Smart Water Tank System

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Abstract- *In home based water tank, the one problem is very common to us that the control of water level of overhead tank, as a result the wastage of water is increasing day by day. But we know water is very precious to us. It is of extreme importance to preserve water. Our project's aim is to design and develop application with simple electronic circuit consist with cheap electronic components for smart management of tank water. In that, the circuit is called water level indicator which will help to identify the water level and application will be used for water purity measurement and water tank cleaning notification.*

I. INTRODUCTION

Almost 70% of earth's surface is covered with water and from that also about 2% of the planet's water is fresh. So, conserving this available water resource is a provoking issue, to be pondered upon. It is found that much of the water is wasted due to the inefficient and poor water allocation and lack of integrated water management systems. This sophisticated and precise water management systems need to be invented. So water level management makes potential significance in home appliances.

The current project helps to automate the system. Sustaining water resource is one of the major issues surfacing recently due to uncontrolled wastage of available fresh water. Majority of the water wastage takes place because of overflowing water tanks. In most of the cases, water tanks are manually controlled by an operator. In absence of the person, water keeps on overflowing until the motor is switched off. In the current system the operator is required to keep an eye on proper functioning. Smart water tank implements IOT, with which, the user can directly monitor and control the working of tank through Smartphone. Our projects aim is to develop an application to make the most reliable smart water tank system.

II. Objectives

The following objectives are focused

1. To make the most viable commercial & reliable water level controller, purity using as less resource as possible.
2. To study the controller model & observe its characteristics.
3. To calculate and notify overall usage of water.
4. To design and develop the user interface using hybrid Ionics framework which is easy to operate.
5. To provide alert if any failure occurs to the current system.
6. To notify tank contaminated water status.

III. PROPOSED WORK

The Architecture of the proposed system is as shown in figure 1. With the help of 7 segment display we can indicate water level contain in a water tank. At every particular level the sound indictor will announce the amount of water filled in tank. The digital display will indicate the total amount of water actually present in tank. The total water used will be measured and stored in the database. The entire system can be divided into module form as mentioned below.

Architecture & Modules:

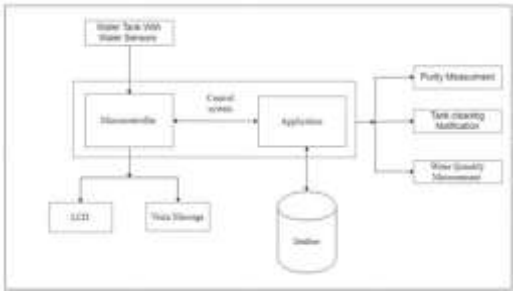

Fig 1: Architecture Design

1. Water Level Management System:

In this module, the user gets the information regarding the daily water usage. It is useful as user gets the total of how much water is used. At present, there is no such system available which helps to tally the water usage with the bill. The user gets the information regarding the water present in the water tank. With the help of float sensors, different levels of water are calculated. Various levels of water are indicated by using LCD display. A voice message system announces the level of water through an audio output for particular level. In this module, the user gets the information regarding the tank cleaning. By using the data from water

purity management system, the quality of water is measured. If the water gets contaminated above certain specified level then tank cleaning notification is generated & it will be sent to the user.

2 .Water purity management system:

In this module, the user gets the information regarding the purity of water. With the help of turbidity sensor the purity of water is measured. This measurement of purity is notified to user each time when the tank becomes full. Turbidity sensors measure the amount of light that is scattered by the suspended solids in water. As the amount of total suspended solid (TSS) in water increases, the water's turbidity level (and cloudiness or haziness) increases. Accordingly the cleaning measures can be taken.

3. Web Service Module:

A hybrid application (hybrid app) is one that combines elements of both native and Web applications. Native applications are developed for a specific platform and installed on a computing device. Web applications are generalized multiple platforms and not installed locally but made available over the Internet through a browser. Hybrid apps are often mentioned in the context of mobile computing. In this module, the data collected by sensor is provided to microcontroller. Microcontroller sends this data to the server with the help of web service (Wi-Fi). Server stores this data on the database. Server also communicates with the hybrid application with the help of web application.

Database Design

The following are the table details.

1) Registration Table

Id	Name	UserName	Mobno	Password
10	Eayan	Eayan	8668973508	Eayan
11	Sajan	Sajan	8055631709	Sajan123
12	Biju	Biju	9526051594	Biju
13	Amey	Amey	7588114478	amey

2) Tank Status(Level)

Id	Level (Lit)	Date & Time
1	750Ltr	2018/12/11
2	500Ltr	2018/12/17
3	250Ltr	2019/01/03

3) Motor status

Id	Status	Date & Time
1	OFF	2018/12/11
2	OFF	2018/12/17
3	ON	2019/01/03

4) Turbidity Status

ID	T1	T2	FN	STime
1	75	88	NA	2019/01/01
2	78	98	NA	2019/02/17
3	43	66	NA	2019/02/21
4	41	50	Sent	2019/02/22

Fig 2: Database

1. Login Details:

id	name	username	mobileno	password
10	Kishor	a	9552610806	a

The above table gives us information about login details.

2. Level values:

id	level	changedtime
1	30	2019-01-14 02:18:53

The above table gives us information about level details.

3. Notifications:

id	title	discription	createdtime
1	Sample Notification	This is sample notification.	2019-01-15 03:21:10

The above table gives us information about Notification messages.

4. Motor Status:

id	status	changedtime
15	On	2019-01-19 23:04:48

The above table gives us information about motor status details.

5. Turbidity values:

id	t1	t2	tp	ms	fn	stime
5	20	30.2	40	1	asa	2018-10-27 21:42:50
6	20	30.2	40	1	asa	2018-10-27 21:42:55
7	20	30.2	40	1	asa	2018-10-27 21:43:32
8	20	30.2	40	1	asa	2018-10-28 22:15:03
9	20	30.2	40	1	asa	2018-12-21 23:33:54
10	20	30.2	40	1	asa	2018-12-21 23:34:20
11	20	30.2	40	1	asa	2018-12-21 23:52:29
12	20	30.2	40	1	asa	2018-12-22 00:01:58
13	20	30.2	40	1	asa	2018-12-22 00:05:48
14	20	30	40	on	no	2018-12-28 00:53:03
15	20	30	40	on	no	2018-12-28 00:53:04
16	20	30	40	on	no	2018-12-28 00:53:04
17	20	30	40	on	no	2018-12-28 00:53:05
18	10	40	75	off	no	2018-12-28 00:53:58
19	10	40	75	off	no	2018-12-28 00:53:59
20	10	40	75	off	no	2018-12-28 00:53:59
21	10	40	75	off	no	2018-12-28 00:54:00
22	10	40	75	off	yes	2018-12-28 00:54:23
23	10	40	75	off	yes	2018-12-28 00:54:23
24	10	40	75	off	yes	2018-12-28 00:54:23
25	10	40	75	off	yes	2018-12-28 00:54:24

The above table gives us information about two turbidity values one for purity and other for cleaning notification.

IV. RESULTS

Hybrid Application:

The applications provide the user registration to gain access to the system. It contains user login and logout process. Application user deals with the following aspects.

1. Main home page:

Fig 3: Screenshot of home page

2. User Login and Logout:

A registered user has to gain access to the system by login process. A user will come to know about the status about motor, water level and water turbidity.

3. Status:

The application will show the water purity status, tank contaminated status, water usage status.

4. Notification:

The application will notify the user about the system failure, tank cleaning notification, etc.

5. Motor:

Application provides easy motor controlling system. A user can manage motor by both ways i.e, automatic as well as manually.

1. Turbidity status values:

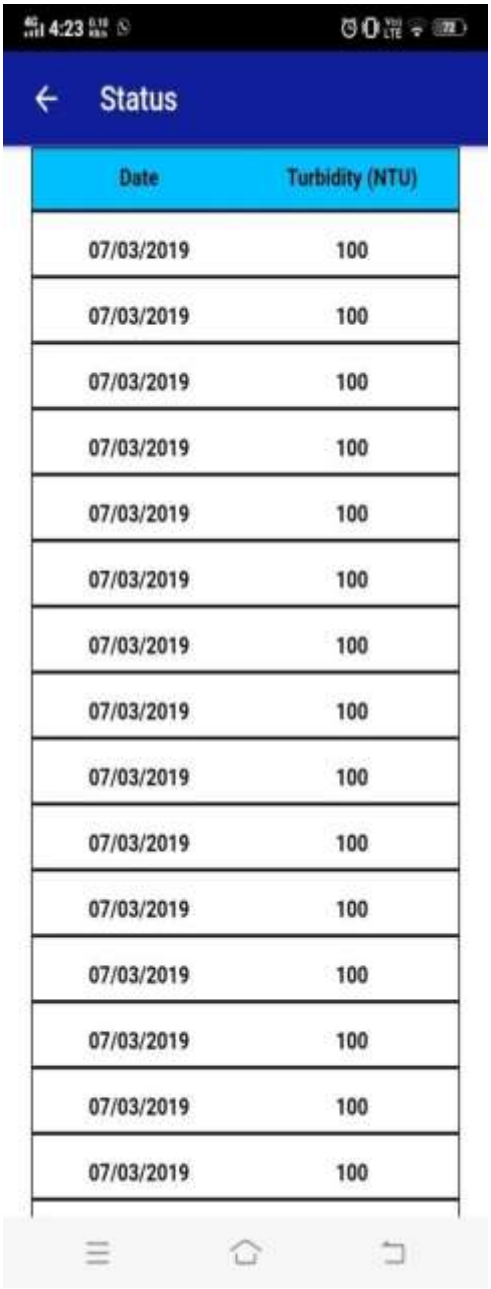

Fig 4: Screenshot of turbidity status values

The turbidity value of water for each day will be displayed in the status table.

3. Notification Messages:

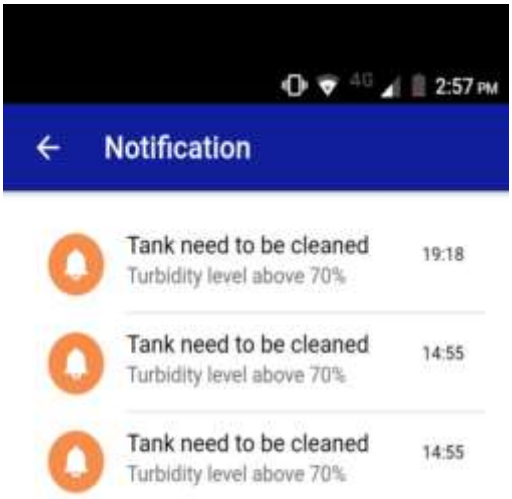

Fig 5: Screenshot of notifications

The screenshot display the notification messages of the cleaning water tank.

Hardware:

Float & turbidity sensors are used to experiment. LCD display is used to display results in the form of graph with its percentage. Speaker is used to notify and announce the results. The estimate of components used is around good.

Table1: Hardware Component

Sr no.	Name of the components	Its Purpose
1	Microcontroller	To generate the output text.
2	7 segment display	To display the output generated by microcontroller
3	Voice IC	To announce the water level in the audio format
4	Transistor	Water level based indicator.
5	Transformer	Sense the voltage. Used to step-down the AC power.
6	Turbidity sensor	To detect the impurity of water.
7	Raspberry Pi / Arduino Uno	Used to assemble the circuit
8	Wires	To connect electrical components

The above table depicts the information about hardware component and its purpose.

V. CONCLUSION

The smart water tank system employs a simple mechanism to detect and indicate the water level in an over head tank or any other water container.

The sensing is done with the help of water sensors. This system is very beneficial in rural as well as urban areas. It helps in the efficient utilization of available water. Its simplicity in design and low cost components make it an ideal piece of technology for the common man. Tank cleaning and system failure notification makes the system more attractive.

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