Actuation of Bird's Water Management System using IOT (Internet of Things)

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Abstract— In present era, we come across an immerging technology – IOT (Internet Of Things) with which we can contribute to our environment. Nowadays due to global warming there are abrupt changes in the atmosphere. There is sudden increase in temperature which has an adverse effect on wildlife, especially birds and they are facing a lot of snags. One of the serious issues is unavailability of water for the birds as the water in the vessels kept by the user gets dried up and due to improper management, no accounts are taken on that note. Especially in summer numerous birds died due to lack of drinking water in the water vessel. In order to avoid this problem, we are introducing a whole new system which will not only ensures24*7 availability of water but will also provide exact data to the user. We will connect the water vessel with the SERVER which we will be continuously monitoring the level of water in the vessel with help of WATER LEVEL SENSORS. The moment the water level in the vessel becomes inadequate, it will send notification on the server so that user can send a command to PUMP to add more water. Hence this project will keep an account of water level in the vessel of birds so that if the vessel gets empty it can be automatically refilled from anywhere across the world using an immerging technology-Internet Of Things (IOT). This project will provide a new look & shape to wildlife.

Key words: IOT (Internet Of Things), Arduino Uno, Water Level Sensor, Pump, Android Blynk Application

I. INTRODUCTION

In present era, to protect environment is our first priority. Nowadays due to global warming there are abrupt changes in the atmosphere. There is sudden increase in temperature which extremely affects the wildlife & their habitat. One of the serious issues is unavailability of water as the water in the vessel kept by the user gets dried up and due to improper management no accounts are taken on that note. Numerous birds are dying due to lack of water. "IOT BASED BIRD'S WATER MANAGEMENT SYSTEM" is a system which measures and maintains an adequate amount of water in the water vessels and can be operated from anywhere across the world.

Nowadays, many birds are dying due lack of water. This is happening because no accounts are being kept of water level in vessel. Hence in order to know how much amount of water level is left in vessel and for proper management, this system can be useful. Also such maintenance occupies a lot of time and manual attention so in order to save time as well as to keep getting updates, this system is interfaced with ESP8266 Wi-Fi module. This module puts the entire system accessible from all across the world for use with the help of IOT Technology.

Basically, a PUMP will be connected to various valves of the water system. These VALVES will be connected to each water vessel ensuring each vessel with adequate amount of water. Moreover, the vessels & the valves are connected to WATER LEVEL SENSOR, individually. These sensors will measure the level of water. If it goes below the set limit it will notify the user on its ANDROID BLYNK APP which will be connected in a CLOUD NETWORK. So, the user will get notification of the inadequate amount of water in the vessels and hence user can enable the valve and water will be automatically refilled in the vessel. The whole system can be operated anywhere across the world if you have a WI-FI CONNECTION along with the BLYNK APP.

Block diagram of the system with explanation of each and every module is covered is covered in 2nd chapter. Hardware and Software details are given in 3rd chapter. The implementation and interfacing methodology along with their results are demonstrated in 4th chapter.

II. BLOCK DIAGRAM

The block diagram of the system consists of Arduino UNO Microcontroller, ESP8266 Wi-Fi Module, Water Level Sensors, pump and Android Application. An arduino controller receives data from the cloud freely provided by blynk android application. These received data are analysed and forwarded to the user's phone so that water can be refilled into the vessel using pump in accordance to the water level of the system which can be measured using water level sensor attached in each vessel.

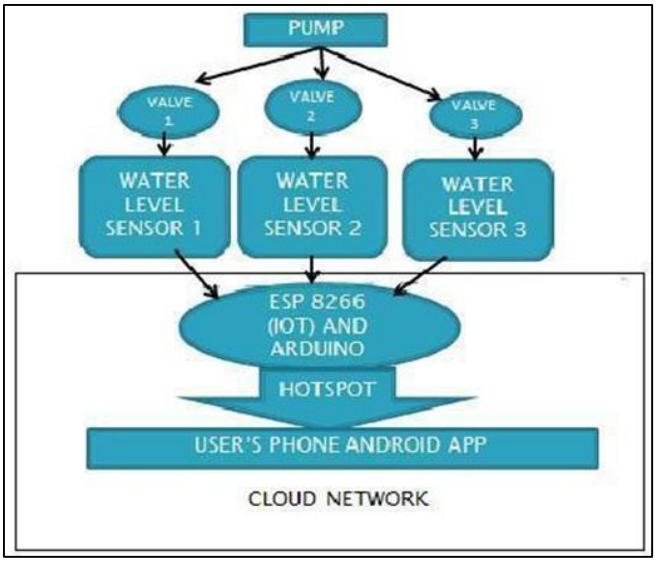

Fig. 1: Block Diagram of the IOT Based System.

III. HARDWARE AND SOFTWARE USED IN THE SYSTEM

A. Hardware used in the system

Name of Hardware	Function/use of hardware in proposed system and specification.
Arduino Uno	To control and operate the system. It is connected to all the components of the system. Specifications: 32KB Flash memory, 1KB EEPROM, 2KB SRAM, 16MHz Clock, 14 Digital I/O, 6 Analog Inputs, 6 PWM Output Pins, 12C Bus, Serial Bus (Tx,Rx).
Relay Unit	To actuate the Pump for the operation of water filling in the vessel of the system. Specifications: 12V, 10 Amp Contact Capacity.
ESP8266 Wi-Fi Module	Wi-Fi Module for connecting the system to the IOT world. Specifications: Wi-Fi direct (P2P), Integrated TCP/IP, UART, Packets, Transmit Rate <2ms, Power consumption <1mW.
Water Level Sensor	To observe and analyse the status of the water level in the vessel. Specifications: Analog voltage (0 to 5 Volt),1.1V/cm Sensitivity, Compact, Low cost,
Pump	To draw the water into the vessel from tank in order to fill the vessel. Specifications: DC 12V 100mA No load, 10 Watt Mechanical Power, 10^5 Pa Pressure, 2000 rpm, Adjustable speed, No clog, Submersible, Top suction.
Keypad	To operate the system manually. Specifications: 8 pin access to 4*4 matrix, Max. Rating 24V DC 30 mA, Long Life Expectancy.
Serial LCD	To display the data while operating manually. Specifications: Serial 16*2, Supports the function like Back light On/Off. It consumes 20mA when Backlit is Off and 70 mA when backlit is On. Directly used after 20ms of initialisation.

Table 1: Hardware used in the system

B. Software used in the System

Name of Software	Use of Software in the proposed system
Arduino IDE	For Programming and Uploading the code to Arduino UNO Board, connected via USB cable to the computer.
Blynk Application	An Android Application by which proposed system is operated using GUI in Application.
Proteus Software	Circuit Diagram is created using it.

Table 2: Hardware used in the system

IV. IMPLEMENTATION WITH RESULTS

A. Arduino Uno interfacing with Relay, Pump, Keypad, LCD (Manually operated system)

As discussed in the Introduction section, before connecting ESP8266 Wi-Fi Module with arduino we connect it with Keypad and LCD in order to operate manually. As soon as the arduino get power supply it starts collecting data according to the code while interfacing with keypad. If on keypad 1st key is pressed it gives the information of water level in vessel 1. Similarly it is water 2nd key that gives information about vessel 2. Now 3rd key gives parallel information of both the vessels. At last 4th and 5th key switch On and Off the Pump respectively. After getting Information if there is a need to fill any vessel with water then relay is been triggered and hence it enables the working of the Pump

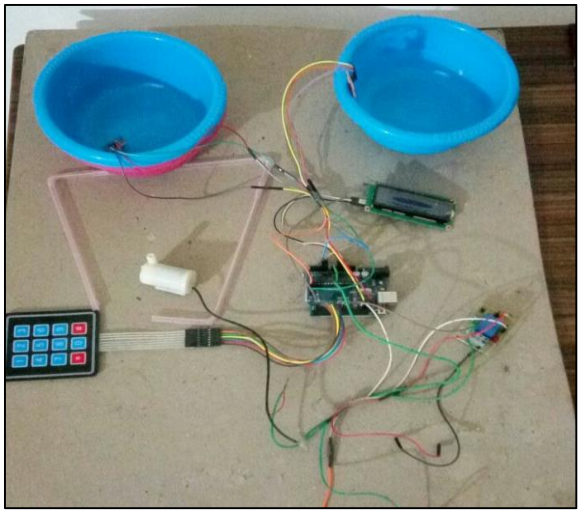

Fig. 2: Connection for operating manually.

B. Arduino Uno connected to ESP8266 Wi-Fi Module to trigger Pump In form of LED

ESP8266 is Wi-Fi Module which is been interfaced with Arduino so that IOT technology can be implemented and the system can be operated across the world. Fig.3 shows the Wi-Fi Module been used.

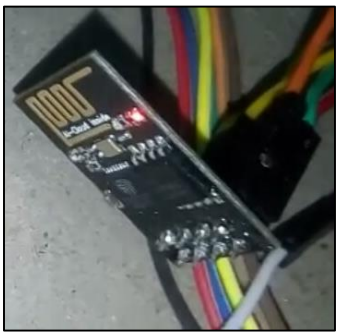

Fig. 3: ESP8266 Wi-Fi Module

Once the Wi-Fi Module is connected to arduino we start getting continuous Ping on our computer which ensures that the connection is successfully build up between the Blynk App, Arduino and Wi-Fi Module. Fig.4 shows the Ping which we get on computer.

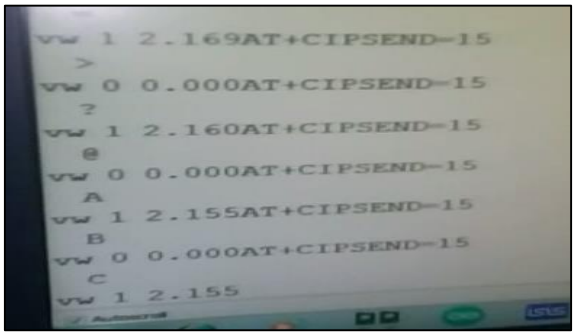

Fig. 4: Ping on Computer after connecting Wi-Fi module.

Now on the Blynk Application we can continuously get the information of both the vessel which can be seen in fig.5.

Fig. 5: Data continuously obtained on blynk app

Since the manual operation in above section is completed as we connected an Arduino Uno with the Wi-Fi module to trigger the pump. In this we have not connected the Pump directly instead we have connected LED to pin of arduino where we are supposed to connect pump in order to observe the results. Now as we press the "On" key on that Blynk Application, the LED glows which indicate that Pump is on. Fig.6shows the setup for operating pump with reference of Led.

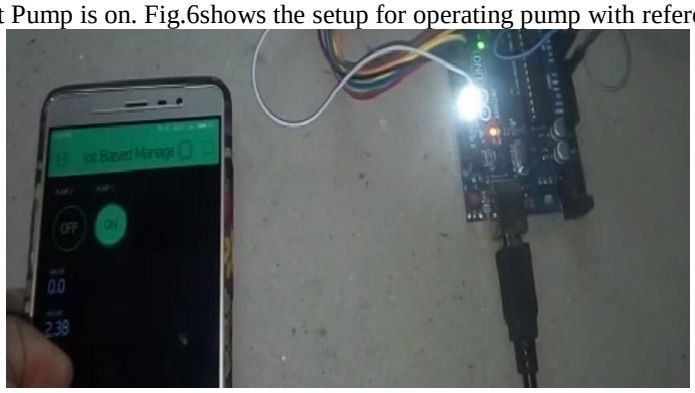

Fig. 6: Led glows when we switch "On" the Pump.

C. Arduino Uno connected to Relay unit

Once the LED interfaced instead of Pump was successfully achieved, further we have interfaced the Relay unit with arduino which has an LED indication so that we come to know that whether the relay is triggered or not. As in our final step Relay unit will be initiating the working of Pump. So before connecting the pump to Arduino, we have connected Relay to see the results. The result can be seen in fig.7 which show the red LED glows when Pump is turned "On".

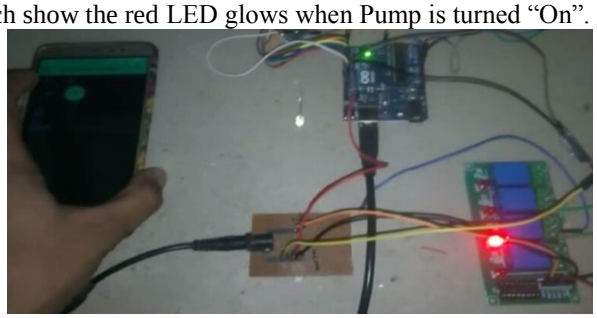

Fig. 7: LED on Relay unit glows when Pump is turned "On".

D. Arduino Uno connected to ESP8266 Wi-Fi Module to trigger Pump

Finally now the Pump is connected to the Relay unit and relay unit is connected to the Arduino which will help the relay to trigger the pump and hence the vessel can be refilled with water through an IOT technology.

Fig. 8: Final Interfacing of Arduino with Pump.

V. CONCLUSION

At the end of the experiments, it can be concluded that, any such water management system can be easily controlled using IOT. It helps operating such system with ease and saves time compared to operating it manually. It provides new shape and look to the wildlife and environment.

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