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DAM AUTOMATION USING ARDUINO

V. Rajendran[1], J. Shilpa[1], S. Veeravalavan[1], and M. Anbarasan[2]

[1]Student, Department of Electronics and Instrumentation Engineering, Adhiyamaan College of Engineering (ACE), Tamil Nadu, India
[2]Assistant professor, Department of Electronics and Instrumentation Engineering, Adhiyamaan College of Engineering (ACE), Tamil Nadu, India

ABSTRACT: Dams have been used in many purposes since long time by mankind. Power has been generated through flow of water in dam and the water stored in dam for a whole year has been used for irrigation and drinking purposes. This paper is based on automating the dam functions based on controlling the various parameters such as level and flow with real time implementation of gate control using Arduino. And the dam functions are regularly monitored and reported to a remote computer or a mobile through RF module.

KEYWORDS: Arduino, Level sensor, Dam automation system.

INTRODUCTION

In India approximately 3200 dam are present and it cover 1,70,000 sq.km for collecting water. Dam are manmade or artificial barriers usually constructed across to impound water. There is also 2067.68 km long and complex canal network through which about 10 lakes hectare land gets water for irrigation and drinking purpose. The farmers are dependent on seasonal ran and after that bore well water for their crops.

Recently, all the farmers use in flood irrigation system for plant their crops which needs more water. As we know water is gradually becoming one of the most precious natural resources

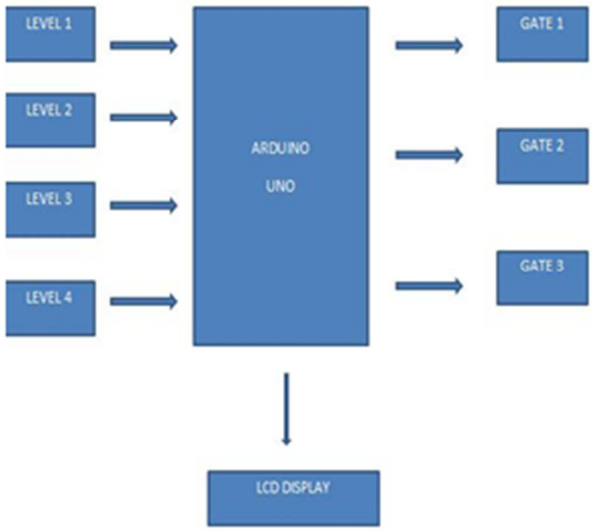
As the solution of above problem we are making this project to develop a Arduino based system which detects the water level in dam and thereby control the movement of gates automatically.

Automation or automatic control is the use of various control system for operating equipment such as machinery, process in factories, boilers and heat treating ovens, switching in telephone network, steering and stabilization of ship, aircraft and other application with minimal pr reduced human intervention some processes have been completely automated. The biggest benefit of automation is that it is saves labor however, it is also used to save energy and waterfalls and to improve quality, accuracy and precision.

SYSTEM DEVELOPMENT

In our project we have developed the overall method on many ways. This is used to control the dam gates automatically and used to store the water in any condition of weather.

SCHEMATIC DIAGRAM



IMPLEMENTATION OF PROPOSED SYSTEM

In this section the prototype that we have developed in order to implement the proposed system has been explained. There are various components we used to implement this system.

By using components the entire system is controlled and implemented in accordance with the level of water present in the reservoir and it is sensed and send to the controller where the corresponding gates are opened.

a. Arduino

Arduino is open source hardware. The hardware references designs are distributed under a creative common Attribution Share-Alike 2.5 license and are available on the Arduino website. The source code for the IDE is released under GNU General Public License, Version 2.

Although the hardware and software designs are freely available under licenses, the develops have requested that the name Arduino be exclusive on use of the Arduino name emphasizes that the project is open to incorporating work by other into the official product Arduino.

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```
  Serial.println(val);
  myservoy.write(val);
  delay(50);
  Serial.print("GENERATED VOLTAGE =  ");
  Serial.println(vin,2);
  delay(500);
  if (millis() - lastMillis > 2000)
  {
    TMP_Therm_ADunits = analogRead(analogPinForTMP);
    RV_Wind_ADunits = analogRead(analogPinForRV);
    RV_Wind_Volts = (RV_Wind_ADunits *  0.0048828125);
    TempCtimes100 = (0.005 *((float)TMP_Therm_ADunits * (float)TMP_Therm_ADunits)) - (16.862 * (float)TMP_Therm_ADunits) + 9075.4;
    temp= (TempCtimes100)/100;
    zeroWind_ADunits = -0.0006*((float)TMP_Therm_ADunits * (float)TMP_Therm_ADunits) + 1.0727 * (float)TMP_Therm_ADunits + 47.172;
    zeroWind_volts = (zeroWind_ADunits * 0.0048828125) - zeroWindAdjustment;
     WindSpeed_MPH =  pow(((RV_Wind_Volts - zeroWind_volts) /.2300) , 2.7265);
     Serial.print("NACELLE TEMP =");
    Serial.print(temp);
    Serial.print(" C");
    Serial.print("   WIND SPEED =  ");
    Serial.print(WindSpeed_MPH);
    Serial.println(" mph");
    lastMillis = millis();
  }
if(WindSpeed_MPH > 5)
{
    myservop.write(90);
}
```

b. Sensing element

Sensing element in our project is the water level sensor which is attached in the reservoir. Whenever the water level increases the sensor will sense the water. Whenever the desired level achieved then the sensor will send the input to the Arduino which controls the action of gate as opening and closing the gate and sensors are used to send the level of water.

c. Gate control

In gate control assembly there are three doors are used in our proposed system. One gate partially open when the water is preset in the low level and the water level increases then the gate 1 is fully opened and keep on increasing to the next level then gate 1 as well as gate 2 will be open. For very high condition only emergency gate called gate 3 will open along with another two gate. The opening and closing of gate is controlled by using gear motor, the motor shaft is connected with the gears belt which placed on gate assembly. The opening of gate also control by timer with required time application. When the gate is fully open during this stop action of gate will controlled by using manual bypass switch.

d. Communication and display interface

RF module is used to send a communication of all process which involved in a Dam automation. It will send to a computer through RF transmitter from the senor and gate and received in a computer where LCD display are used to display the entire process in the automation of dam and control if gates.

e. Water Level Sensor

Wide spectrum of sensors is available in the market and commonly, they are classified based on the specific application of the sensor. Sensor used for measuring humidity is termed as humidity sensor, the one used for measurement of pressure is called pressure sensor, sensor used for measurement of displacement is called position sensor and so on though all of them

may be using the similar sensing principle. In a similar fashion, the sensor used for measurement of fluid levels is called a level sensor.

f. Gear Motor

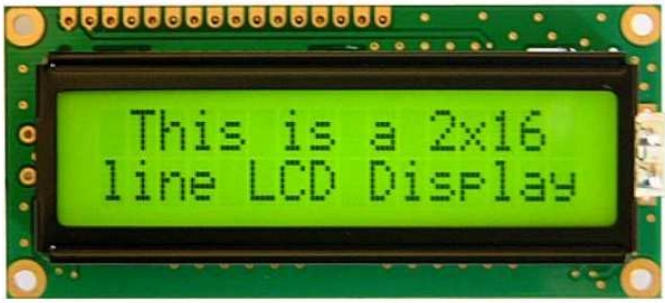
"Gear motor" refers to a combination of a motor plus a reduction gear train. These are often conveniently packaged together in one unit. The gear reduction (gear train) reduces the speed of the motor, with a corresponding increase in torque. Gear ratios range from just a few (e.g. 3) to huge (e.g. 500). A small ratio can be accomplished with a single gear pair, while a large ratio requires a series of gear reduction steps and thus more gears. There are a lot of different kinds of gear reduction.

g. LCD

LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology.

A **liquid-crystal display** (**LCD**) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and 7-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

LCDs are used in a wide range of applications including computer monitors, televisions, instrument panels, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens are common in portable consumer devices such as digital cameras, watches, calculators, and mobile telephones, including smart phones. LCD screens are also used on consumer electronics products such as DVD players, video game devices and clocks. LCD screens have replaced heavy, bulky cathode ray tube (CRT) displays in nearly all applications. LCD screens are available in a wider range of screen sizes than CRT and plasma displays, with LCD screens available in sizes ranging from tiny digital watches to huge, big-screen television set.



h. Motor shield

Arduino board designs use a variety of microprocessors and controllers. The boards are 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 boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

The Arduino project started in 2005 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors.

The name *Arduino* comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet. The bar was named after Arduino of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014

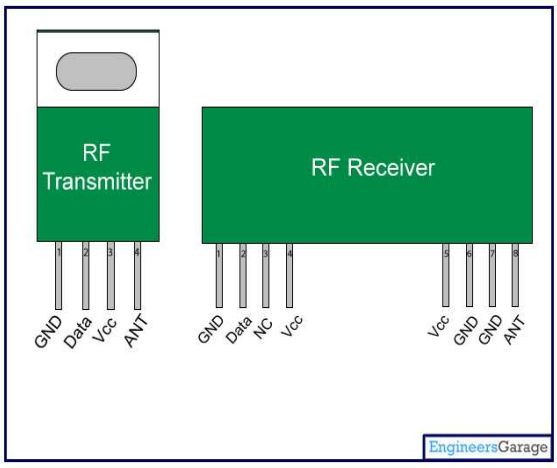
i. RF MODULE

An **RF module** (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio frequency (RF) communication. For many applications the medium of choice is RF since it does not require line of sight. RF communications incorporate a transmitter or receiver.

RF modules are widely used in electronic design owing to the difficulty of designing radio circuitry. Good electronic radio design is notoriously complex because of the sensitivity of radio circuits and the accuracy of components and layouts required to achieve operation on a specific frequency. In addition, reliable RF communication circuit requires careful monitoring of the manufacturing process to ensure that the RF performance is not adversely affected. Finally, radio circuits are usually subject to limits on radiated emissions, and require Conformance testing and certification by a standardization organization such as ETSI or the U.S. Federal Communications Commission (FCC). For these reasons, design engineers will often design a circuit for an application which requires radio communication and then "drop in" a pre-made radio module rather than attempt a discrete design, saving time and money on development.

RF modules are most often used in medium and low volume products for consumer applications such as garage door openers, wireless alarm systems, industrial remote controls, smart sensor applications, and wireless home automation systems. They are sometimes used to replace older infra red communication designs as they have the advantage of not requiring line-of-sight operation.

Several carrier frequencies are commonly used in commercially available RF modules, including those in the industrial, scientific and medical (ISM) radio bands such as 433.92 MHz, 915 MHz, and 2400 MHz. These frequencies are used because of national and international regulations governing the used of radio for communication. Short Range Devices may also use frequencies available for unlicensed such as 315 MHz and 868 MHz.



CONCLUSION

In India, Dam control is done manually and has not been automated till now. Human invention is involved in opening the gate, measuring the water level in the reservoir and controlled manually. The concept of our work is to automation all process in the dam and make it easier to operate. Also use the bypass to control manually.

In this paper, it represents an automatic controlling of a motor using Arduino. This system model of a dam automation system which is the completely automated can control the level of the dam gates using the backup of the water. Thus using Arduino the level of water in the dam is controlled effectively there by opening and closing the gates of the dam whenever the level increases. Therefore, the use of level sensor has opened doors for a level of automation dam systems and also monitoring the entire system about the gate opening and closing of the gate.

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