Automation And Management Of Covered Swimming Pool Using Sensors & RFID

[1] Sayali Kolhe, [2] Komal Kolhe, [3]Siddhesh Kamble, [4]Hrushika Banekar, [5]Prof.P.S. Nawghare

Department of Information Technology, Zeal College of Engineering & Research, University of Pune.

Abstract- Today many hotels, buildings and many places have indoor as well as outdoor swimming pools. These pools can be in the hotel, in the room, or even outside the hotel. All Modern swimming pool has large volume & Water Temperature control system is the serious delay as well as managing the Swimmers, their shifts, Payments as well as attendance, changeable seasons, outside dirt are the main issues in the system. So using the covered idea for swimming pool it resolves all above issues. Automatic swimming pool covering by DC Motor, Sensing the temperature, humans as well as automatic payment & attendance system, used IOT technology for the management.

KEYWORDS - Automation, Sensors, RFID.

1. INTRODUCTION

Now a days, swimming pools are using widely used. Swimming as a sports and exercise is done by many people maintenance in order to keep them functioning in a people way. Currently various cover systems are used for covering the pools. These covers use various cover sensors such as proximity sensors, human detector sensors, humidity sensors etc to insure the process of cover's takes place smoothly.

We have implementation a system to enhance the functioning of cover system by providing auto locking of access of the system. Our system will keep a track of payments made for the cover system. If complete payment has done, then full access is provided. The system also generates frequent alerts in the form of SMS to the user regarding the payment due dates .If payment is not done by the due date, then the system is locked the access password is rest and the person will not be able to access it. The system will also maintain the database regarding the number of user of the system.

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors and network connectivity, which enables these objects to collect and exchange data. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, and resulting in improved efficiency, accuracy and economic benefit.

2. EXSTING SYSTEM

Now-a-days many health clubs, fitness clubs and private clubs are used for daily exercise purposes. The standard swimming pool used for Olympics consist of 50m in length by 25m in wide, and it is divided into 8lanes and its depth consists of 6.6ft and the temperature of the pool consists of 25-28 degree.

Normally most of the pools are open and due to this all the dirty which travel through air like dust, leafs, insects enter the water in the pool. Another problem is water levels increasing and decreasing during seasons. In rainy seasons water level in the pool may increase, because the pool is open and all the rain water directly enters the pool. Due to this the pool may overflow, and all the water in the pool may spoil out. This may make all the area all around the pool wet, and there may be possibilities of accidents tend to be happened.

Another problem can be faced in summer season when due to excess amount of heat, water from the pool gets evaporated. In summer the water gets evaporated from the pool which will result in reducing water level, which may change the feet dimensions of the pool. This will cause the problem of identifying the accurate depth of the pool.

Another problem causes in winter were the water temperature drastically reduces. If the temperature reduces and people swim in that water it may cause diseases like pneumonia n many more, people will get crams n other joint pains etc. So the temperature should also be maintained, and standard temperature of a pool must be 25-28 degrees.

So to save the pool from all these problems today covered structures are used to cover the pools. It is an object of this invention to provide a pool cover which will eliminate the longitudinal struts which have to be locked open in order to cover the pool or folded in order to uncover it but this covers consist of plastics, polythins, etc. and all these are used to cover the pools. But all this covers are not so efficient and reliable. These covers can be easily damaged, wore off, cut, and tore so these do not work effectively.

The amount of chorine added to the water by the management is not properly measured, it is just randomly added. This can cause the level of chorine in water to be high or low occasionally, this may cause diseases when chorine level is low and if the chorine level is high it can cause harm to the human body.

Today's pool manages these costumers by maintaining their personal profile. And small budget swimming pools use pass system, which punches the pass every day the person enters the pool. But this system management is not so efficient in ways of maintaining all records of the costumers manually n all there passes and their money related details. Things and files may be

misplaced and all the information regarding a particular person can be gone. By using all this system a user can easily trick the management and enter the pool. One person can act as another person and can use his or her access and enter the pool as many times wanted. Due to today's pool management system, a pool needs a huge amount of space, and a lot of space is being wasted. So cost of pool effects very much, due to this a large cost is added to the building of the pool.

Now-a-days time management of people in the pool is down on hourly bases. There are gongs after every hour so that the batch which is in the pool for past 1hour has to come out, so that another batch of people can use the pool. Lanes are put manually in the pool.

3. PROPOSED SYSTEM

The basic requirement of system is to close and lock system automatically, if client is unable to pay the money to the distributer. When system is sold, at that time distributer and client both have same password to operate the system. Here we use different sensors like temp sensor, dust sensor, proximity sensor and humidity sensor for safety of cover. For human safety, human detector sensor is used for warning and giving notification. This warning is given by using alarm indication or announcement LCD display LED indication for human detects and cover needs   to close open. It indicates with help of LED and display message on LCD

If cover is open it gives green indication.If cover is close it gives red indication.

RFID reader can read information when System cover is open. A single member may enter many times in the pool. All data is logged and displays on dash board: On client's side it displays following data: How many members enter in a day (show with bar   graph)

- Client password
- Remaining days
- Remaining installment
- Total system cost
- Reminder sticky note
- Cover renewal reminder

Do online payment for remaining installation
Ondistributer'ssideit displays following data:

- Client reg. no
- Client name
- Contact no
- Email id
- System cost
- Remain days
- Allocated days
- Remaining installment
- Client history

Client data is update on how much duration gives to client remind by call, SMS and email. If client is unable to pay money the system locks automatically and generates

unique password which is known to the distributer only. After receiving payment from the client, the generated password is sent to the client. If in case system breaks down, like motor or sensors fail then it is indicated by LED as well as display on LCD.

4. WORKING DESCRIPTION

To compute the system required more components like sensors, RFID Tags, DC Motor, Capacitors, PCB, LEDs, Transistors, Micro Controller.

- **PIC16 Microcontrollers:**

Microcontrollers are required to handle more work without increasing a product's frequency or power. In addition, microcontrollers are becoming increasingly connected, whether by Universal Serial Bus (USB), Ethernet, or wireless radio, and hence, the processing needed to support these communication channels and advanced peripherals are growing. Similarly, general application complexity is on the increase, driven by more sophisticated user interfaces, multimedia requirements, system speed, and convergence of functionality.

- **Liquid Crystal Display:**

Fig.2 LCD Display

LCD is used in a project to visualize the output of the application. We have used 16x2 LCD which indicates 16 columns and 2 rows. So, we can write 16 characters in each line. So, total 32 characters we can display on 16x2 LCD.
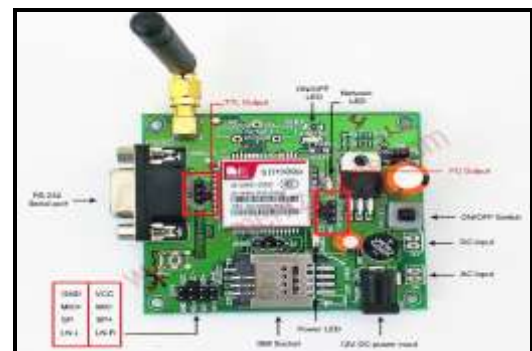
- **GSM MODULE**

Fig.3 GSM Module

GSM (Global System for Mobile communication) is a digital mobile telephony system. With the help of GSM

module interfaced, we can send short text messages to the required authorities as per the application. GSM module is provided by sim uses the mobile service provider and send SMS to the respective authorities as per programmed. This technology enables the system a wireless system with no specified range limits.

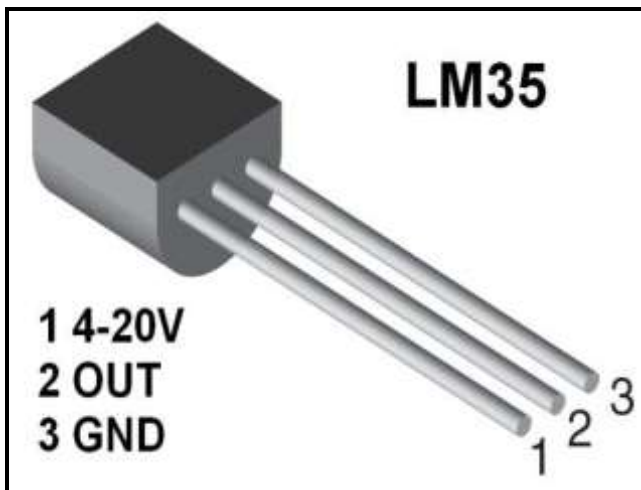- **Sensors:**

1.Temperature Sensor LM35

Fig.4 Temperature Sensor

The LM35 thus has an advantage over linear temperature sensors calibrated in°Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1/4°C at room temperature and ±3/4°C over a full -55 to 150°C temperature range.

Features:

Calibrated directly in°Celsius (Centigrade)
Low cost due to wafer-level trimming
Low self-heating
Low-impedance output
Linear Scale factor
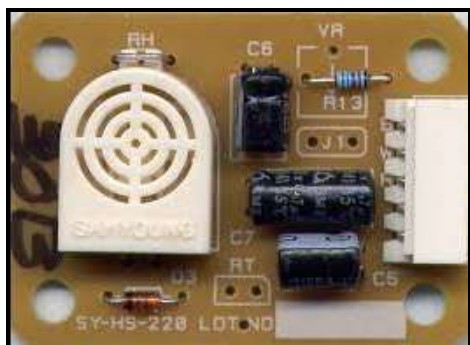Rated Range

2. Humidity Sensor SY-HS-220

Fig.5 Humidity Sensor SY-HS-220

The humidity sensor is of capacitive type, comprising on chip signal conditioner. However, it is mounted on the PCB, which also consists of other stages employed to make sensor rather more smart . The PCB consists of CMOS timers to pulse the sensor to provide output voltage . Moreover, it also consists of oscillator, AC amplifier, frequency to voltage converter and precision rectifiers. Incorporation of such stages on the board significantly helps to enhance the performance of the sensor. Moreover, it also helps to provide impediment to the noise. The humidity sensor used in this system is highly precise and reliable.. The humidity dependent voltage is obtained and subjected for further processing.
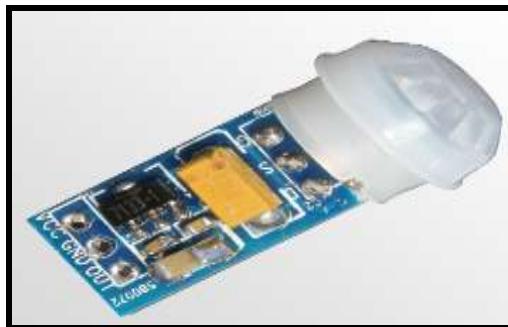
3.Human Detector Sensor

Fig.6 Human Detector Sensor

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion"sensors.

This chip takes the output of the sensor and does some minor processing on it to emit a digital output pulse from the analog sensor.

4. Proximity sensor

Fig.7 Proximity sensor

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic

radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target.

The maximum distance that this sensor can detect is defined "nominal range". Some sensors have adjustments of the nominal range or means to report a graduated detection distance. Proximity sensors can have a high reliability and long functional life because of the absence of mechanical parts and lack of physical contact between sensor and the sensed object.

5. Dust Sensor

Fig.8 Dust Sensor

GP2Y1010AU0F is a dust sensor by optical sensing system. An infrared emitting diode (IRED) and a phototransistor are diagonally arranged into this device. It detects the reflected light of dust in air. Especially, it is effective to detect very fine particle like the cigarette smoke. In addition it can distinguish smoke from house dust by pulse pattern of output voltage.

- **RFID Reader**

Fig.9 RFID Reader

An RFID reader's function is to interrogate RFID tags. The means of interrogation is wireless and because the distance is relatively short; line of sight between the reader and tags is not necessary. A reader contains an RF module, which acts as both a transmitter and receiver of radio frequency signals. The transmitter consists of an oscillator to create the carrier frequency; a modulator to impinge data commands upon this carrier signal and an amplifier to boost the signal enough to awaken the tag. The receiver has a demodulator to extract the returned data and also contains an amplifier to strengthen the signal for processing. A microprocessor forms the control unit, which employs an operating system and memory to filter and store the data. The data is now ready to be sent to the network.

- **DC MOTOR**

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line.DCmotors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

- DC Motor Driver L298

The L298 is an integrated monolithic circuit in a 15-leadMultiwatt and PowerSO20 packages. It is high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided tenable or disable the device independently of the input signals. The emitters of the lower transistors of each bridge are connected together and the corresponding External terminal can be used for the connection of an external sensing resistor. An additional Supply input is provided so that the logic works at lower voltage.

5. ARCHITECTURE OF SYSTEM
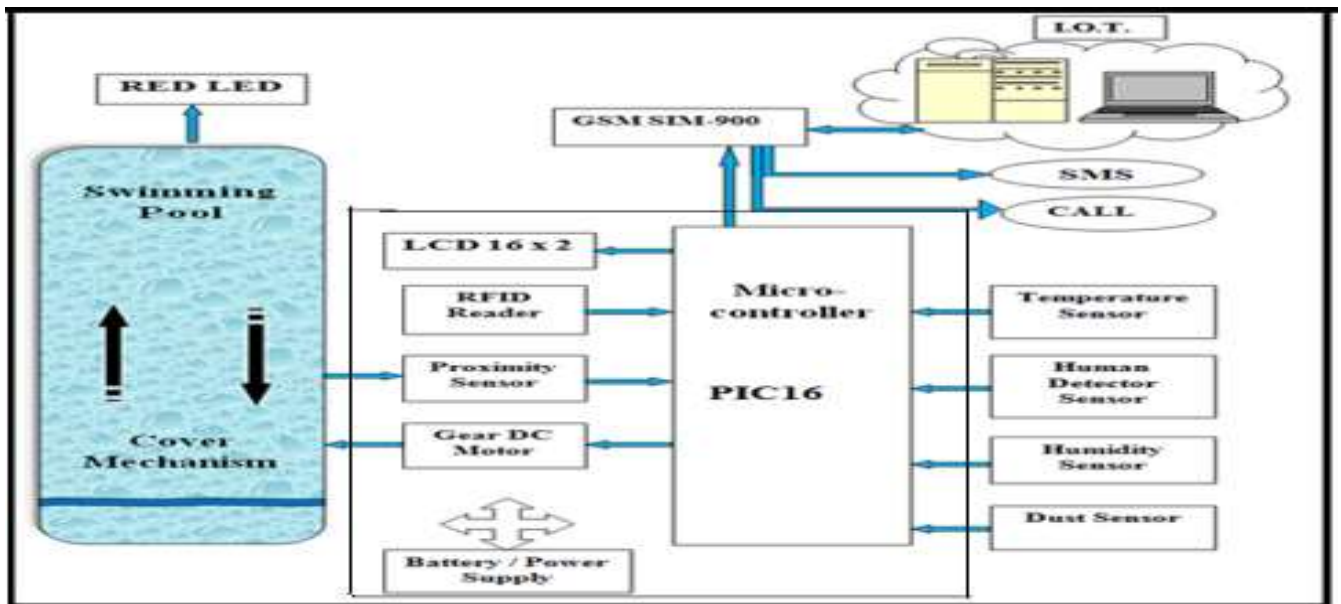The below figure shows the architecture of proposed method.

Fig 1: Architecture of proposed system

6. ALGORITHM

Hardware:

Step 1: Sensors (Temperature, Humidity, and Human Detection) & RFID collect the live data & send to PIC processor

Step2: PIC Processor contains the logic for data collection & the data is send to SIM900 GSM/GPRS Module.

Step3: GSM/GPRS Module upload data to internet & the data is pushed through API in the database

Software:

Step1: Here on Login portal when the login is successful & we display dashboard screen on which Control Canter shows the all live monitoring updates & graphs.

Step2: AJAX Fetches the data from database per second & updates it & the respective hardware action is perform like open or close cover, human detection, temperature

7. CONCLISION

Automatic covers can be installed on a wide range of pools of varying shapes and sizes. Regardless of the automatic cover system type that is used, whether the tracks or mechanism are under grade or on top of the pool deck, there are a number of benefits that a homeowner will gain by adding an automatic pool cover to their swimming pool.

So we conclude that research may beneficial for Swimming pool clubs including safety, savings in pool heating, pool chemicals, electricity, water also payment & installation. Future scope inLarge Swimming Pools, Indoor Swimming Pools, Olympics Swimming Pools.

REFERENSES

[1] Thorsten Joachims Cornell University Department of Computer Science 2005.Optimizing Search Engine using clickthrough data.

[2] Aniko Hannak and Arash Molavi Kakhki Northeastern University 2007. Measuring Personalization of Web Search.

[3] Wai-ating Leung and Waifred NG, Dik LUN Lee 2008. Personalized Concept-Based Clustering of Search Engine Queries.

[4] Bhupesh Gupta, Sandip Goyal and Ashish Oberois CSE deptt. MM University Mullana India 2012. A Review on Query Clustering Algorithm for Search Engine Optimization.

[5] S. Preetha, PG Student, and Vimal Shanker, Assistant Professor 2012. Personalized Search engine on mining user preference using clickthrough data