the idea of a smart water bottle which reminds humansto input water after certain interval of time so that the person does not feel dehydrated. The Water Float Sensor present in thebottle detects the position of water as low or high. RS232 chip decides the type of communication to be transferred and also instructs the GSMModem that provides voice and data related services to communicate with the electronic devicee.g., mobile phone after whichthe person receives communication in the form of SMS on the mobile screen reminding him her to drink water and stay doused . Alsothe power consumed for this proposed model was 5v.

2) *IoT Based Smart Water Bottle*

J Laxmi Lahari proposed the idea of water bottle which can help us in keeping track of the quantum of water we drink. It also reminds to refill the water bottle and assists the consumer to ameliorate his water drinking habits. An ultrasonic detector is installed inside the cap of the bottle which is leakproof in nature. It'll help in determining the water position inside the bottle for which the labors will be shown in Adafruit IO feeds. Its data changes with change in the position of water. The buzzer rings whenever the water position is zero inside the bottle and stops once the bottle is refilled. It also rings to remind the consumer to drink water if he hasn't drank for further than 2 hours. This promotes a healthy life.

3) A Self-monitoring Water Bottle for Tracking Liquid Intake

Bo Dong, Ryan Gallant, and Subir Biswas have worked on a water bottle which target the input of water regularly as it's theintroductory need of mortal body and it's demanded for its normal functioning. They principally made a band and attachment which canbe attached to any normal water bottle and make it a smart Bottle by tracking the input of fluid of the stoner. It's a Bluetoothbased device which will shoot all the details about drinking habbit of the stoner to their separate smartphones when connectedand remind them to drink if the input is low at regular interval of time. It principally works on the discovery of volume of fluid/ water inside the bottle. The stylish part about it's that we do not need the whole bottle we just need a band and can attach it to any regular water bottle and make it a smart bone .

4) GROW: A Water Bottle that Use its Surface as Display to Motivate Water Intake:

Gul Kaner, Deniz Erdogan, Huseyin Ugur Genc created a smart water bottle named' grow'. It's a abstract to encourage druggies to drink water. As we know water is a introductory demand for mortal body. still, individualities ignore drinking water due to their busy schedule. So they developed a bottle which would help people to meet their quotidian water conditions. This bottle is bedded with liquid position sensor and uses bottle face as an ambient display to track and cover quotidian water consumption of an existent. A bottle also contains a thermo- chromic print over the face of bottle, so that by toast different corridor of print, bottle gives positive, aesthetic and non- protrusive feedback.

5) Accuracy of Daily Fluid Intake Measurements using a "smart" Water Bottle

Borofsky MS etal. have worked on water bottle which helps to measure the input of fluids by the person using it, especially used for high input for order gravestone cases. It uses touch seeing and measures the position of water outside. It can each be watched viewed over the smart phones with all the data day wise using an operation. Survey was also done on people for 2weeks to check bottles pros and cons. It came out to be effective within 3 range. It can be a great and cost effective measure to reduce drop like order monuments without any drug just by helping the person to input right quantum of fluid per day.

6) Healthcare Services and a Water Bottle for Seniors Citizens

Nam Eui Lee, Tae Hwa Lee, Seo Dong Heui, Sung yeon kim discovered a smart water bottle and give healthcare servicesto old peoples. In old people the central jitters tend to decelerate down due to which the body lacks water. They organise lots ofchecks, perceptivity & also give a structure of correct water input habits. They came with a fact that 75 of respondants are not feeling thirsty and 47 input water designedly for health purpose indeed they weren't thirsty. utmost of the respondants are on drug, which also affects the water input effectively. It isn't easy to form new habits. So they all created a bottlegrounded on iot technology which is equipped with weight detector and other functions also, to track and cover diurnal waterconsumption of an existent a bottle also contains a thermo chromic print over the face of bottle.

III. COMPONENTS DESCRIPTION

A. NodeMCU –ESP8266

Knot MCU is an Internet of effects(IoT)- concentrated open- source Lua- grounded firmware and development board. It includes software for the ESP8266 Wi- Fi SoC from Espressif Systems, as well as tackle for the ESP- 12 board. The firmware uses the Lua programming language. The firmware is grounded on the eLua design and was erected with the EspressifNon-OS SDK for ESP8266.. It incorporates lua- cjson and SPIFFS, among other open source systems. Due to resource restrictions, druggies must pick the modules that apply to their design and develop a firmware that's acclimatized to their requirements. Also included is support for the 32- bit ESP32.

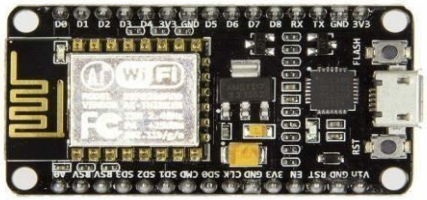


Fig.3.1NodeMcu

B. Water Evidence Ultrasonic Sensor

Variety of sizes to induce varied sound labors across a wide range of frequentness.

C. Adafruit IO

An ultrasonic distance detector measures the time between transferring and entering an ultrasonic palpitation to determine the distance to a target. ME007YS is a leakproof ultrasonic detector module with a range of 4.5 meters. It works with 5V bias like Arduino, Raspberry Pi, and others. Because the typical current of the ME007YS is just 8mA, it may be powered via the IO harborage of utmost regulators. The ultrasonic detector uses a unrestricted transmitter and receiver inquiry that's leakproof and dustproof, making it ideal for harsh and wettish measuring surroundings. It has a2.54- 4P interface and communicates through UART. ME007YS has experienced expansive testing and optimization, allowing it to give a quick response time, high stability and perceptivity, and low power consumption.



Fig.3.2 Water proof Ultrasonic Sensor

D. Piezo Buzzer

A piezo buzzer is an electrical device that generates tones, admonitions, or sounds. It's basically a affordable- cost product that is featherlight and has a introductory structure depending on the piezo ceramic buzzer parameters, it's also reliable and may be erected in a Adafruit diligence Ltd's Adafruit IO is a pall service. This pall service can be used for a purpose, including storing values and cranking bias via commands transferred over IO. The data is shown online in real- time. It connects the design to the internet and is substantially used to store and recoup data from internet connected IoT bias. It has the capability to operate motors as well as read detector data. It may also link systems to online services similar as Twitter, RSS feeds, rainfall vaticinations, and so on. is useful for generating, viewing, and managing multitudinous data aqueducts. Different types of pointers, needles and other controls are utilised. The triggers are used to control and respond to the data in youradafruit.io account. When the system goes offline, the triggers may be set up similar that an dispatch is transferred. It can also deliver announcements to cellphones using IFTTT and Zapier integration.

E. Power Supply

The Node MCU may be powered through a USB connection or an external power force. The power force is automatically named. External(non-USB) power can be handed via an AC- to- DC appendage (wall- nodule) or a battery. To connect the appendage, a2.1 mm center-positive connector may be fitted into the board's power harborage. The Gnd and Vin pin heads on the POWER connection is used to connect battery leads.

A 6-to-20-volt external power force is used to power the board. However, the 5V leg may only deliver five volts, causing the board to come unstable, if lower than 7V is supplied. However, the voltage controller may heat and damage the board, If further than 12V is utilised. The suggested voltage range is 7 to 12 volts.

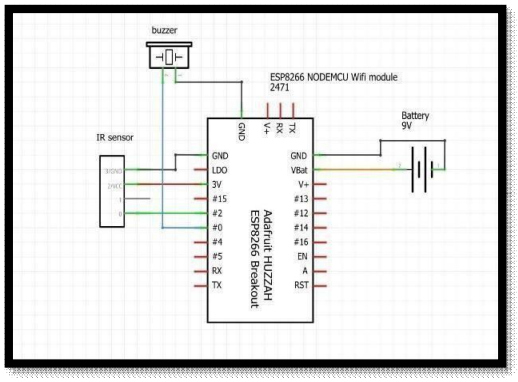
The power legs are

1) VIN This is the input voltage when the Nodemcu is powered by an external source (as opposed to 5 volts from the USB connection or other regulated power source). still, this leg could be used for supply or pierce voltage, If power is supplied via the power jack.

2) 5V The board's controller provides a regulated 5V to this leg. The board will be powered using the DC power connector (7-12V), USB(5V), or the VIN leg on the board (7- 12V). The controller is bypassed when power is supplied via the 5V or3.3 V legs, which may beget damage to our board.

3) 3V3. The on- board controller generates a 3.3-volt force.

4) GND. Leg can be used as a ground.



IV. WORKING

Fig.4.1 Circuit Diagram of Smart Water Bottle the NodeMCU is connect to the waterproof Ultrasonic Sensor. Ultrasonic Sensor has four legs- VCC, Trig(signal affair leg), Echo(signal input leg), and GND. GND leg of is connect to GND of NodeMCU, while VCC leg is connect to Vin of NodeMCU. The data legs Echo and Trig and connected to D1 and D2(digital legs) of NodeMCU. The piezo Buzzer consists of two legs-positive and negative. The positive leg is connected to D5 leg and negative leg is connected to thaGnd leg of NodeMCU. Thebatterysupplyof9volts positive and negative outstations is connected to the Vin (Vbat) and ground of the NodeMCU independently. The software law is now added to the NodeMCU uses the Arduino IDE.

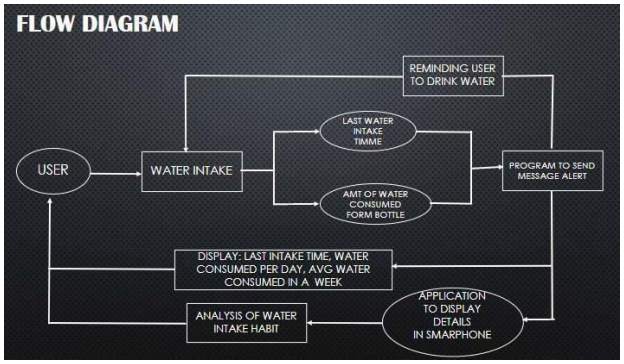


Fig.4.2 Flow Diagram

The leakproof ultrasonic detector is installed into the bottle cap using cement gun. By fixing the cap to the bottle the entire setup of design is done. The bottle will start reading the water position inside it using the ultrasonic detector. The values are manipulated by the program which is ditched in the Nodemcu and the needed data is projected on periodical examiner in Arduino IDE. The needed labors of the design are reflected in the Adafruit IO feeds.



Fig 4.3 Adafruit IO Dashboard

Fig 4.3 Adafruit IO Dashboard with values Whenever the water situations in the bottle are changed the data get streamlined in the Adafruit Io with the use of Graphs and Values. When the water position in the bottle is measured to be zero the buzzer starts giving an alert to the stoner to refill the bottle. The buzzer rings until the bottle is refilled. If the stoner doesn't consume water for ample quantum of time (which is fixed as 2 hours in program) the buzzer rings to remind stoner to drink water.

V. CONCLUSION

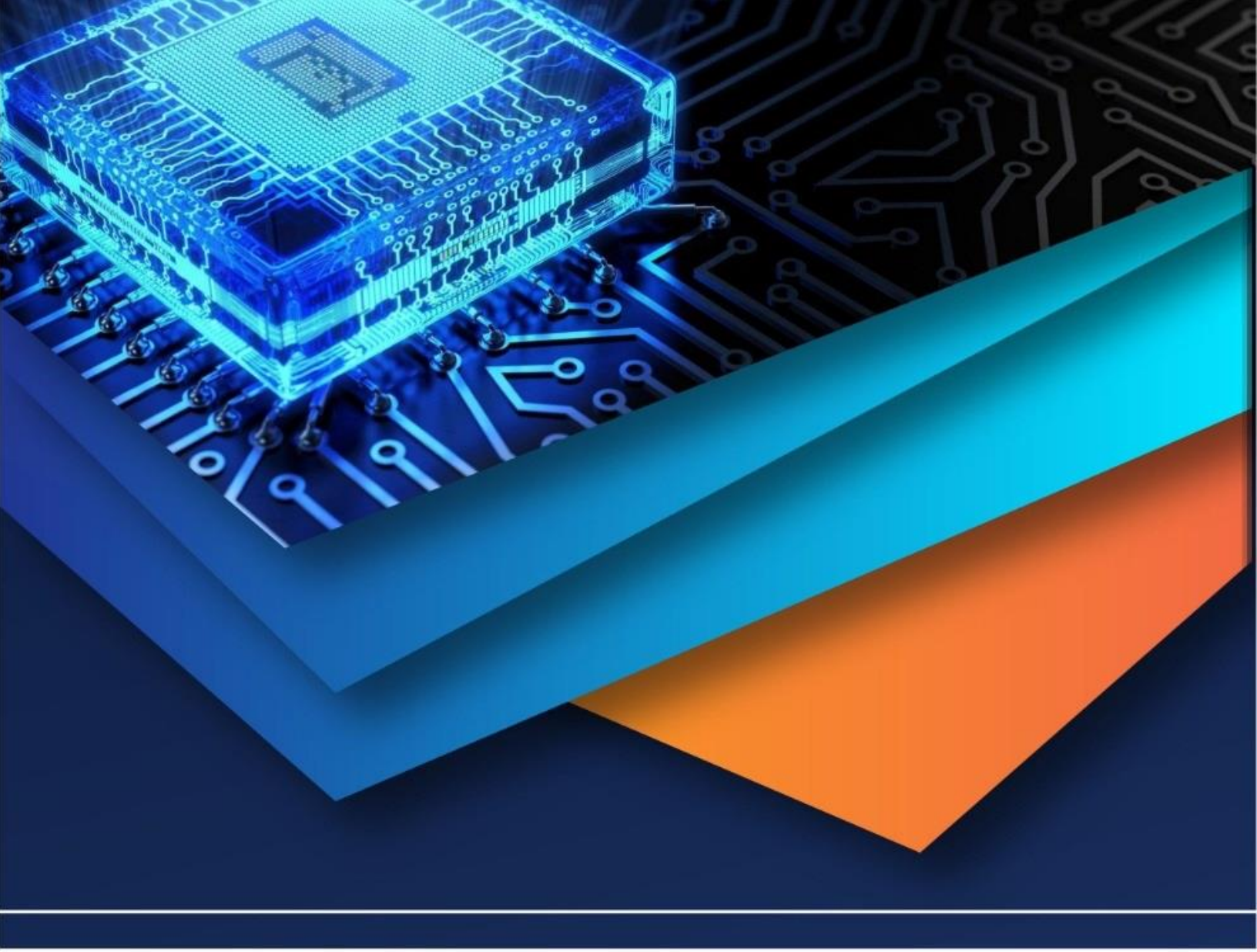
Water may be stored and consumed in a standard bottle. It seeks to give the stoner with water operation information. The conception is unique in that it considers each stoner's health and gives monuments and advice for proper water consumption. It's a product that can combine technological and healthrelated aspects. This idea addresses a social cause of a healthy life, and the general public will benefit from such a product if they're willing to live a healthy life with balanced water input.

VI. FUTURE SCOPE

This smart water bottle can also be linked to other health operation apps, allowing the data collected from the bottle to be utilised to assess a person's overall health. This design may be expanded to include taking stoner inputs similar as age, weight, and gender, as well as covering the temperature and moisture of the surroundings, and recommending the demanded water input volume, thus establishing diurnal water consumption objects.

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