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Hygienic and Quantity Based Water Distribution for Smart Cities Using IoT

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Abstract: The goal of this project is to reduce the water scarcity in every area and every person will get sufficient amounts of quality water. Today, cities around the world are expected to deliver clean, pressurized and reliable water to their residents' taps on a daily basis. However, with increasing urbanization and population growth leading to rising costs and water scarcity, cities are struggling to meet customer demands. In this work, to overcome these problems we are designing a real time water monitoring and controlling system as a project using IOT to provide equal amounts of quality water to everyone. The main hardware that is used in the implemented system includes Arduino UNO MCU, HC-SR04 UltraSonic sensor and SIM900 GSM transceiver. The system has been implemented practically at low cost and low power and gave expected and accurate results.

Index terms—Smart water Quality Monitoring System, Internet of Things.

I. INTRODUCTION

Water is essential for life and for most activities of human society. Both economic and social development and the maintenance of human health are completely dependent upon ready access to adequate water supplies. All societies require water both for basic survival and for economic development. A mere 0.014% of all water on Earth is both fresh and easily accessible. Technically, there is a sufficient amount of freshwater on a global scale. These cities will face increasing water stress with demand expected to outstrip supply by 40% by 2030.However, due to unequal distribution resulting in some very wet and some very dry geographic locations, plus a sharp rise in global freshwater demand in recent decades driven by industry, humanity is facing a water crisis. In a city or town that provides water to its citizens, the water utility distributing the water must ensure the water quality .The testing is done on the raw water before it is treated and distributed to the users. At present, there are about 600 major water supply schemes being maintained by Tamil Nadu Water Supply and Drainage Board, Chennai Metro Water Supply and Sewerage Board and other local bodies. Incorporating innovative water technologies into water supply systems improves water supply from sustainable perspectives. The development of innovative water technologies provides flexibility to the water supply system, generating a fundamental and effective means of sustainability based on an integrated real options approach. It is necessary to adopt a new approach to design urban water supply networks; water shortages are expected in the forthcoming decades and environmental regulations for water utilization. Many of the urban water supply networks in developing countries face problems related to population increase, water scarcity, and environmental pollution.

In future water demand will increase which is the known fact by everyone. Using technologies like RO, Desalination, etc… water can be reusable for day to day activities such as Drinking, household usage, etc.. .But these technologies are not suitable for drinking water. In real time, people are able to get water from various sources. But people are not aware of the quality in drinking water. Tamil Nadu Water Supply and Drainage Board provides water from a central tank to each area of people through the municipal pipe in particular time. In high population areas there is a chance for a few people not to get water. This may

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be a reason for people to get water from the underground individually through bore well technology and they get individual municipal corporations pipe connection to their house for the drinking purpose. Due to lots of changes in climate leads to groundwater level decrease in summer and turbidity water in the rainy season from bore well. In many areas water is distributed to the people using tanker lorry and private water suppliers. Even in this process people are not aware of quality and they do not get sufficient amounts of water to everyone in a particular area. In this world we have sufficient amounts of healthy drinking water. Already we are monitoring only the water that is present in the tank and it is distributing to houses in a particular area. But these techniques may not be able to provide efficient quality water to everyone in future. For a Smart City to be successful, adopting a sustainable mindset is as important as using smart technological innovations. Individuals will need to start adopting eco-friendly practices and products. Say for example, possible methods to overcome this increasing water demand is rain water harvesting and water aerators. If every independent house/flats try to use these systems, a huge amount of water can be conserved annually. This alone can reduce the water demand significantly, if efficiently designed and properly managed. Smart Cities can be the smartest way to upgrade the lives of urban residents and to protect our environment. But this can be a reality only if local Governments, corporate companies, technology experts and individuals join hands together for a sustainable revolution. To overcome the problems of these methods we develop a project using IOT to provide equal amounts of quality water to everyone. This may reduce the water scarcity in every area. Every person will get sufficient amounts of quality water.

II. RELATED WORKS

An Integrated System for Real-Time Water Monitoring Based on Low Cost Unmanned Surface Vehicles presents the development of an integrated system for the monitoring of aquatic ecosystems aiming at providing a set of tools to identify critical environmental scenarios and then adopt strategic decisions for the management of lakes, rivers or coastal areas. The whole monitoring infrastructure is centered on the realization of a low cost Unmanned Surface Vehicle (USV) to be employed for the collection of crucial parameters about water quality. The vehicle, called WeMo (Water Environmental Mobile Observer) has been realized with low cost off-the-shelf components and is provided with a modular array of sensors to measure chemical and physical parameters as well as to perform bathymetry. It can be controlled either manually or automatically and it is also provided with LoRa Wide Range wireless connectivity enabling it to automatically store the collected data onto a cloud platform. Data analytics tools have also been introduced in order to develop a complete monitoring ecosystem covering all the tasks of data collection, storage and analysis. Wireless Monitoring system of Volatile Organic Compounds/Water Vapor/Gas Pressure/Temperature Using RF Transceiver describes the development and characterization of a wireless pressure monitoring system (WPMS) using an integrated radio frequency (RF) transceiver for applications such as monitoring of exerted vapor pressure variations of gases, volatile organic compounds (VOCs), and water vapor. Parametric sensing and environment detection using integrated approach are the key drivers for modern sensor technology. Our WPMS has an operating frequency band of 2.3152–2.6478 GHz. It has been developed using a pressure transducer, voltage controlled oscillator, amplifier, and transmit/receive filtennas (filtering antennas). Transmitting antenna has been used for radiating RF signal (conditioned pressure information), while reflecting the undesired harmonics. Filtering antenna at the receiver side has been used to detect the desired RF signal, while filtering out the undesired signal. Experiments have been performed for monitoring a pressure variation of 0–50 kPa for a distance of 3 m from the transmitter. The pressure sensitivity of the system is 6.4 MHz/kPa with a good response. Tracking of a Fluorescent Dye in a Freshwater Lake with an Unmanned Surface Vehicle and an Unmanned Aircraft System describes recent catastrophic events in our oceans, including the spill of toxic oil from the explosion of the Deepwater Horizon drilling rig and the rapid dispersion of radioactive particulates from the meltdown of the Fukushima Daiichi nuclear plant, underscore the need for new tools and technologies to rapidly respond to hazardous agents. Our understanding of the movement and aerosolization of hazardous agents from natural aquatic systems can be expanded upon and used in prevention and tracking. New technologies with coordinated unmanned robotic systems could lead to faster identification and mitigation of hazardous agents in lakes, rivers, and oceans. In this study, we released a fluorescent dye (fluorescein) into

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a freshwater lake from an anchored floating platform. A fluorometer (fluorescence sensor) was mounted underneath an unmanned surface vehicle (USV, unmanned boat) and was used to detect and track the released dye in situ in real-time. An unmanned aircraft system (UAS) was used to visualize the dye and direct the USV to sample different areas of the dye plume. Image processing tools were used to map concentration profiles of the dye plume from aerial images acquired from the UAS, and these were associated with concentration measurements collected from the sensor on board USV.

Development of Unmanned Surface Vehicles for Smart Water Quality Inspector describes effective and efficient management of water resources is becoming unprecedentedly more important nowadays due to the increasing demand from a growing population, increasing standards of living and changing supply due to climate change. Water monitoring technology has directly contributed to the effectiveness of water resource management. Traditional water measurement methods, mostly done in laboratories, cannot help so much for making timely and informed decisions. The new method called Water Sensor Network can acquire and serve data in real time, but most of them are a type of fixed location platform that makes them lacking mobility. In this paper, we present the combination of wireless water sensor technology together with unmanned surface vehicles (USV) to solve the problem. The overall system consists of water quality sensors, wireless communication system and mobility platform. The water sensors include temperature, pH, dissolved oxygen (DO), oxidation reduction potential (ORP) and electrical conductivity (EC). Software was developed using open source technology aiming at providing continuous and autonomous water quality measurement to reduce cost. A Study of LoRa: Long Range & Low Power Networks for the Internet of Things presents that LoRa is a long-range, low-power, low-bitrate, wireless telecommunications system, promoted as an infrastructure solution for the Internet of Things: end-devices use LoRa across a single wireless hop to communicate to gateway(s), connected to the Internet and which act as transparent bridges and relay messages between these end-devices and a central network server. This paper provides an overview of LoRa and an in-depth analysis of its functional components. The physical and data link layer performance is evaluated by field tests and simulations. Based on the analysis and evaluations, some possible solutions for performance enhancements are proposed.

III. PROPOSED SYSTEM

In this proposed system ,we implement a water control method in the water distribution system .In this system having ultrasonic sensor, gas sensor , arduino uno, water motor, gsm and lcd Ultrasonic sensor will detect water level inside of the water tank. Whenever we press the button, water level detect and information messages will be sent using gsm. Gas sensor will detect unwanted gases inside of the water tank after that water motor is on and water will be distributed to every home. We implement a water control method in the water distribution system. This system has the following sensors and components: Ultrasonic sensor which is used to measure the water level using ultrasonic waves. It transducers are transducers that convert ultrasound waves to electrical signals or vice versa. Those that both transmit and receive may also be called ultrasound transceivers; many ultrasound sensors besides being sensors are indeed transceivers because they can both sense and transmit. This device works on a principle similar to that of the transducer used in Radar and sonar systems, which evaluate attributes of a target by interpreting the echoes from radio or sound waves, respectively. Gas sensor which is used to sense the nature of toxic Gases. A detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shot down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. Water flow sensor which senses the rate of flow of water. It consists of a plastic valve from which water can pass.

Arduino UNO is a cross platform application. It is used to write and upload programs to the Arduino board. The source code for the IDE is released under the GNU general public license, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. It is able to read inputs-Light on a sensor, a finger on a button, or a twitter message-and turn it into an output- activating a motor, turning on an LED, publishing something online connecting the Arduino: Connecting an arduino board to your PC is quite simple. On Windows: Plug in the USB cable-one end to the PC, and one end to the Arduino board. When

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prompted, Select " Browse my computer for driver" and then select the folder to which you extracted your original Arduino IDE download. You make an error that the board is not a Microsoft certified device- select "Install anyway". Your board should now be ready for programming. Before the code can be uploaded to your board, two important things are required: Select your Arduino from the list under tools->board. The standard board used in RBE 1001,2001,and 2002 is the Arduino mega 2560, so select the " Arduino mega 2560 or mega ADK "option in the dropdown Select the communication port, or COM port , By going tools ->serial port .Then system have a GSM which is standard in telecommunication and it is implemented globally. It acts as a base for telecommunications. Also it has a button.

A.Embedded System

system is an arrangement in which all its unit assemblies work to according to a set of rules. It can also be defined as a way of wo organizing or doing one or many tasks according to a fixed pla example, a watch is a time displaying system. Its components follow a set of rules to show time. If one of its parts fails, the watch will stop working. So we can say, in a system, all its subcomponents depend on each other. As its name suggests, Embedded means something that is attached to another thing. An embedded system can be thought of as a computer hardware system having software embedded in it. An embedded system can be an independent system or it can be a part of a large system. An embedded system is a microcontroller or microprocessor based system which is designed to perform a sp task. For example, a fire alarm is an embedded system; it will sens smoke. An embedded system has three components −It has hardw has application software. It has a Real Time Operating system (R that supervises the application software and provides a mechanism the processor run a process as per scheduling by following a plan to control the latencies. RTOS defines the way the system works. It sets the rules during the execution of the application program. A small scale embedded system may not have RTOS. So we can define an embedded system as a Microcontroller based, software driven, reliable, real-time control system.

a.Characteristics of an Embedded System

Single-functioned − An embedded system usually performs a specialized operation and does the same repeatedly. For example: A pager always functions as a pager. **Tightly constrained** − All computing systems have constraints on design metrics, but those on an embedded system can be especially tight. Design metrics is a measure of an implementation's features such as its cost, size, power, and performance. It must be of a size to fit on a single chip, must perform fast enough to process data in real time and consume minimum power to extend battery life. **Reactive and Real time** − Many embedded systems must continually react to changes in the system's environment and must compute certain results in real time without any delay. Consider an example of a car cruise controller; it continually monitors and reacts to speed and brake sensors. It must compute acceleration or de-accelerations repeatedly within a limited time; a delayed computation can result in failure to control of the car .**Microprocessors based** − It must be microprocessor or microcontroller based .**Memory** − It must have a memory, as its software usually embeds in ROM. It does not need any secondary memories in the computer .**Connected** − It must have connected peripherals to connect input and output devices .**HW-SW systems** − Software is used for more features and flexibility. Hardware is used for performance and security.

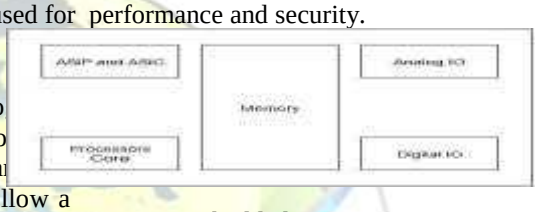

Fig .1 Embedded system

b.Basic Structure of an Embedded System

The following illustration shows the basic structure of an embedded system

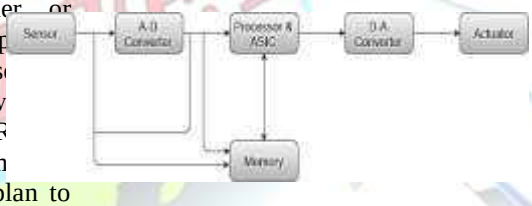

Fig .2 Embedded System Structure

Sensor − It measures the physical quantity and converts it to an electrical signal which can be read by an observer or by any electronic instrument like an A2D converter. A sensor stores the measured quantity to the memory. **A-D Converter** − An analog-to-digital converter converts the analog signal sent by the sensor into a digital signal. **Processor & ASICs** − Processors process the data to measure the output and store it to the memory. **D-A Converter** − A digital-to-analog converter converts the digital data fed by the processor to analog data **Actuator** − And actuator compares the output given by the D-A Converter to the actual (expected) output stored in it and stores the approved output.

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B.Internet of Things(IOT)

internet of Things (IoT) is a revolutionary new concept that has the potential to turn virtually anything This extraordinary revolution has captured the attention of millions. Why is this so big picture? So imagine a world where machines function without any written of human interaction. A future where machines communicate with other machines and make decisions based on the data collected and all independent of an end us. To understand how this revolution took shape we have from a well renowned inventor Nicola Tesla stated that the world will be wirelessly connected to a single brain. Every invention starts with a simple thought inventor of the computer, spoke about machines having sensors and humans to give Artificial Intelligence (AI). Then came the World Wide Web (www), the flow of information that is available to the public and this was exactly what was missing to the idea of sensors with the internet [5]. The IoT journey the idea of sensors with the internet [5]. The IoT journey idea of sensors with the internet[5]. The iot journey has taken over a century to see light and it will undoubtedly not stop there.

Fig. 1: The proposed schematic diagram of the smart water quality monitoring system. It might be difficult to see the significance of the IoT but every advancement made is to make everyday life simpler and safer. Examples of these are a baby monitor to keep track of a baby's health in real time [6], an IoT for caregivers which collects behavioral data to improve care [7] and a heart monitoring system that collects biometrics data to track an aging patient's health [8]. These are just a few examples of how IoT projects can improve the way of life. Fig. 1 shows the proposed schematic diagram of the smart water quality monitoring system using the IoT concept.

IV. ARCHITECTURE Design

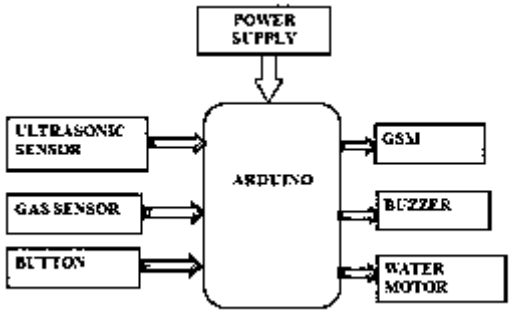

Fig .3 Shows architecture design of proposed system

SOFTWARE DETAILS

A.ARDUINO IDE

The **Arduino integrated development environment (IDE)** is a cross platform application(for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino board. The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU tool chain, also included with the IDE distribution. The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board to travel back to the 1900's with a profound prediction teaching the machines, what we know today as Artificial Intelligence (AI). Then came the World Wide Web (www), the flow of information that is available to the public and this was exactly what was missing to the idea of sensors with the internet [5]. The IoT journey: the idea of sensors with the internet [5]. The iot journey has taken over a century to see

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Fig .4. Arduino

light and it will undoubtedly not stop here. Fig. 1: The proposed schematic diagram of the smart water quality monitoring system. It might be difficult to see the significance of the IoT but every advancement made is to make everyday life simpler and safer. Examples of these are a baby monitor to keep track of a **PROTEUS**

B.PRODUCT MODULES

The Proteus Design Suite is a Windows application for sche capture, simulation, and PCB (Printed Circuit Board) layout des can be purchased in many configurations, depending on the s designs being produced and the requirements for microcon simulation. All PCB Design products include an auto router and mixed mode SPICE simulation capabilities. a.Schemat Capture Schematic capture in the Proteus Design Suite is used for both the simulat designs and as the design phase of a PCB layout project. therefore a core component and is included with all pı configurations. b.Microcontroller Simulation

The microcontroller simulat Proteus works by applying either a hex file or a debug file microcontroller part on the schematic. It is then co-simulated with any analog and digital electronics connected to it. This e its use in a broad spectrum of project prototyping in areas su motor control, temperature control and user interface design.[6] finds use in the general hobbyist community and, since no har is required, is convenient to use as a training or teaching tool. Si is available for co-simulation of: Microchip Technologies P PIC12, PIC16,PIC18,PIC24,dsPIC33 Microcontrollers. Atmel (and Arduino), 8051 and ARM Cortex-M3 Microcontrollers NXP 8051, ARM7, ARM Cortex-M0 and ARM Cortex-M3 Microcontrollers. Texas Instruments MSP430, PICCOLO DSP and ARM Cortex-M3 Microcontrollers. Parallax Basic Stamp, Freescale HC11, 8086 Microcontrollers.

C.PCB Design

The PCB Layout module is automatically given connectivity information in the form of a netlist from the schematic capture module. It applies this information, together with the user specified design rules and various design automation tools, to assist with error free board design. PCB's of up to 16 copper layers can be produced with design size limited by product configuration.

HARDWARE DETAILS

A.POWER SUPPLY

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

B.ARDUINOUNO

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes pre-programmed with a boot-loader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The Uno also differs from all

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preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converterThe Arduino project started at the Interaction Design Institute Ivrea (IDII) in Ivrea, Italy. At that time, the students used a BASIC Stamp microcontroller at a cost of $100, a considerable expense for many students. In 2003 Hernando Barragán created the development platform Wiring as a Master's thesis project at IDII, under the supervision of Massimo Banzi and Casey Reas, who are known for work on the Processing language. The project goal was to create simple, low-cost tools for creating digital projects by non-engineers. The Wiring platform consisted of a printed circuit board (PCB) with an ATmega168 microcontroller, an IDE based on Processing and library functions to easily program the microcontroller.

a.Specification

Microcontroller: Microchip ATmega328P ,Operating Voltage: 5 Volt, Input Voltage: 7 to 20 Volts, Digital I/O Pins: 14 (of which 6 provide PWM output),Analog Input Pins: 6,DC Current per I/O Pin: 20 mA, DC Current for 3.3V Pin: 50 mA SRAM: 2 KB,EEPROM: 1 KB, Clock Speed: 16 MHz,Length: 68.6 mm,Width:53.4 mm,Weight:25g

b.Communication

The Arduino/Genuino Uno has a number of facilities for communicating with a computer, another Arduino/Genuino board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a . inf file is required. The Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows serial communication on any of the Uno's digital pins

Fig .5 Arduino UNO

C. ULTRASONIC SENSOR

Ultrasonic transducers are transducers that convert ultrasound waves to electrical signals or vice versa. Those that both transmit and receive may also be called ultrasound transceivers; many ultrasound sensors besides being sensors are indeed transceivers because they can both sense and transmit. These devices work on a principle similar to that of transducers used in radar and sonar systems, which evaluate attributes of a target by interpreting the echoes from radio or sound waves, respectively. Active ultrasonic sensors generate high-frequency sound waves and evaluate the echo which is received back by the sensor, measuring the time interval between sending the signal and receiving the echo to determine the distance to an object. Passive ultrasonic sensors are basically microphones that detect ultrasonic noise that is present under certain conditions, convert it to an electrical signal, and report it to a computer. This technology can be used for measuring wind speed and direction (anemometer), tank or channel fluid level, and speed through air or water. For measuring speed or direction, a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure tank or channel level, the sensor measures the distance to the surface of the fluid. Further applications include: humidifiers, sonar, medical ultrasonography , burglar alarms, non-destructive testing and wireless charging. Systems typically use a transducer which generates sound waves in the ultrasonic range, above 18 kHz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed.

TRANSDUCER

An ultrasonic transducer is a device that converts AC into ultrasound, as well as the reverse, sound into AC. In ultrasonics, the term typically refers to piezoelectric transducers or capacitive transducers. Piezoelectric crystals

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change size and shape when a voltage is applied; AC voltage makes them oscillate at the same frequency and produce ultrasonic sound. Capacitive transducers use electrostatic fields between a conductive diaphragm and a backing plate. The beam pattern of a transducer can be determined by the active transducer area and shape, the ultrasound wavelength, and the sound velocity of the propagation medium.

Fig 6 Ultrasonic transducer

D.GAS SENSOR (MQ6)

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals. Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes and emerging technologies such as photovoltaic. They may be used in fire fighting. Gas leak detection is the process of identifying potentially hazardous gas leaks by sensors. These sensors usually employ an audible alarm to alert people when a dangerous gas has been detected. Common sensors include infrared point sensors, ultrasonic sensors, electrochemical gas sensors, and semiconductor sensors. More recently, infrared imaging sensors have come into use. All of these sensors are used for a wide range of applications and can be found in industrial plants, refineries, waste-water treatment facilities, vehicles, and homes.

Fig .7 Gas sensor

a.Features

5V DC or AC circuit, Requires heater voltage ,Operation Temperature: -10 to 70 degrees C, Heater consumption: less than 750

E.PUSH BUTTON

A push-button (also spelled pushbutton) or simply button is a simple switch mechanism to control some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, although many un-biased buttons (due to their physical nature) still require a spring to return to their un-pushed state. Terms for the "pushing" of a button include pressing, depressing, mashing, slapping, hitting, and punching.

Fig .7 Push Button

F.GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION)

If you are in Europe or Asia and using a mobile phone, then most probably you are using GSM technology in your mobile phone.GSM stands for **G**lobal **S**ystem for **M**obile Communication. It is a digital cellular technology used for transmitting mobile voice and data services.The concept of GSM emerged from a cell-based mobile radio system at Bell Laboratories in the early 1970s.GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard.GSM is the most widely accepted standard in telecommunications and it is implemented globally.GSM is a circuit-switched system that divides each 200 kHz channel into eight 25 kHz time-slots. GSM operates on the mobile communication bands 900 MHz and 1800 MHz in most parts of the world. In the US, GSM operates in the bands 850 MHz and 1900 MHz.GSM owns a market share of more than 70 percent of the world's digital cellular subscribers.GSM makes use of narrowband Time Division Multiple Access (TDMA) technique for transmitting signals.GSM was developed using digital technology. It has an ability to carry 64 kbps to 120 Mbps of data rates. Presently GSM supports more than one billion mobile subscribers in more than 210 countries throughout the world.GSM provides basic to advanced voice and data services including roaming service. Roaming is the ability to

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use your GSM phone number in another GSM network.GSM digitizes and compresses data, then sends it down through a channel with two other streams of user data, each in its own timeslot. Listed below are the features of GSM that account for its popularity and wide acceptance. Improved spectrum efficiency, International roaming, Low-cost mobile sets and base stations (BSs),High-quality speech, Compatibility with Integrated Services Digital Network (ISDN) and other telephone company services, Support for new services.

Fig . 8 Global System for Mobile Communication

a.GSM Architecture

A GSM network comprises of many functional units. These functions and interfaces are explained in this chapter. The GSM network can be broadly divided into:The Mobile Station (MS)The Base Station Subsystem (BSS)The Network Switching Subsystem (NSS)The Operation Support Subsystem (OSS)

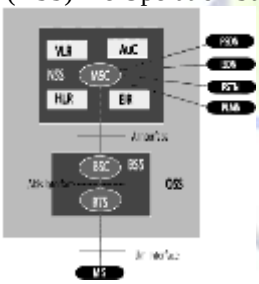

Fig .9 GSM Architecture

The following diagram shows the GSM network along with the added elements:

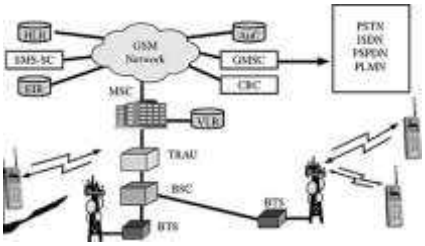

Fig .10 GSM Network with Elements

The MS and the BSS communicate across the Um interface. It is also known as the air interface or the radio link. The BSS communicates with the Network Service Switching (NSS) center across the A interface.

b.GSM Protocol Stack GSM architecture is a layered model that is designed to allow communications between two different systems. The lower layers assure the services of the upper-layer protocols. Each layer passes suitable notifications to ensure the transmitted data has been formatted, transmitted, and received accurately.

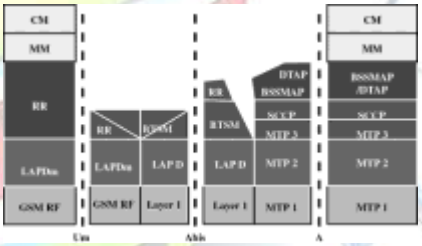

Fig .11 GSM Protocol Stack

G.WATER MOTOR

The pumping of water is a basic and practical technique, far more practical than scooping it up with one's hands or lifting it in a hand-held bucket. This is true whether the water is drawn from a fresh source, moved to a needed location, purified, or used for irrigation, washing, or sewage treatment, or for evacuating water from an undesirable location. Regardless of the outcome, the energy required to pump water is an extremely demanding

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component of water consumption. All other processes depend or benefit either from water descending from a higher elevation or some pressurized plumbing system. The ancient concept of the aqueduct took simple and eloquent advantage of maintaining elevation of water for as long and far a distance as possible. Thus, as water moves over great distances, it retains a larger component of its potential energy by spending small portions of this energy flowing down a slight gradation. Granted, a useful aqueduct system ultimately depends on a fresh water source existing at a higher elevation than the location .

Fig .12 Water Motor

V. EXPERIMENTAL RESULTS

Whenever we press the button, ultrasonic sensor will check for water, whether it is present or not. If the water is present , then it will check for Quality measures like gas.Gas sensor will check any smell is detect or not. It checks whether the sensed value and already assumed values are same or not. If it is not same, then it sends a message to users.. Gas sensor sense the toxic nature in water. If anything is detected then it sends a message through GSM to users that "Gas high doesn't use water". If nothing is detected, then its sends message to users that "Water motor ON". Then the water is distributed to the each and every house.

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