CHAPTER 01

INTRODUCTION

An electronic system to stop the overflow of the tank is described here. It is able to maintain the water level between the predetermined levels from the bottom to the top point, starting from the bottom to the top of the water tank. The technique system uses a point level control technique. Four different points are chosen along the height of the tank, from the bottom up. The sensors are placed at each point and are wired to address the inputs of a special digital encoder parallel to series (212). With the water level rising or falling, the encoder sequentially follows a well-defined list of numbers (discussed later in the circuit description section).

The 4-bit digital number produced by the sensors is serially coded by the encoder and sent to a remote, wireless receiver. Communication between the two ends is done through a pair of 433MHz UHF transmitter and receiver modules, which operate in ASK / OOK mode. At the receiving end, a compatible serial to parallel decoder (212) is used. Decode and recognize transmitted data when, and only when, the address lines of the decoder are fed with matching data. That is, at any time, the 4-bit digital number produced in the encoder by the sensors and the 4-bit number fed to the decoder's address lines must be the same. To have a match, a special digital counter continuously generates and feeds a well-defined list of 4-bit numbers to decode the address lines. As soon as a match is met, the decoder generates a valid transmission signal (VT). It also outputs 4-bit data sent from the encoder to its data output lines. When using this TV signal, the counter-scanner stops and remains stopped, provided that no new sensor data is generated. Between the four digital address bits, a relay control circuit can use either to automatically activate / deactivate the relay: lower bit to activate the relay and upper bit to deactivate it. This, in turn, turns on / off the water pump to keep the water between two levels, represented by said bits

CHAPTER 02

LITERATURE SURVEY

1. Microcontroller Based Water Level Indicator Using GSM Modem (Melaty Amirruddin., Nurhakimah M. Mukhtar., Hana A. Halim., and Nur S. Noorpi) Design and Application", 1st International Conference on Future Trends in Computing and Communication Technologies.

Abstract:

Automatic water level controller for both overhead and underground tank is designed to monitor the level of water in a tank. It shows the level of water and when it is at the lowest level; a pump is activated automatically to refill the tank. When the tank is filled to its maximum capacity, the pump is automatically de-energized.

Conclusion:

Going through the planning, flow process, design and software implementation, the system has been a tough one, the chapter one to four has actually tried as much as possible to explain vividly almost all (if not all) what is involved in the construction of this project. After the complete design of the system, the deviation between the expected result and the actual result was very close. The performance and efficiency was beyond expectation and from every ramification the design of automatic water controller was successful.

2. Microcontroller Based Automated Water Level Sensing and Controlling (S. M. Khaled Reza., Shah Ahsanuzzaman Md. Tariq., and S.M. Mohsin Reza) Design and Implementation Issue", Proceedings of the World Congress on Engineering and Computer Science.

Abstract:

Water level control system which is wireless, automatic, cost effective and reliable. It uses Radio Frequency transmitter and receiver along with a controller each installed at the tank and sump. Radio Frequency transmitter and receiver are used for wireless communication. It is completely automated with the help of a micro controller. The system doesn't need any attention of the user unless the sump is empty. Installation cost is reduced since the system is wireless. It is reliable because it has no problems arising after installation such as breakage of wire.

Conclusion:

As per our design it is best implementable for houses and offices. The range coverable is only up to domestic and office areas. It is observed that domestic and offices are one of the major areas of water polling. So implementing the low cost easy maintainable wireless system is one among the solutions. It has no problem such as breakage of wire arising after installation.

CHAPTER 03

PROPOSED METHODOLOGY

There are many methods of designing an automatic water level control with switching device but all these methodologies require human assistance. In this project an automatic water level control for both overhead and underground tank with switching device is designed using electronic control to refill the water without human intervention. The system design was carefully arranged to refill the water tank any time waster get low to a certain level finally the system automatically shutdown the water pump by putting the electric pump by putting the electric pump off when the tank is full.

We are making the project by using Arduino UNO which uses simple c-programming ,And there many other RF encoder and decoders but we are using 433MHz RF encoder(RF transmitter) and decoder(RF receiver) to get better accuracy .

To make the working easy and accurate we are using this components and to be cost friendly

CHAPTER 04

PROJECT DESCRIPTION

This project is design by using ARDUINO UNO along with a few essential circuits like a Relay, RF encoder (transmitter part) and RF decoder (receiver part), RF transmitter and receiver, Mini water pump, pull up resistors at transmitter part

The main objective of this project is to help us easily understand and demonstrate others. Our project can broadly broken down into 5 blocks:

1. ARDUINO UNO
2. Relay
3. Transmitter circuit and Receiver circuit
4. Mini water pump

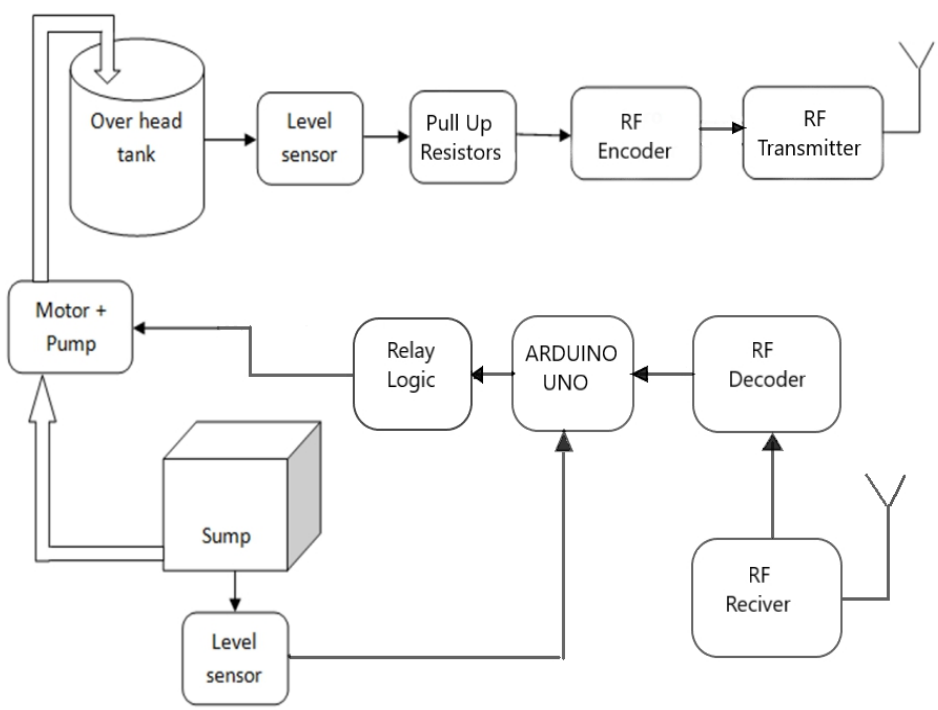


Fig 4.1.0

4.1 ARDUINO UNO

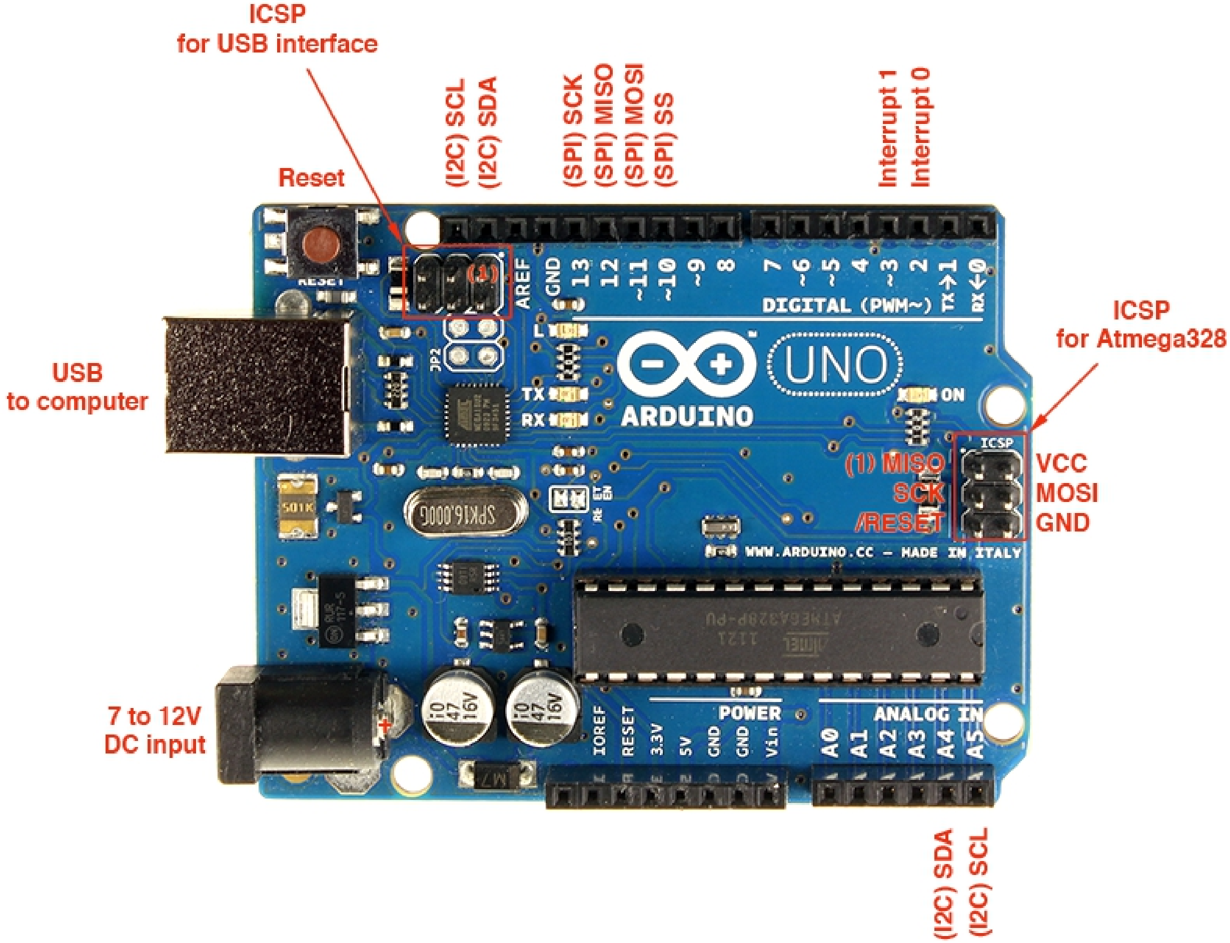


Fig 4.2.0

4.1.1 INTRODUCTION

ARDUINO is used to construct different types of electronic circuits easily using both a physical programmable circuit board, usually a microcontroller and a piece of code that runs on a computer with a USB connection between the computer and ARDUINO.

The programming language used in ARDUINO is just a simplified version of C ++ that can easily replace thousands of cables with words.

4.1.2 ARDUINO UNO-R3 Physical Components

ATMEGA328P-PU microcontroller

The most important element in ARDUINO UNO R3 is ATMEGA328P-PU is an 8-bit Microcontroller with flash memory reach to 32k bytes. Its features as follow:

• Advanced RISC Architecture

a) 131 Powerful Instructions – Most Single Clock Cycle Execution
b) 32 x 8 General Purpose Working Registers
c) Up to 20 MIPS Throughput at 20 MHz
d) On-chip 2-cycle Multiple

• High Endurance Non-volatile Memory Segments

a) 4/8/16/32K Bytes of In-System Self-Programmable Flash program memory
b) 256/512/512/1K Bytes EEPROM
c) 512/1K/1K/2K Bytes Internal SRAM
d) Write/Erase Cycles: 10,000 Flash/100,000 EEPROM
e) Data retention: 20 years at 85°C/100 years at 25°C
f) Optional Boot Code Section with Independent Lock Bits
g) In-System Programming by On-chip Boot Program
h) True Read-While-Write Operation
i) Programming Lock for Software Security

• Peripheral Features

a) Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
b) One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode
c) Real Time Counter with Separate Oscillator
d) Six PWM Channels
e) 8-channel 10-bit ADC in TQFP and QFN/MLF package
f) Temperature Measurement
g) 6-channel 10-bit ADC in PDIP Package
h) Temperature Measurement

i) Programmable Serial USART
j) Master/Slave SPI Serial Interface
k) Byte-oriented 2-wire Serial Interface (Philips I2 C compatible)
l) Programmable Watchdog Timer with Separate On-chip Oscillator
m) On-chip Analog Comparator
n) Interrupt and Wake-up on Pin Change

- Special Microcontroller Features
  a) Internal Calibrated Oscillator
  b) External and Internal Interrupt Sources
  c) Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby, and Extended Standby
  d) Power-on Reset and Programmable Brown-out Detection

- I/O and Packages
  a) 23 Programmable I/O Lines
  b) 28-pin PDIP, 32-lead TQFP, 28-pad QFN/MLF and 32-pad QFN/MLF

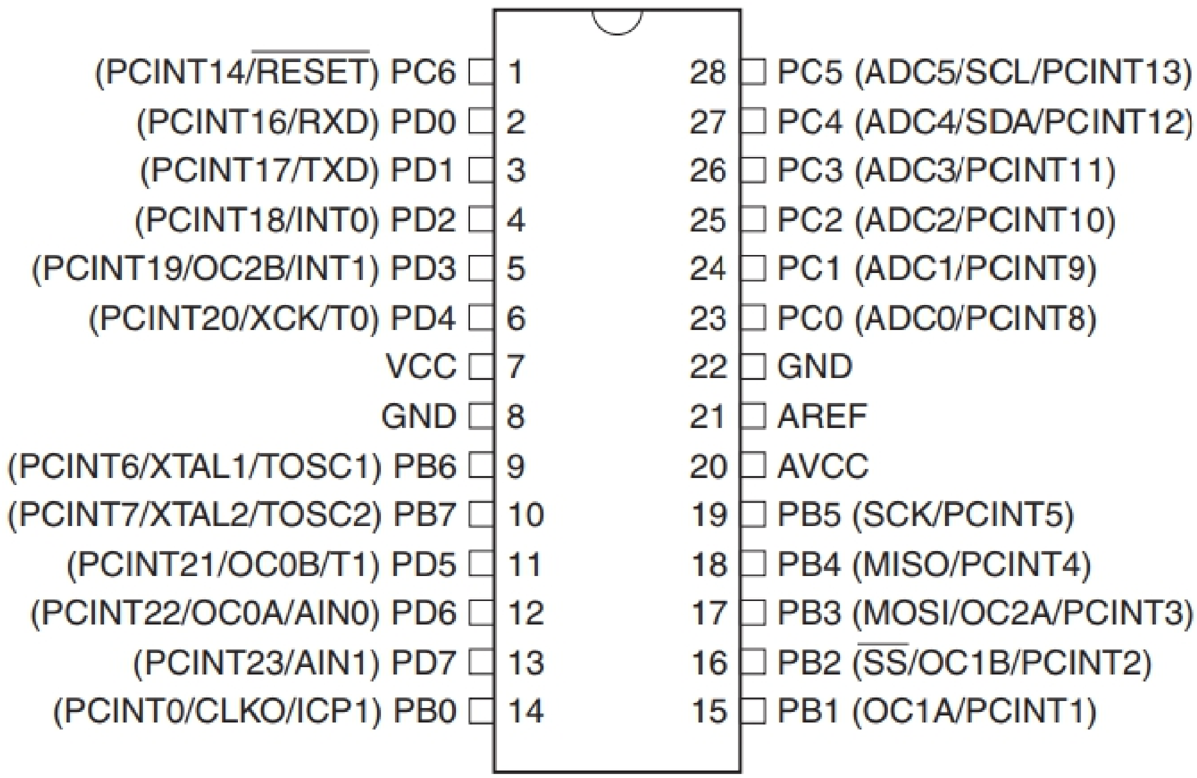
- Operating Voltage:
  a) 1.8 - 5.5V

- Temperature Range:
  a) -40°C to 85°C

- Speed Grade:
  a) 0 - 4 MHz@1.8 - 5.5V, 0 - 10 MHz@2.7 - 5.5.V, 0 - 20 MHz @ 4.5 - 5.5V

- Power Consumption at 1 MHz, 1.8V, 25°C
  a) Active Mode: 0.2 mA
  b) Power-down Mode: 0.1 µA
  c) Power-save Mode: 0.75 µA (Including 32 kHz RTC)

4.1.3 Pin configuration of ATMEGA328P-PU



4.1.3.1 ATMEGA16u2- mu microcontroller

Is a 8-bit microcontroller used as USB driver in ARDUINO UNO R3 it's features as follow:

- Advanced RISC Architecture
  - a) 125 Powerful Instructions – Most Single Clock Cycle Execution
  - b) 32 x 8 General Purpose Working Registers
  - c) Fully Static Operation
  - d) Up to 16 MIPS Throughput at 16 MHz

- Non-volatile Program and Data Memories
  - a) 8K/16K/32K Bytes of In-System Self-Programmable Flash
  - b) 512/512/1024 EEPROM

c) 512/512/1024 Internal SRAM

d) Write/Erase Cycles: 10,000 Flash/ 100,000 EEPROM

e) Data retention: 20 years at 85˚C/ 100 years at 25˚C

f) Optional Boot Code Section with Independent Lock Bits

g) In-System Programming by on-chip Boot Program hardware-activated after reset

h) Programming Lock for Software Security

• USB 2.0 Full-speed Device Module with Interrupt on Transfer Completion

a) Complies fully with Universal Serial Bus Specification REV 2.0

b) 48 MHz PLL for Full-speed Bus Operation: data transfer rates at 12 Mbit/s

c) Fully independent 176 bytes USB DPRAM for endpoint memory allocation

d) Endpoint 0 for Control Transfers: from 8 up to 64-bytes

e) 4 Programmable Endpoints:

– IN or Out Directions

– Bulk, Interrupt and Isochronous Transfers

– Programmable maximum packet size from 8 to 64 bytes

– Programmable single or double buffer

f) Suspend/Resume Interrupts

g) Microcontroller reset on USB Bus Reset without detach

h) USB Bus Disconnection on Microcontroller Request

• Peripheral Features

a) One 8-bit Timer/Counters with Separate Prescaler and Compare Mode (two 8-bit PWM channels)

b) One 16-bit Timer/Counter with Separate Prescaler, Compare and Capture Mode(three 8-bit PWM channels)

c) USART with SPI master only mode and hardware flow control (RTS/CTS)

d) Master/Slave SPI Serial Interface

e) Programmable Watchdog Timer with Separate On-chip Oscillator

f) On-chip Analog Comparator

g) Interrupt and Wake-up on Pin Change

- Special Microcontroller Features

a) Power-On Reset and Programmable Brown-out Detection

b) Internal Calibrated Oscillator

c) External and Internal Interrupt Sources

d) Five Sleep Modes: Idle, Power-save, Power-down, Standby, and Extended Standby

- I/O and Packages

a) 22 Programmable I/O Lines

b) QFN32 (5x5mm) / TQFP32 packages

- Operating Voltages

a) 2.7 - 5.5V

- Operating temperature

a) Industrial (-40°C to +85°C)

- Maximum Frequency

a) 8 MHz at 2.7V - Industrial range.

b) 16MHz at 4.5V- Industrial range.

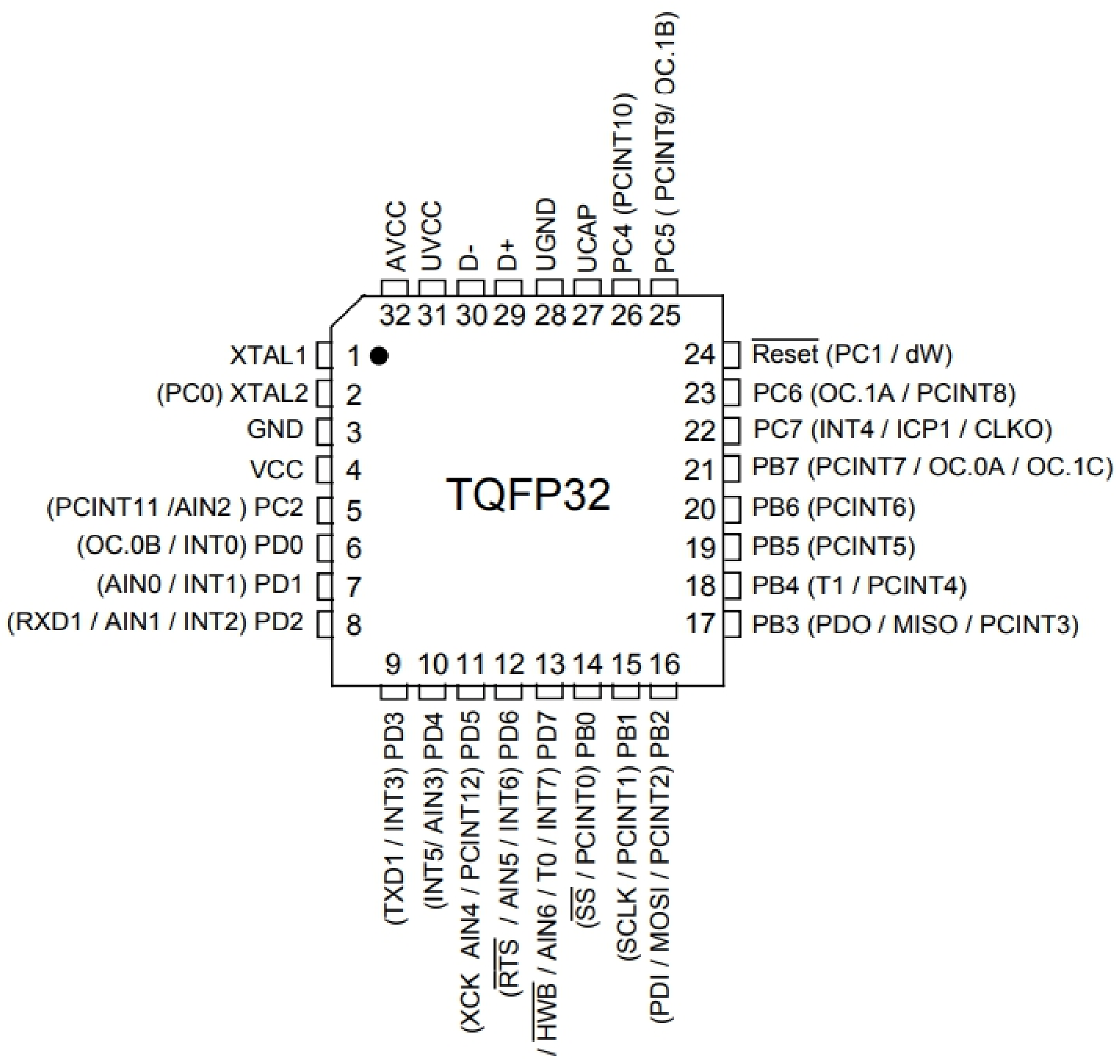
4.1.4 Other ARDUINO UNO R3 Parts

Each of the 14 digital pins on the Uno can be used as an input or output, using pin Mode (),digital Write(), and digital Read() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 k Ohms. In addition, some pins have specialized functions:

a) Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.

b) External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.

c) PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analog Write() function.



d) SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.

e) LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

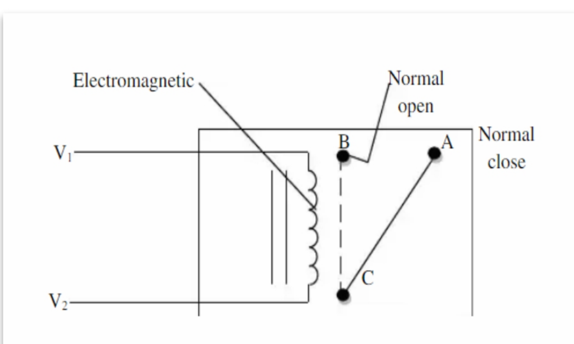
The Uno has 6 analog inputs, labeled A0 through A5, each of which provides 10 bits of resolution (i.e.1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analog Reference () function. Additionally, some pins have specialized functionality:

- TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.

There are a couple of other pins on the board:

- AREF: Reference voltage for the analog inputs. Used with analog Reference().
- Reset: Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

4.2 Relay



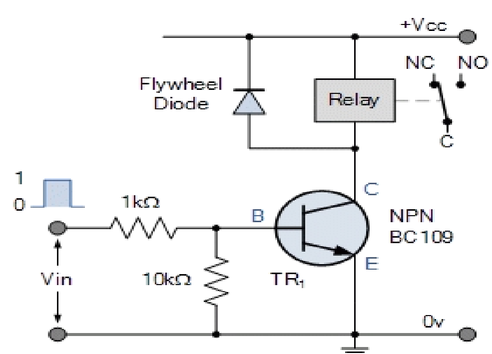


Fig 4.2.1: Diagram of A Relay Circuit

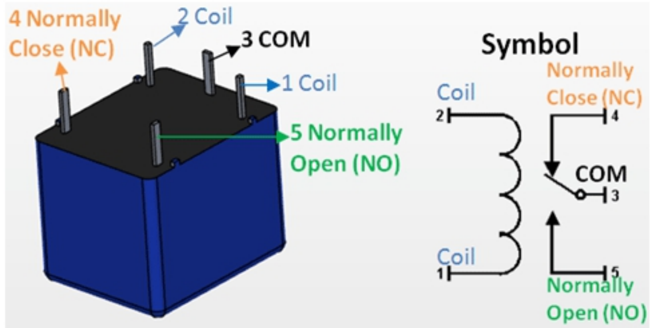


Fig4.2.2: 5V Relay Pin Diagram

4.2.1: Relay Pin Configuration

Pin Number	**Pin Name**	**Description**
1	Coil End 1	Used to trigger(On/Off) the Relay, Normally one end is connected to 5V and the other end to ground
2	Coil End 2	Used to trigger(On/Off) the Relay, Normally one end is connected to 5V and the other end to ground
3	Common (COM)	Common is connected to one End of the Load that is to be controlled
4	Normally Close (NC)	The other end of the load is either connected to NO or NC. If connected to NC the load remains connected before trigger
5	Normally Open (NO)	The other end of the load is either connected to NO or NC. If connected to NO the load remains disconnected before trigger

4.2.2: What Is a Relay and How It Works?

The relays are the main protection, as well as the switching devices in most controls. processes or equipment regardless of whether they are electronic or electromechanical. All relays respond to one or more electrical quantities such as voltage or current so that open or close contacts or circuits. A relay is a switching device since it works isolate or change the state of an electrical circuit from one state to another. These are found on all types of devices. The relays allow one circuit to change to a second circuit that can be completely separated from the first. There is no electrical connection inside the relay. between the two circuits: the link is magnetic and mechanical only. Basically, a relay consists of an electromagnet coil, an armature, a spring and a series of electrical contacts The electromagnet coil obtains power through a switch or a relay controller and causes the armature to be connected so that the load gets the power supply. The The movement of the armor is produced using a spring. Therefore, the relay consists of two electrical circuits that are connected to each other only through a magnetic connection, and the relay is controlled by controlling the switching of the electromagnet.

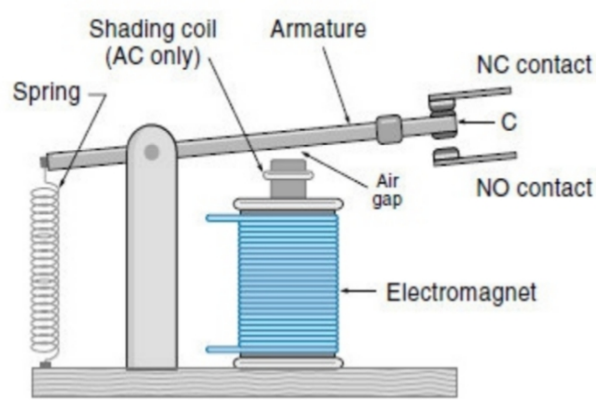


Fig4.2.2.1 Working Diagram of Relay circuit

Contacts are usually common (COM): normally open (NO) and normally closed (NC). The normally closed contact is connected to the common contact if no power is applied to the coil The normally open contact opens if no power is applied to the coil. When the coil is energized, the common contact is connected to the normally open contact, and Normally closed contact is left floating. The double pole versions are the same as the Monopolar version except when the two switches open and close together.

4.2.3: Applications of Relay

- Commonly used in switching circuits.
- For Home Automation projects to switch AC loads
- To Control (On/Off) Heavy loads at a pre-determined time/condition
- Used in safety circuits to disconnect the load from supply in event of failure
- Used in Automobiles electronics for controlling indicators glass motors etc.

4.3: Transmitter circuit (Encoder) and Receiver circuit (Decoder)

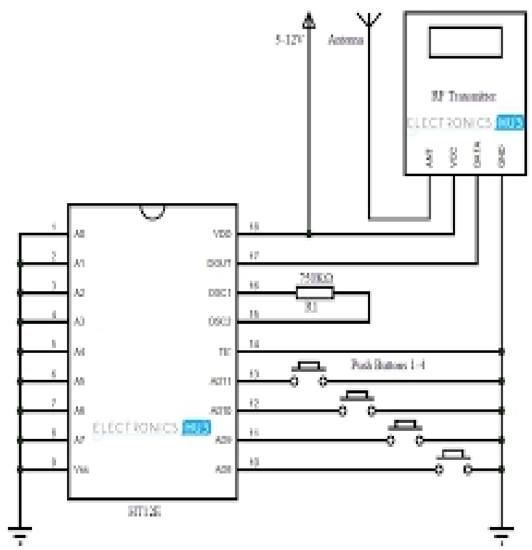


Fig 4.3.1: RF ENCODER

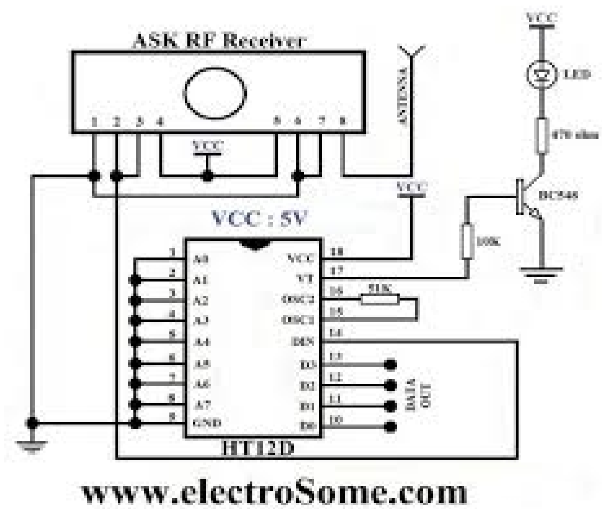


Fig 4.3.2: RF DECODER

4.3.1: Description

This radio frequency (RF) transmission system uses Shift Keying Amplitude (ASK) with transmitter / receiver (TX / RX) torque operating at 434 MHz The transmitter module takes serial input and transmits these signals via RF. The transmitted signals are received by the receiver module placed away from the transmission source.

The system allows unidirectional communication between two nodes, namely transmission and reception. The RF module has been used together with a set of four-channel encoder / decoder integrated circuits. Here HT12E and HT12D have been used as encoder and decoder respectively. The encoder converts the parallel inputs (of the remote switches) into a set of serial signals. These signals are transferred in series via RF to the reception point. The decoder is used after the RF receiver to decode the serial format and retrieve the original signals as outputs. These outputs can be observed in the corresponding LEDs.

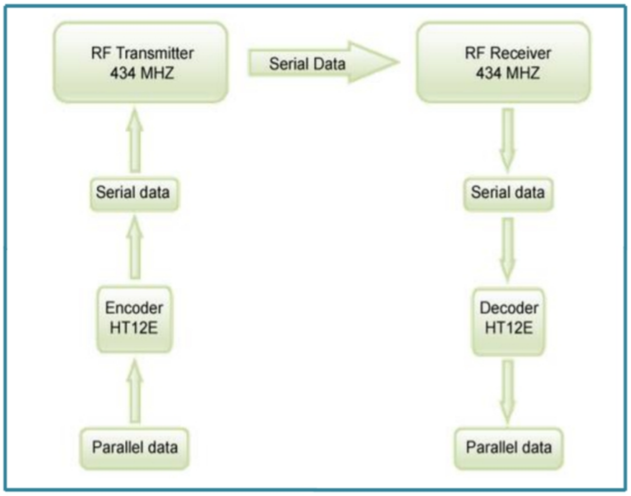


Fig 4.3.3 Flow of Data

The IC encoder (HT12E) receives parallel data in the form of address bits and control bits. The control signals of the remote switches together with 8 address bits constitute a set of 12 parallel signals. The HT12E encoder encodes these parallel signals in serial bits. Transmission is enabled by providing ground to pin14 that is active low. Control signals are given on pins 10-13 of HT12E. Serial data is sent to the RF transmitter through pin17 of HT12E.

The transmitter, upon receiving serial data from the IC encoder (HT12E), transmits it wirelessly to the RF receiver. The receiver, upon receiving these signals, sends them to the IC decoder (HT12D) through pin2. Serial data is received on the data pin (DIN, pin14) of HT12D. The decoder then retrieves the original parallel format of the received serial data.

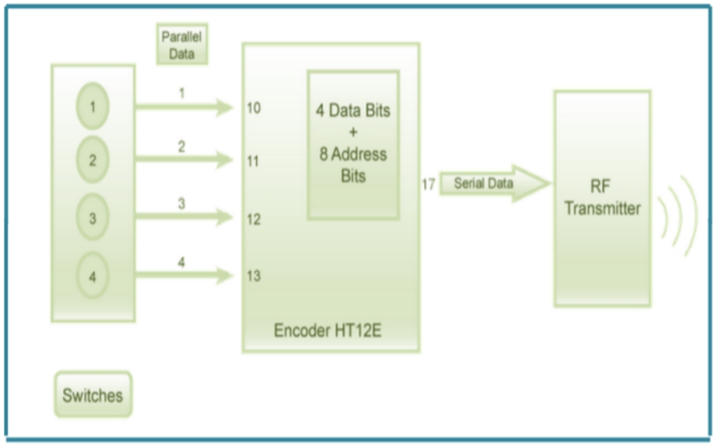


Fig4.3.4 Transmitter Flow

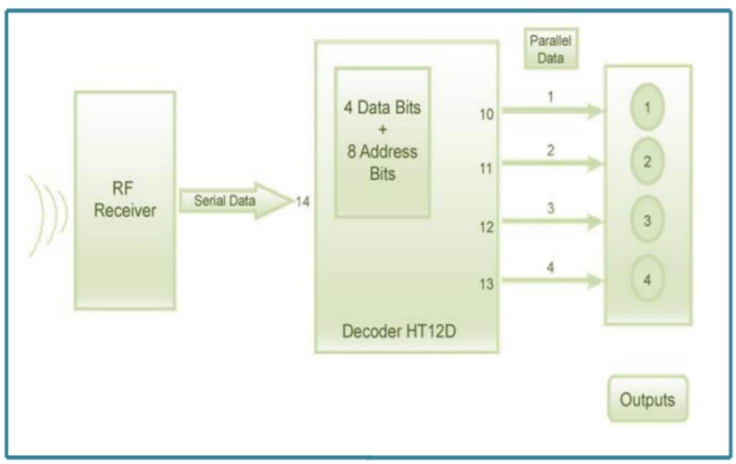


Fig 4.3.5 Receiver Flow

When no signal is received on the HT12D data pin, it remains in standby mode and consumes very less current (less than 1 µA) for a voltage of 5V. When the receiver receives the signal, it is sent to the DIN pin (pin 14) of HT12D. Upon receiving the signal, the HT12D oscillator is activated. IC HT12D then decodes the serial data and verifies the address bits three times. If these bits match the local address pins (pins 1-8) of HT12D, then place the data bits on their data pins (pins 10-13) and make the VT pin high. An LED is connected to the VT pin (pin17) of the decoder. This LED functions as an indicator to indicate a valid transmission. The corresponding output is thus generated on the data pins of the decoder IC.

A signal is sent by lowering any or all pins 10-13 of HT12E and the corresponding signal is received at the end of the receiver (on HT12D). The address bits are configured using the first 8 pins of the encoder and decoder integrated circuits. To send a particular signal, the address bits must be the same in the integrated circuits of the encoder and decoder. By setting the address bits correctly, a single RF transmitter can also be used to control different RF receivers of the same frequency.

To summarize, in each transmission, 12 bits of data consisting of 8 address bits and 4 data bits are transmitted. The signal is received at the end of the receiver that is then fed to the decoder IC. If the address bits match, the decoder converts them into parallel data and the corresponding data bits are reduced, which could be used to control the LEDs. The outputs of this system can be used in negative logic or NOT gates (such as 74LS04) can be incorporated into the data pins.

4.3.2: HT12E Encoder

HT12E is an integrated encoder circuit of 2 12 series of encoders. They are paired with 2 12 sets of decoders for use in remote control system applications. It is mainly used in the interface of RF and infrared circuits. The chosen encoder / decoder pair must have the same number of addresses and data format. Simply put, HT12E converts parallel inputs into serial output. Encodes parallel 12-bit data in series for transmission through an RF transmitter. These 12 bits are divided into 8 address bits and 4 data bits.

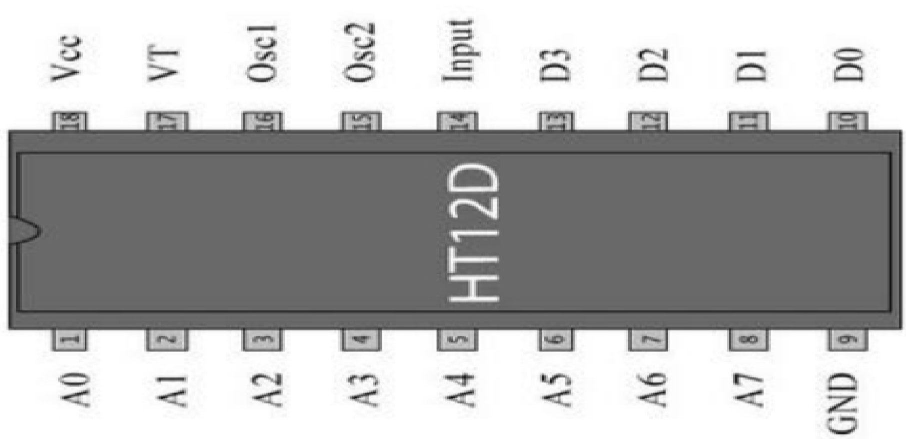
4.3.2.1: Pin Description

Pin Number	Function	Name
1	8 BIT ADDRESS PINS FOR INPUT	A0
2		A1
3		A2
4		A3
5		A4
6		A5
7		A6
8		A7
9	GROUND (0V)	GROUND
10	4 BIT DATA/ADDRESS PINS FOR INPUT	D0
11		D1
12		D2
13		D3

HT12E has a transmission enable pin that is active low. When a trigger signal is received on the TE pin, the programmed addresses / data are transmitted together with the header bits through an RF or infrared transmission medium. HT12E begins a 4-word transmission cycle upon receiving a transmission enable. This cycle is repeated as long as the TE is kept low. As soon as TE returns to high, the encoder output completes its final cycle and then stops.

4.3.3: HT12D Decoder

HT12D IC comes from HolTek Company. HT12D is an integrated decoder circuit that belongs to 2 12 series of decoders. This series of decoders are mainly used for applications of remote control systems, such as burglar alarm, car door controller, security system, etc. It is mainly provided to interconnect RF and infrared circuits. They are paired with 2 12 series of encoders. The chosen encoder / decoder pair must have the same number of addresses and data format.



4.3.3.1: Pin Description

Pin Number	Function	Name
1	8 BIT ADDRESS PINS FOR INPUT	A0
2		A1
3		A2
4		A3
5		A4
6		A5
7		A6
8		A7
9	GROUND (0V)	GROUND
10	4 BIT DATA/ADDRESS PINS FOR OUTPUT	D0
11		D1
12		D2
13		D3
14	SERIAL DATA INPUT	INPUT
15	OSCILLATOR OUTPUT	OSC 2
16	OSCILLATOR INPUT	OSC 1
17	VALID TRANSMISSION, ACTIVE HIGH	VT
18	SUPPLY VOLTAGE; 5V (2.4 – 12V)	Vcc

In simple terms, HT12D converts serial input into parallel outputs. It decodes serial addresses and data received by, for example, an RF receiver, in parallel data and sends them to output data pins. Serial input data is compared to local addresses three times in a row. The input data code is decoded when no errors or mismatched codes are found. A valid transmission in indicated by a high signal on the VT pin.

HT12D is capable of decoding 12 bits, of which 8 are address bits and 4 are data bits. The data on the 4-bit latch-type output pins remains unchanged until new is received..

4.4: RF MODULES (434MHz)

The RF module, as the name implies, operates at radio frequency. The corresponding frequency range varies between 30 kHz and 300 GHz. In this RF system, digital data is represented as variations in the amplitude of the carrier wave. This type of modulation is known as Amplitude Shift Keying (ASK).

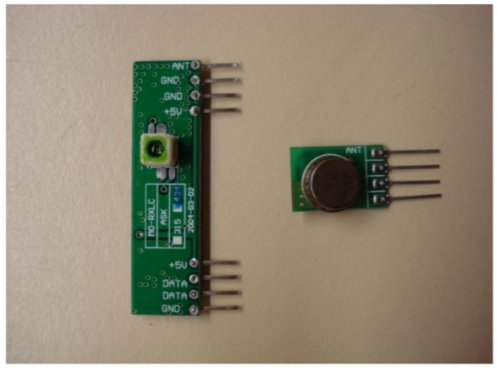


Fig 4.4.1: RF Modules (434MHz)

RF transmission is better than IR (infrared) due to many reasons. First, RF signals can travel over great distances, which makes it suitable for long-range applications. In addition, while IR operates primarily in line of sight mode, RF signals can travel even when there is an obstruction between the transmitter and the receiver. Then, the RF transmission is stronger and more reliable than the IR transmission. RF communication uses a specific frequency unlike IR signals that are affected by other IR emitting sources.

This RF module consists of an RF transmitter and an RF receiver. The transmitter / receiver pair (TX / RX) operates at a frequency of 434 MHz. An RF transmitter receives data in series and transmits it wirelessly through RF through its antenna connected to pin4. The transmission occurs at a speed of 1 Kbps - 10 Kbps. The transmitted data is received by an RF receiver that operates at the same frequency as that of the transmitter.

The RF module is often used in conjunction with an encoder / decoder pair. The encoder is used to encode parallel data for the transmission feed while decoding decodes it. HT12E-HT12D, HT640-HT648, etc. These are some commonly used encoder / decoder integrated circuits.

4.4.1: Pin Diagram

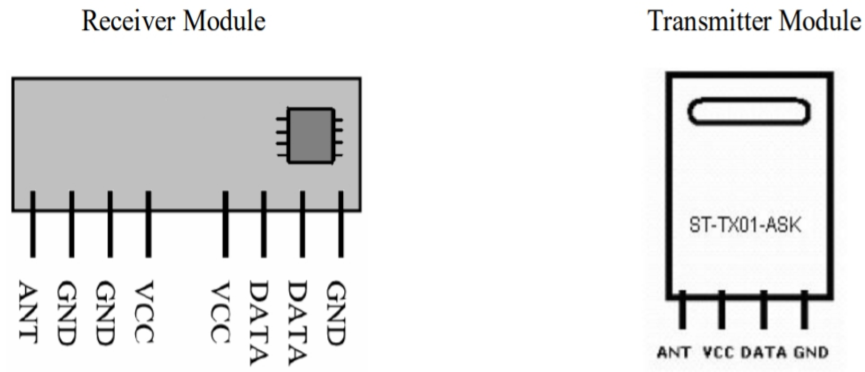


Fig 4.4.1

Transmitter Module

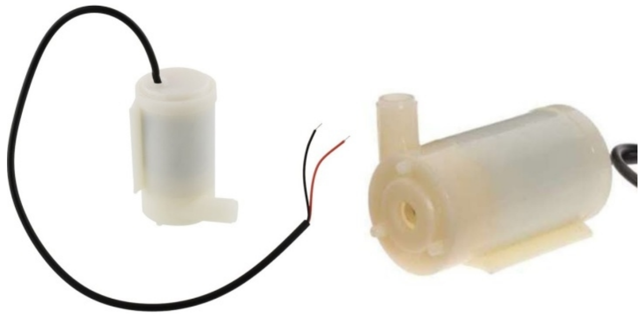
Pin Number	Function	Name
1	Ground (0V)	GND
2	Serial Data Input Pin	DATA
3	Supply Voltage (5V)	VCC
4	Antenna Output Pin	ANT

Receiver Module

Pin Number	Function	Name
1	Ground (0V)	GND
2	Serial Data Output Pin	DATA
3	Linear Output Pin; Not Connected	NC
4	Supply Voltage (5V)	VCC
5	Supply Voltage (5V)	VCC
6	Ground (0V)	GND
7	Ground (0V)	GND
8	Antenna Input Pin	ANT

4.5: Mini Water Pump

The water pump can be defined as a pump that uses mechanical and hydraulic principles throughout a pipe system and to make sufficient force for future use. They have been approximately in one structure or another because of early civilization. Currently, these pumps are used in a wide range of housing, agriculture, municipality and manufacturing applications.

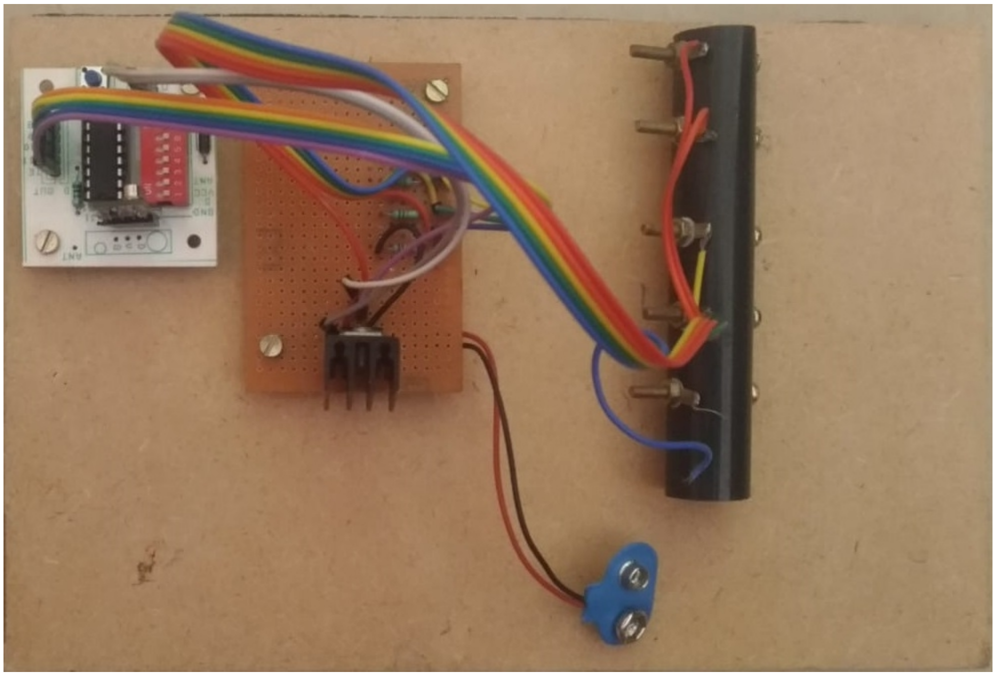


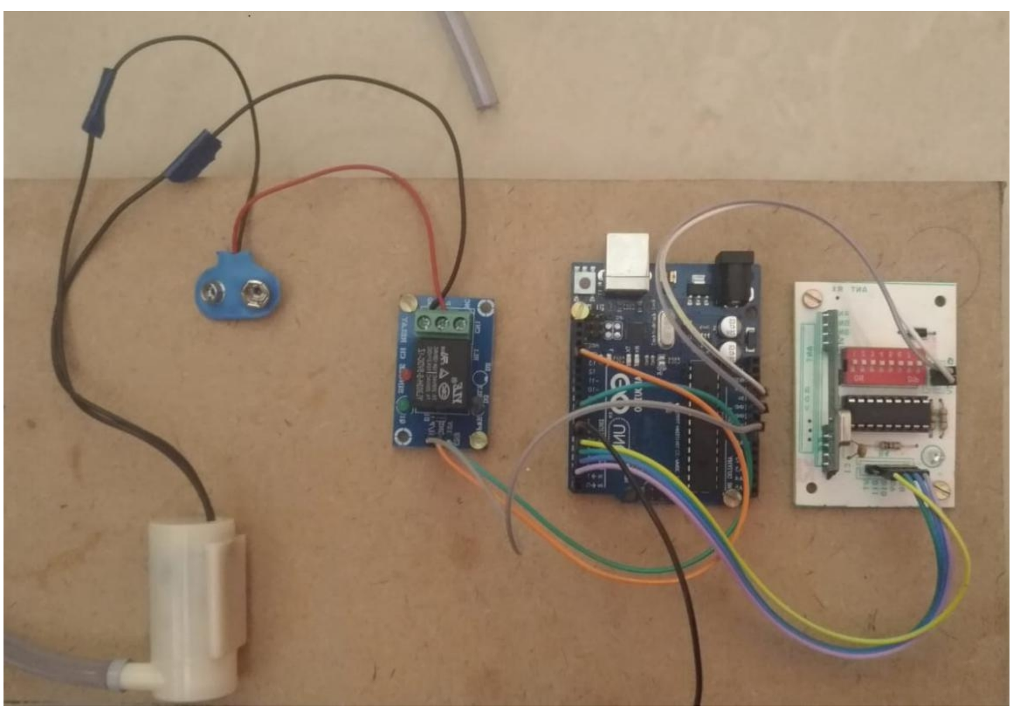
4.5.1: Water Pump Working Principle

The principle of operation of a water pump depends mainly on the principle of positive displacement, as well as the kinetic energy to push the water. These pumps use AC power, otherwise DC power to energize the water pump motor, while others can be energized for other types of controllers such as gasoline or diesel engines.

The water pump is a portable device and can be applied in various domestic applications. These pumps are used to pump large amounts of water from one place to another. The main objective of a water pump is versatile. A quality pump that can be selected with care can be perfect for draining water from a low flood region, filling the pool and bathtub, circulating pesticides or fertilizers.

COMPLETE PROJECT FIGURE





Program code

```
int sump=6;
int qut=2;
int hlf=3;
int thf=4;
int ful=5;
int motor=8;
int buz=7;
int s;
int q;
int h;
int t;
int f;
int i;     //motor status flag
int v=100; //comparison variable(needs some adjustment)
int b=0;   //buzzer flag
int m=0;   //motor flag
int c=0;   //sump flag


void setup()
{
Serial.begin(9600);
pinMode(qut,INPUT);
pinMode(hlf,INPUT);
pinMode(qut,INPUT);
pinMode(ful,INPUT);
pinMode(sump,INPUT);
pinMode(motor,OUTPUT);
pinMode(buz,OUTPUT);
digitalWrite(buz,LOW);
}

void loop()
{

i=digitalRead(motor);
s=digitalRead(sump);
q=digitalRead(qut);
h=digitalRead(hlf);
t=digitalRead(thf);
f=digitalRead(ful);
```

```
if(f==1 && t==1 && h==1 && q==1 )
{
m=0;
b=0;
}
else
{
if(f==0 && t==1 && h==1 && q==1 )
{
b=0;
}
else
{
if(f==0 && t==0 && h==1 && q==1)
{
b=0;
}
else
if(f==0 && t==0 && h==0 && q==1)
{
b=0;
}
else
{
if(f==0 && t==0 && h==0 && q==0)
{
m=1;
b=0;
}
else

{
digitalWrite(motor,LOW);

b=1;
}
}}}

if(s==1 && m==1)
{
```

```
digitalWrite(motor,HIGH);
}
if(s==0)
{
digitalWrite(motor,LOW);
c=1;
}
if(s>v)
{
c=0;
}

if(m==0)
{
digitalWrite(motor,LOW);
}
Serial.print("A=");
Serial.println(q);
Serial.print("B=");
Serial.println(h);
Serial.print("C=");
Serial.println(t);
Serial.print("D=");
Serial.println(f);
Serial.flush();
if(b==1 || c==1)
{
digitalWrite(buz,HIGH);
delay(500);
digitalWrite(buz,LOW);
}
else
{
digitalWrite(buz,LOW);
}
delay(100);
}
```

The hardware design is as shown in the block diagram. It has microcontrollers placed in the sump. They perform the task of control, error detection and communication sequencing. In the tank, two water levels are taken into account, that is, when the tank is almost empty as "LOW" and full as "HIGH". Two sensors are placed on these two levels. The sensor outputs are given to the tank controller as interruptions so that the highest priority is for the "LOW" level. Then, the conditions for the tank controller to send the request are:

When a "LOW" level is detected.

When a "HIGH" level is detected

As soon as an interruption occurs, the tank controller has to communicate with the sump controller. Therefore, a request is sent from the tank controller through the R.F. For every request you send, the controller in the sink has to recognize the effectiveness of the communication. Assume that an acknowledgment is lost or an error occurs, the request is transmitted again. The communication bits are configured in such a way that the first 4 transmission bits always indicate the identity of the device and the next bit is the error detection bit and the last 3 bits are data bits. The device identification bit prevents interference from the signals of two neighboring systems.

In the sump, the controller is placed together with a transceiver module. The sensor is placed to detect the presence or absence of water level. The sensor signal is given as the external interruption to the controller. When the controller in the sump receives a "LOW" water level message in the sump, it recognizes it to the tank controller and changes the engine. And when the sump controller receives a "COMPLETE" water level in the tank, it turns off. Then, the conditions for the sump controller to send requests are:

When "NO WATER LEVEL" is detected in the sump.

When water is filled.

A small prototype based on the above conditions is written in programming language C. That is then poured into the microcontroller and the entire hardware design is implemented.

CHAPTER 05

5.1: RESULT AND DISCUSSION

The project was successfully completed before the expiration date. Each member of the group now understands very well how any screen works, which means that we fulfill the objective of our project.

Our basic concepts of fundamental electronics have been strengthened as we have implemented the concepts we learned in class and practically made it work.

CHAPTER 06

6.1: CONCLUSION AND FUTURE SCOPE

In this article we have explained the design of a cost-effective and easy method to control the water level of the tank wireless and automatically. According to our design, it is better implementable for homes and offices The coverage range is only for domestic and office areas. It is noted that homes and offices are one of the main areas of water surveys. Therefore, implementing the easy-to-maintain and low-cost wireless system is one of the solutions. It has no problem, such as cable breakage that arises after installation. But the same idea can be extended to a wide coverage area and can be implemented in industries. And also for irrigation purposes. Wired sensors can be replaced with wireless and the coverage area can be increased. The wireless detection method can also be applied for the detection of water leaks.

The project was designed to automatically control the pump, which guarantees a constant reserve of water in the tank. The scope of the design was simple and concise so as not to introduce unnecessary complexities and make it uncomfortable in general. The system does not have a complex peripheral device connected that, although impossible because of the detailed printable information, has been excluded for reasons of affordability, low-range material and less precise yields were used compared to a well-constructed automatic water pump to achieve this objective. The automatic water level controller detects and controls the water in the tank.

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5. Microcontroller Based Automated Water Level Sensing and Controlling (S. M. Khaled Reza., Shah Ahsanuzzaman Md. Tariq., and S.M. Mohsin Reza) Design and Implementation Issue", Proceedings of the World Congress on Engineering and Computer Science

APPENDIX

[1] ARDUINO UNO REV3data-sheet by ARDUINO company

[2] RF encoder and decoder data-sheet by robokits.co.in