RESEARCH ARTICLE OPEN ACCESS

Smart Water Level Monitoring System By Using IOT And Arduino UNO And GSM Module

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ABSTRACT

One of the major problems faced by most of the countries is the issue of water scarcity in the world and wastage during transmission has been identified as a major culprit; this is one of the motivations for this research, to deploy computing techniques in creating a barrier to wastage in order to not only provide more financial gains and help the environment as well as the water cycle which in turn ensures that we save water for our future. IOT based Water Level Monitoring system is an innovative system which will inform the users about the level of liquid and will prevent it from overflowing. To demonstrate this the system makes use of containers, where the water level sensor placed over the containers to detect the liquid level and compare it with the container's depth. The system makes use of AVR family microcontroller, Aurdino uno r3, LCD screen, GSM modem for sending data and a buzzer. A 12 V transformer is used for power supply in this system. The LCD screen is used to display the status of the level of liquid in the containers. The liquid level is highlighted as coloured to show the level of liquid present in the container with the help of a web page to the user. The buzzer starts ringing when the set limit of the liquid is crossed. Thus this system helps to prevent the wastage of water by informing about the liquid levels of the containers

Keywords:- LCD

I. INTRODUCTION

PROBLEM IDENTIFICATION:

In the current scenario of the cosmos. The tracking of health of a somebody or a patient is a really slow process and complicated matter. With the help of devices, it becomes really easy to supervise the health of a somebody or a patient by utilizing a gimmick. At this occasion we can implement the IOT we can supervise the health condition and to diagnose the patient from whatever situation we can sense the heartbeat (Pulse) and the temperature. By using of sensors we can literally sense the data and present status of the patient or health report to the doctor and to the hospital.

This project is a brilliant result for such form of problem. This IOT device plays a major part in determining the health condition of the patient and gives up the accuracy report to the physician. It holds the potential to cover the patient 24*7.

II. MOTIVATION OF THE PROJECT

One day I'm turning up the newspaper and found the small content that IOT applications in health care appliances can take a lot more enhancements to the medical industry.That found very interesting to me later on I went done the topic how the IOT can be useful for present appliances and what is it? And how it is altering the entire world and I found some of the terrific information.

Which we can perform the wonders with IOT and with the aid of sensors we can build up the communication in between devices and can deploy the information to your mobile device.

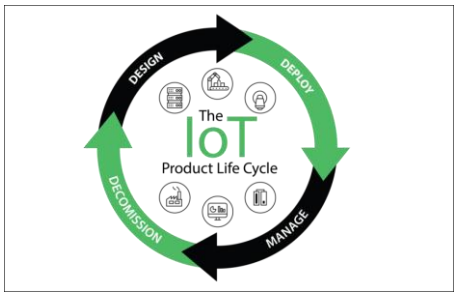
III. INTERNET OF THINGS

The internet of things is a arrangement of interrelated computing devices, mechanical and digital machines, objects, creatures or people that are provided with unique identifiers and the ability to transmit over a net without involving human-to-human or human-to-computer interaction it means

getting all the affairs in the world and connected the to the internet.

We totally experience that IOT is changing industries across the broad-from agriculture to healthcare to manufacturing and everything in between.

IV. PHASES OF IOT LIFE CYCLE



DESIGN: In this phase, we design the task according to the user requirements and it is the central function of adequate the client.

DEPLOY: Deploying the project along with SRS to the customer if any maintenance needed, it will be kept in the following stage.

MANAGE: The project will be renovated and preserved.

DECOMMISION: The last and final phase of an IOT product lifecycle it is really important that OEM's (Original Equipment Manufacturers) this enables end users and stakeholders to remove a device from the system and deploy a novel ace.

V. FEATURES & APPLICATIONS OF IOT

The most important features of it on which it works are connectivity, analyzing, integrating, active engagement, and many more. Listed below are some of them for your use:

Connectivity: Connectivity refers to making a proper link between all the things of IoT to IoT platform it may be served or cloud. After connecting the IoT devices, it calls for a high speed messaging between the devices and cloud to enable dependable, secure and bi-directional communication.

Analyzing: After connecting all the relevant things, it comes to real-time analyzing the information accumulated and use them to make effective business intelligence. If we hold a sound insight into data gathered from all these affairs, then we bid our system receives a smart organization.

Integrating: IoT integrating the various examples to improve the user experience as good.

VI. SCOPE OF IOT

The scope of IoT includes:

- Embedded devices which handle and gather data from detectors or other inputs Cloud storage of information.
- Collection and analysis of information.
- Applications which present data to users in meaningful ways.

VII. REQUIREMENT ANALYSIS

The requirement elicitation process in the IOT project has been performed through calls and face to face meetings amongst the collaborators on the general topics affecting the overall architecture of the project. Main requirements have been corroborated through a study that has been applied internally to validate the query set and will subsequently be proposed to a group of stakeholders. This helped to substantiate some of the principal pillars of the its proposition. In the first iteration requirements have been gathered in an agile approach just collecting the description. The first iteration goal is to explore some of the technical open issues that the project goal presents: using semantic, creating a simple adoption path and an inclusive approach for the involved stakeholders requires placing on the technical shoulders of the project a high tier of complexity that demands to be iteratively validated and designed. In the second iteration, an issue tracking system in the project's GitLab1 could be employed to manage

requirements linked to implementation milestones. The grade of detail of the requirements will be, as the first iteration of the document, non homogeneous across the elements of the task. The end of the task is ambitious and the iterations will represent a validation of some of the facets and the opportunity to enhance and enrich them over time. Components of the architecture definition will not be duplicated in this document, but referred to the specific sections.

VIII. SRS(SYSTEM REQUIREMENTSPECIFICATION)

A software requirement specification is a description of the software to be evolved. It is also specifies the ground for an understanding between customers and contractors for an interaction. It is an assessment of requirements before the more specific system designs. And it is also provides a naturalistic foundation for calculating prices, hazards, etc. Software requirements specifications can help the software project failure.

It is extremely recommended to review or test Srs documents before start writing test cases and forming any plan for testing. Let's find out how to test series and the important point to hold in mind while examining it.

Most of the faults which we see during testing are because of either incomplete requirements or ambiguity in Srs. To avoid such defects it is rattling significant to test software requirements specification before writing the test examples. Hold open the latest version of Srs with you for reference and keep yourself updated with the latest change made to the serial publication. The best exercise is to work through the document very carefully and note down all the confusions, assumptions and incomplete requirements and then take in a meeting with the customer to make them clear before the development phase starts as it becomes costly to make the bugs after the software is broken. Afterward all the requirements are cleared to a tester, it becomes comfortable for him to write effective test cases and accurate expected results.

IX. SYSTEM REQUIREMENTS

SOFTWARE REQUIREMENTS

AURDINO IDE (Integrated Development Environment):

The Arduino Software (IDE) allows you to write programs and upload them to your dining table. On the Arduino Software page you will find two selections

If you possess a reliable Internet connection, you should utilize the online IDE (Arduino Web Editor). It will permit you to save your sketches in the swarm, having them available from any device and backed up. You will constantly possess the most up-to-date version of the IDE without the need to install updates or community generated libraries.

If you would rather work offline, you should employ the latest version of the desktop IDE.

HARDWARE REQUIREMENTS:

ARDUINO UNO R3:

The Arduino UNO is a microcontroller board based on the ATmega328. It holds 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connector, a power jack, an in-circuit system programming (ICSP) header, and a reset button. It comprises everything needed to hold up the microcontroller; simply tie it to a data processor with a USB cable or power it with an AC-to-DC adapter or battery to obtain gone.

The UNO differs from all preceding boards in that it does not use the FTDI USB-to- serial driver chip. Rather, it features an ATmega16U2 programmed as a USB-to- serial convertor. This auxiliary microcontroller has its own USB bootloader, which allows advanced users to reprogram it.

The Arduino has a large support community and an encompassing set of support libraries and hardware add-on "shields" (e.g. you can easily make your Arduino wireless with our Wixel shield), making it a great introductory platform for embedded electronics. Remark that we also offer a SparkFun Inventor's Kit, which includes an Arduino Union, along with an assortment of ingredients (e.g. Bread board, sensors, jumper wires, and LEDs) that make it possible to create a routine of fun introductory projects.

GSM MODULE:

This is an ultra compact and reliable wireless module. The SIM900A is a complete Dual-band GSM/GPRS solution in an SMT module which can be engrafted in the client applications, allowing you to benefit from small dimensions and cost- efficient results. Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power use. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900A can fit almost all the distance requirements in your applications, especially for slim and compact demand of design.

SIM900A GENERAL SPECIFICATION:

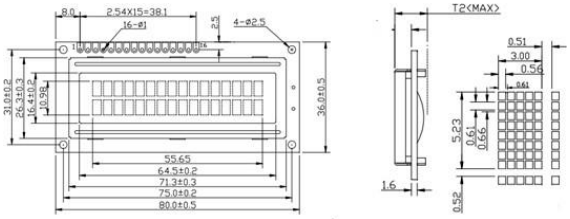
- Dual-Band 900/ 1800 MHz
- GPRS multi-slot class 10/8
- GPRS mobile station class B
- Compliant to GSM phase 2/2+
- Class 4 (2 W @ 900 MHz)
- Class 1 (1 W @ 1800MHz)
- Dimensions: 24x24x3mm
- Weight: 3.4g
- Control via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT Commands)
- SIM application toolkit
- Fax: Group 3, Class 1
- Data
- GPRS class 10: max. 85.6 kbps (downlink)
- PBCCH support
- Coding schemes CS 1, 2, 3, 4
- Compatibility: AT cellular command interface

LCD 2*16 INTERFACING AURDINO:

LCD modules are very commonly practiced in most embedded projects, the reason being its cheap cost, availability and programmer friendly. Most of us would have come across these displays in our day to day life, either at PCO's or calculators. The appearance and the spots have already been visualized above now let us acquire a bit technical. 16×2 LCD is made so because; it has 16 Columns and 2 courses. On that point are a set of combinations available like, 8×1, 8×2, 10×2, 16×1, etc., but the most used one is the 16×2 LCD. Thus, it will have (16×2=32) 32 characters in total and each case will be made of 5×8 Pixel Dots. A Single character with all its Pixels is shown in the below image.

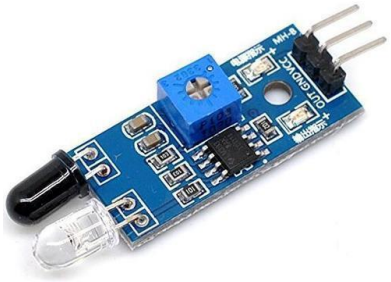
Now, we know that each character has (5×8=40) 40 Pixels and for 32 Characters we will have (32×40) 1280 Pixels. Farther, the LCD should also be taught about the Position of the picture elements. Hence it will be a hectic task to handle everything with the help of MCU, hence an Interface IC like HD44780is used, which is mounted on the backside of the LCD Module itself. The role of this IC is to get the Commands and Data from the MCU and process them to display meaningful information onto our LCD Screen. You can learn how to interface an LCD using the above mentioned links. If you are an advanced programmer and would like to create your own library for interfacing your Microcontroller with this LCD module then you have to understand the HD44780 IC is working and commands which can be found its datasheet.

2D model of 16×2 LCD module:



IR SENSORS:

IR detectors are little microchips with a photocell that are tuned to listen to infrared light. They are almost always used for remote control detection - every TV and DVD player has one of these in the front to listen for the IR signal from the clicker. Inside the remote control is a matching IR LED, which emits IR pulses to tell the TV to turn on, off or change channels. IR light is not visible to the human eye, which means it takes a little more work to test a setup.



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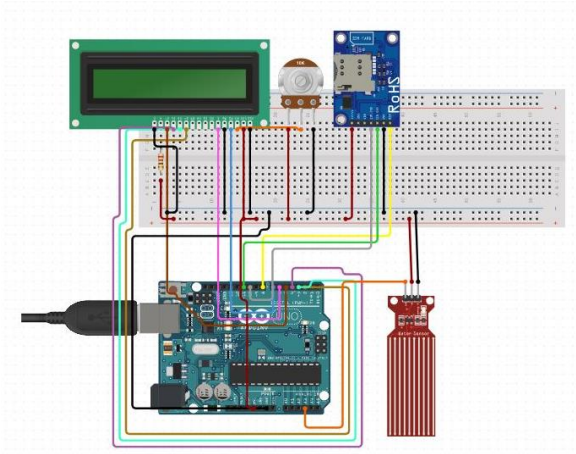
FEATURES:

- Input Power: 3.3V or 5VDC.
- 3 pin interface which are OUT, GND and VCC:
  - ➢ OUT is digital output pin from sensor module, please connect to any digital input on your microcontroller. Will output logic LOW when object is detection.
  - ➢ GND is where you connect to your controller ground, or 0V.
  - ➢ VCC is the +ve supply, connect to either +3.3V or +5V.
- Two LED indicators, one (Red) as power indicator, another(green) as object detection indicator.
- Obstacle detection range: 2cm to 10cm
- Adjustable sensitivity with on board potentiometer, this translate to adjustable detection range.
- Detection angle: 35 degree
- Small size makes it easy to assembly.
- Single bit output.
- Compatible with all types of microcontrollers.
- Dimension: 3.1cm x 1.5cm

CIRCUIT DIAGRAM:



BLOCK-DIAGRAM:

X. CONCLUSION

This IOT based Proposed system is used to acquire water level and its evaporation details as a water source in real time from any location, any device connected to the internet. This water evaporation data can be used for various purposes for better management of water sources.Monitoring water evaporation from physically every time. The system can be implemented for different sources of water by replacing sensor device suitable for the condition. Concluding the proposed IOT based water evaporation monitoring system will be helpful to collect,analyze and predict the water level detail,water usage and other information of particular water source at particular location in real-time remotely.

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