

Design and Implementation of Wireless Based Water Level and Monitoring and Control System

Submitted in partial fulfillment of the requirements for the award
of

**Bachelor of Engineering degree in
Electronics and Communication Engineering**

By

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SCHOOL OF ELECTRICAL AND ELECTRONICS

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **SHAIK.NOOR MOHAMMED (37130371)**, and **RAHUL.R (37130333)** who carried out the project entitled “**Design and Implementation of Wireless Based Water Level and Monitoring and Control System**” under my supervision from AUG 2020 to MARCH 2021.

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DECLARATION

We **Shaik Noor Mohammed (37130371)** and **Rahul. R (37130333)** hereby declare that the Project Report entitled “**Design and Implementation of Wireless Based Water Level Monitoring and Control System**” done by us under the guidance of **Dr.S. Emalda Roslin,M.E.,Ph.D.,** at **SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY** is submitted in partial fulfilment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

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ABSTRACT

This project mainly focuses on harnessing IoT in monitoring and manage dams. A large dam is of much importance, primarily because of its use for generating electricity, but the risk which is associated with it should be greatly taken into account. There is a need for daily updated information related to the dam status in order to use for dam management. An information system has been invented based on the existing systems, allowing utilization of wireless sensor networks. The goal of this project is the use of the Internet of Things application within a specific system for dam safety purposes. The system must provide real-time alerting in case of security parameters vary from the expected values. In the world, thousands of dams are there, so security must be monitored. It is of major importance due to the fact that the collapse of such dams can harm millions of people. The continuous monitoring of dams via sensors and the prevention of the problems. Prediction is of vital importance for the safety of dams. In this study, in an effort to properly operate reliable equipment in the tunnels of dams Sensor network has been explored

Dams play a crucial role in a country's economy as they mean power generation, irrigation, propagation of tourism, water conservation, and other means. However, the unwanted and sudden unannounced release of water from spillways of these dams sometimes possess a serious threat to human life. Here to propose an automatic dam water level monitor and controller system. The proposed project uses sensors to sense the water level opens the dam gate the water level. The system uses multiple water level sensors for this purpose. These sensors are mounted at three different levels in order to check water levels and provide signals accordingly. When the water reaches the first sensor it is sensed and displayed. When the water reaches the second sensor it provides a signal to the microcontroller and it opens the dam gate partially. As soon water level reaches the third sensor, it signals the microcontroller microcontroller then signals the motor to run, which is demonstrated as opening the dam gate fully. A GSM module is used to send information to the higher authorities so that necessary precautions are taken. A buzzer is used to alarm the people nearby to make awareness about going to a safer place. Thus proposed system allows for automatic dam gate opening.

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CHAPTER 1

INTRODUCTION

This chapter deals with the introduction about automatic dam door opening using water level sensors with adding advanced components for better use.

1.1 WORKING PRINCIPLE

Almost every water resources project features a reservoir or diversion work for the control of floods or to store water for irrigation or power generation, domestic or industrial water system. A spillway with an impact mechanism is nearly invariably provided for the discharge of waters during excess flood inflows. Releases of water can also be administered by control devices provided in conduits within the body of the dam and tunnels. so as to realize flow control, a gate or a shutter is provided during which a leaf or a closure member is placed across the waterway from an external position to regulate the flow of water. Control of flow in closed pipes like penstocks conveying water for hydropower is additionally done by valves, which are different from gates within the sense that they are available along side the driving equipment, whereas gates require a separate drive or hoisting equipment. differing types of hydraulic gates and hoists, performing on different principles and mechanisms are in use for controlled release of water through spillways, sluices, intakes, regulators, ducts, tunnels, etc. the proper selection of gates and their hoisting arrangement is extremely important to ensure the safety of the structure and effective control. A designer has got to plan a gate and its hoisting arrangement together. Separate planning of gates or hoists sometimes leads to an unsatisfactory installation. Though the selection for the gates and hoists depends on several factors, primarily safety, ease operational also as maintenance and economy are the governing requirements within the same order.

As of late various urban communities on the planet have been going up against broad waterlogging, especially for a few flowing impacts notwithstanding hefty precipitation. To get over the present circumstance, this task is viewed as an important method to take steps to waterlog. Subsequent to dissecting a few papers organized on programmed dam doors, it is seen that PLC was applied in those .

But in practice, it is really expensive and complex for small-scale dam gate projects. However, in some system, three phase induction motor was utilized to use for gate movement which enhances the complexity of the system.

To overcome these problems, an autonomous dam gate system has been proposed and developed during this paper which will be ready to open and shut gates automatically when it's necessary and subsequently reduce the tidal water effect. After taking into consideration all limitations, An Arduino-based autonomous dam gate technique has been designed employing a low-cost sensor which offered better water level detection also as consequently are going to be utilized to guard lowland areas from tidal water or excessive water during the flood also as proper drainage issue.

In the proposed system, the DAM environment is monitored using water level sensors. The sensors are interfaced with the Arduino Mega microcontroller. Depends on the water level sensor values the dam door is opened using Servo motor. The sensed information transmits using IOT from the dam section to the monitoring section. The measured values are stored in the data memory. It can control the dam shutter from a remote place. If any abnormality occurs, using GSM sends the message to the higher authorities. Using the APR voice module, an emergency alert can be given for the nearest places.

CHAPTER 2

LITERATURE REVIEW

This chapter deals with the different techniques used for automatic controlling of gates on different platforms in various period of time.

Anisha, et .al (2017) proposed on the prevention of unnecessary wastage of water from residential areas is a much more efficient task rather than finding methods to replenish the already wasted water. It provides an interactive and automated method to conserve the wastage of water with timely notifications sent to the consumer. This ensures that the consumer is well-informed about this water use and if the usage is high, can take necessary steps to reduce wastage. The proposed system can operate for several years without requiring a change of components. Since power supply to the system is through the power mains of the house, there are no digital batteries that have to be frequently changed. The consumer has to only monitor the utilization of water and not about maintaining of the electronically controlled water flow restrictor. This proposed installation of this system be made compulsory by the municipal authorities in every house. It is a one-time investment and since it uses few components, it will require minimal maintenance. An electronically controlled water flow restrictor is a simple and efficient means of water conservation in residential areas.[1] The features are it is cost effective due to one time installation and necessary steps can be taken to reduce water wastage. The disadvantages are it does not work all the time as it is powered through mains.

Zhai Chengwu, et.al (2011) proposed the problems of ecological environment and water resources shortage, build the water resources allocation simulation model and the water resources allocation schemes, and get the water resources allocation results, and the results show that the river ecological base flow supply reliability exceeds 90% in the sections of Lin Jiacun and Jiabu. Which effectively relaxes tensions of ecological environment water shortage and provides theory references for water demand and improvement of ecological environment in Bao Ji.[2]The features are from this can reduce the water shortage. The disadvantages are it involves more schemes.

Xavier Litric (2016) proposed the Transactions on Control Systems Technology. This paper deals with the automatic control of a dam river system, where the action variable is the upstream discharge and the controlled variable the downstream discharge. The system is a cascade of single input-single output (SISO) systems, and can be considered as a single input-multiple output (SIMO) system, since there are multiple outputs given by intermediate measurement points distributed along the river. A generic robust design synthesis based on internal model controller (IMC) design is developed for internal model based controllers. The robustness is estimated with the use of a bound on multiplicative uncertainty taking into account the model errors, due to the nonlinear dynamics of the system. Simulations are carried out on a nonlinear model of the river. [3] The features are cascade SISO can be used as SIMO, the downstream is controlled by upstream. The disadvantages are prone of error in the output is high due to the input variance.

Syed Sheraz Mohani, et.al (2014) proposed 'Design for Irrigation and Monitoring System of an Automated Dam' In this paper explain the industry has always focused to device engineering methodologies for establishment and modification of relatively easier Controlling and Automation methods for any scrupulous process. This paper presents the design and implementation of a control system by means of microcomputers and data transmission networks. To verify the principle operation of the Controlling design to be presented a miniature Automated Dam model is experimentally tested using a PC-based system. [4] The features are easy Controlling and Automation methods for heavy process and use of microcomputers and data transmission networks. The disadvantages are it required very high cost to set up.

Z. Y. Ling, et.al (2012) proposed that the experiment studied the flow characteristics of distilled water flowing in the round micro channel under pressure driven, acquiring reliable experimental data and describing the characteristic curves of flow rate and pressure, then compared with the general laminar flow flowing theory. Experimental flow rate, bigger in diameter and shorter in length micro channel, is less than the prediction, and it is proportion to driving pressure and the flow characteristics can be described by the general laminar flow theory. Otherwise, experimental flow rate is higher than the prediction in micro channel which is smaller than the preferred one.

In diameter and longer in length, and this means that there is a critical value between length and diameter in smaller diameter micro channel, so apparent slip will be appearing on the solid, and experimental flow rate is higher than the prediction when the ratio of l/d is bigger than the critical values. The modified equation which can be used to calculate the flow rate is also given in this paper and the calculation is consistent with the experimental values. [5] The features are Laminar flow theory is applied to round micro channels and performance is increased due to change in pressure, shape and length. The disadvantages are predicted values differ from experimental values.

CHAPTER 3

EXISTING METHODOLOGY

This chapter discusses in detail the research methodology that has been used Arduino UNO, LCD and Motor Driver Controller.

3.1 INTRODUCTION TO EXISTING METHODOLOGY

In the existing system, there is no automation in the dam doors based on the water level present in the dam, due to this, there is a chance of disaster because of many parameters like human negligence. An Arduino UNO with a processor like Raspberry Pi is used, leading to the huge processing time of the information obtained which causes further delay in taking the necessary steps.

3.2 METHODOLOGY

To develop an autonomous dam gate system and the main objective is to demonstrate a system to control the dam automatically so that it can control the water flow autonomously to make effective use of water in the irrigation system as well as to control floods. The overall working process of the system where a water level sensor is used to detect the level of water and provide a signal to the Arduino. As well as a microswitch has been incorporated here to detect the gate position, it is either open or close. Arduino UNO is used here as the main processor, which analyses the data provided from the water level sensor and micro switch, and after completing the analysis process a signal is sent to the L293D motor driver, which controls the motor to open or close the dam according to the output. The water level sensor, which is situated on the drain side, detects the level of the drain water and this sensor again sends the level information to the processor. An LCD display is available in the control box to show the water level status. According to the obtained data if the water level is detected higher than Arduino will autonomously start a DC pump. The Control panel's push switches are also attached to the system, which is used to open or close the gate manually.

3.3 ARDUINO MEGA

Fig 3.1 explains the Mega 2560 is a microcontroller board based on the ATmega 2560. It has 54 digital input/output pins (of which 15 can be used as PWM which is the

outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

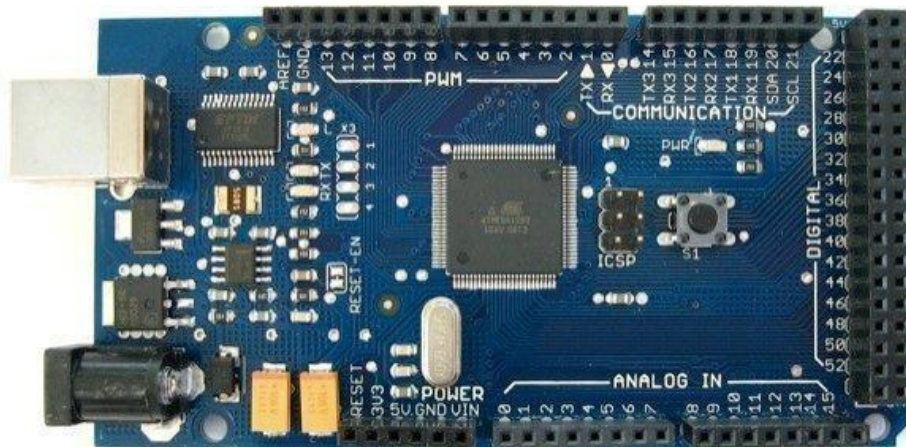


Fig 3.1 Arduino mega

Programming

The ATmega2560 on the Mega 2560 comes preprogrammed with a bootloader that allows the uploading of new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol is starter kit. It can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar; see these instructions for details. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available in the Arduino repository. The ATmega16U2/8U2 is loaded with a DFU bootloader, which can be activated by

On Rev1 boards: connecting the solder jumper on the rear of the board (near the map of Italy) then resetting the 8U2. On Rev1 boards: connecting the solder jumper on the rear of the board (near the map of Italy) then resetting the 8U2.

On Rev2 or later sheets: there is a resistor that pulling the 8U2/16U2 HWB line to the ground, making it simpler to place into DFU mode. It can utilize Atmel's FLIP software(Windows) or the DFU developer (Mac OS X and Linux) to stack another firmware. Or can utilize the ISP header with an outside software engineer (overwriting the DFU bootloader). See this client contributed instructional exercise for more data.

Table3.1 Technical specification of Arduino mega

Microcontroller	ATmega2560
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	54 (of which 15 provide PWM output)
Analog Input Pins	16
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	256 KB of which 8 KB used by bootloader
SRAM	8 KB
EEPROM	4 KB
Clock Speed	16 MHz
LED_BUILTIN	13
Length	101.52 mm
Width	53.3 mm
Weight	37 g

Drawbacks of Arduino Uno

The Mega 2560 has resettable poly circuits that shield the PC's USB ports from shorts and overcurrent. Albeit most PCs give their own inward assurance, the circuit gives an additional layer of insurance. On the off chance that in excess of 500 mA is applied to the USB port, the circuit will naturally break the association until the short or over-burden is taken out.

The Mega 2560 are often fueled by means of a USB association or with an external power supply. The force source is chosen naturally. Outer (non-USB) force can come either from an AC-to-DC connector (divider mole) or battery. The connector are often associated by connecting a 2.1mm focus positive fitting to the board's force jack. Leads from A battery are often embedded within the GND and Vin pin headers of the facility connector. The board can work on an outer stockpile of 6 to twenty volts. Whenever given under 7V, be that because it may, the 5V pin could provide under five volts and therefore the board may become precarious. within the event that utilizing quite 12V, the voltage controller may overheat and harm the board. The prescribed reach is 7 to 12 volts.

The power pins are as follows:

Vin. The information voltage to the board when it's utilizing an outside power source (rather than 5 volts from the USB association or other controlled force source). It can supply voltage through this pin, or, if providing voltage by means of the force jack, access it through this pin. 5V. This pin yields a directed 5V from the controller on the board. The board can be provided with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Providing voltage by means of the 5V or 3.3V pins sidesteps the controller, and can harm the board. don't. A 3.3-volt supply created by the on-board controller. The greatest current draw is 50 mA. GND. Ground pins. IOREF. This pin on the board furnishes the voltage reference with which the microcontroller works. An appropriately designed safeguard can peruse the IOREF pin voltage and select the suitable force source or empower voltage interpreters on the yields for working with the 5V or 3.3V.

Input and Output

Every one of the 54 advanced pins on the Mega can be utilized as an input or output, utilizing `pinMode()`, `digitalWrite()`, and `digitalRead()` capabilities. They work at 5 volts. Each pin can give or get 20 mA as the suggested working condition and has an inward pull-up resistor (separated of course) of 20-50 k ohm. A limit of 40mA is the worth that should not be surpassed to keep away from lasting harm to the microcontroller.

In addition, some pins have specialized functions:

Sequential: 0 (RX) and 1 (TX); Serial 1: 19 (RX) and 18 (TX); Serial 2: 17 (RX) and 16 (TX); Serial 3: 15 (RX) and 14 (TX). Used to get (RX) and communicate (TX) TTL sequential information. Pins 0 and 1 are likewise associated with the relating pins of the ATmega16U2 USB-to-TTL Serial chip.

External Interrupts: 2 (interrupt 0), 3 (interrupt 1), 18 (interrupt 5), 19 (interrupt 4), 20 (interrupt 3), and 21 (interrupt 2). These pins can be configured to trigger an interrupt on a low level, a rising or falling edge, or a change in level. See the `attachInterrupt()` function for details.

PWM: 2 to 13 and 44 to 46. Provide 8-bit PWM output with the `analogWrite()` function. SPI: 50 (MISO), 51 (MOSI), 52 (SCK), 53 (SS). These pins support SPI communication using the SPI library. The SPI pins are also broken out on the ICSP header, which is physically compatible with the Arduino/Genuino Uno and the old Duemilanove and Diecimila Arduino boards.

Driven: 13. There is an implicit LED associated with advanced pin 13. At the point when the pin is HIGH, the LED is on, when the pin is LOW, it's off. TWI: 20 (SDA) and 21 (SCL). Backing TWI correspondence utilizing the Wire library. Note that these pins are not in a similar area as the TWI pins on the old Duemilanove or Diecimila Arduino sheets.

The Mega 2560 has 16 analog inputs, each of which provides 10 bits of resolution (i.e. 1024 different values). By default, they measure from ground to 5 volts, though it is possible to change the upper end of their range using the AREF pin and `analogReference()` function.

There are a couple of other pins on the board:

- AREF. Reference voltage for the analog inputs. Used with `analogReference()`
- 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

See also the mapping Arduino Mega 2560 PIN diagram.

The Mega 2560 has 16 simple information sources, every one of which give 10 pieces of data (i.e. 1024 various qualities). As a matter of course they measure from ground to 5 volts, however it is conceivable to change the upper limit of their reach utilizing the AREF pin and `analogReference()` work.

There are a couple of other pins on the board:

- AREF. Reference voltage for the analog inputs. Used with `analogReference()`.
- 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.

Communication

The Mega 2560 board has different workplaces for talking with a PC, another board, or other microcontrollers. The ATmega2560 gives four gear UARTs to TTL (5V) successive correspondence. An ATmega16U2 (AT mega 8U2 on the change '1' and update '2' sheets) on the board channels one of these over USB and gives a virtual com port to programming on the PC (Windows machines will require a .inf report, anyway OSX and Linux machines will see the board as a COM port normally. The Arduino Software (IDE) consolidates a persistent screen which licenses fundamental artistic data to be transported off and from the board. The RX and TX LEDs on the board will streak when information is being sent through the ATmega8U2/ATmega16U2 chip and USB association with the PC (yet not for sequential correspondence on pins 0 and 1).

A Software Serial library takes into account sequential correspondence on any of the Mega 2560's computerized pins. The Mega 2560 additionally upholds TWI and SPI correspondence. The Arduino Software (IDE) incorporates a Wire library to improve on utilization of the TWI transport; see the documentation for subtleties. For SPI correspondence, utilize the SPI library.

Genuine Characteristics and Shield Compatibility the most limit length and width of the Mega 2560 PCB are '4' and 2.1 inches independently, with the USB connector and power jack connecting past the past estimation. Three screw openings license the board to be joined to a surface or case. Note that the distance between cutting edge pins '7' and '8' is 160 mil (0.16"), not an even different of the 100-mil separating of various pins. The Mega 2560 is proposed to be practical with most protects expected for the Uno and the more settled Diecimila or Duemilanove Arduino sheets. Progressed pins '0' to '13' (and the adjoining AREF and GND pins), straightforward wellsprings of information '0' to '5', the power header, and ICSP header are all in equivalent regions. Also, the central UART (consecutive port) is arranged on comparative pins ('0' and '1'), as are external encroaches upon '0' and '1' (pins '2' and '3' independently). SPI is available through the ICSP header on both the Mega 2560 and Duemilanove/Diecimila sheets. In the event that it's not all that much difficulty, note that I2C isn't arranged on comparable pins on the Mega 2560 board ('20' and '21') as the Duemilanove/Diecimila sheets (basic wellsprings of data '4' and '5').

Automatic (software) Reset

Perhaps than requiring a real press of the reset button before an exchange, the Mega 2560 is arranged such that grants it to be reset by programming running on a related PC. One of the hardware stream control lines (DTR) of the ATmega8U2 is related with the reset line of the ATmega2560 through a 100 nano-farad capacitor. Right when this line is expressed (taken low), the reset line drops sufficiently long to reset the chip. The Arduino Software (IDE) uses this ability to allow to move code by basically pressing the exchange button in the Arduino environment. This suggests that the bootloader can have a more restricted break, as the bringing down of DTR can be a lot of arranged with the start of the exchange.

This course of action has various implications. Right when the Mega 2560 burden up is related with either a PC running Mac OS X or Linux, it resets each time an affiliation is made to it from programming (through USB). For the going with half-second or close, the bootloader is running on the ATmega2560. While it is changed to dismiss bended data (for instance anything other than an exchange of new code), it will catch the underlying relatively few bytes of data sent off the board after an affiliation is opened. If a sketch running on the heap up gets one-time course of action or other data when it at first starts, guarantee that the item with which it passes on holds up a second ensuing to opening the affiliation and preceding sending this data.

The Mega 2560 board contains a follow that can be sliced to impair the auto-reset. The cushions on one or the other side of the follow can be fastened together to re-empower it. It's marked "RESET-EN". It might likewise have the option to impair the auto-reset by interfacing a 110 ohm resistor from 5V to the reset line; see this gathering string for subtleties.

3.4 LIQUID CRYSTAL DISPLAY

The LCD screen is an electronic showcase module and track down a wide scope of utilizations. A 16x2 LCD show is extremely essential module and is usually utilized in different gadgets and circuits. These modules are liked more than seven sections and other multi portion LEDs. The reasons being: LCDs are conservative; effectively programmable; have no constraint of showing unique and even custom characters (not at all like in seven sections), movements, etc.

A 16x2 LCD implies it can show '16' characters per line and there are 2 such lines. In this LCD each character is shown in 5x7 pixel network. This LCD has two registers, in particular, Command and Data the order register stores the order guidelines given to the LCD. An order is a guidance given to LCD to do a predefined task like instating it, clearing its screen, setting the cursor position, controlling showcase and so on The information register stores the information to be shown on the LCD. The information is the ASCII estimation of the character to be shown on the LCD. Snap to get familiar with inside construction of a LCD.

Specifications

The most by and large used Character set up LCDs are based as for Hitachi's HD44780 controller or other which are practical with HD44580. Analyze about character-based LCDs, their interfacing with various microcontrollers, various interfaces (8-digit/4-cycle), programming, exceptional stuff and bamboozles can do with these clear looking LCDs which can give another look to the application.

Pin Description

The most generally utilized LCDs found in the market today are 1 Line, 2 Line or 4 Line LCDs which have just 1 regulator and backing all things considered of 80 characters, while LCDs supporting in excess of 80 characters utilize 2 HD44780 regulators.

Table 3.2 Pin Description for LCD

Pin No.	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	V _{cc}
3	Contrast adjustment; through a variable resistor	V _{EE}
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4
12		DB5
13		DB6
14		DB7
15	Backlight V _{cc} (5V)	Led+
16	Backlight Ground (0V)	Led-

From table 3.2 explains the pin details of most commonly used LCD's most LCDs with 1 controller have 14 Pins and LCDs with 2 controller has 16 Pins (two pins are extra in both for back-light LED connections)

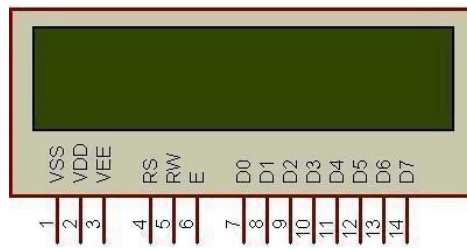


Fig. 3.2 Character LCD type HD44780

Fig 3.2 shows the 16x2 LCD means it can display '16' characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

Table 3.3 Character LCD pins with 2 Controller

Pin No.	Name	Description
Pin no. 1	D7	Data bus line 7 (MSB)
Pin no. 2	D6	Data bus line 6
Pin no. 3	D5	Data bus line 5
Pin no. 4	D4	Data bus line 4
Pin no. 5	D3	Data bus line 3
Pin no. 6	D2	Data bus line 2
Pin no. 7	D1	Data bus line 1
Pin no. 8	D0	Data bus line 0 (LSB)
Pin no. 9	EN1	Enable signal for row 0 and 1 (1 st controller)
Pin no. 10	R/W	0 = Write to LCD module 1 = Read from LCD module
Pin no. 11	RS	0 = Instruction input 1 = Data input
Pin no. 12	VEE	Contrast adjust
Pin no. 13	VSS	Power supply (GND)
Pin no. 14	VCC	Power supply (+5V)
Pin no. 15	EN2	Enable signal for row 2 and 3 (2 nd controller)
Pin no. 16	NC	Not Connected

From table 3.3 clarifies the attributes of LCD pins when utilized with two regulators and Busy Flag is a status pointer banner for LCD. At the point when it sends order or information to the LCD for handling, this banner is set (i.e BF =1) and when the guidance is executed effectively this banner is cleared (BF = 0). This is useful in creating and careful measure of postponement for the LCD handling. To peruse Busy Flag, the condition RS = 0 and R/W = 1 should be met and The MSB of the LCD information transport (D7) act as occupied banner. At the point when BF = 1 methods LCD is occupied and won't acknowledge next order or information and BF = 0 methods LCD is prepared for the following order or information to measure. Guidance register relates to the enlist where can send orders to LCD e.g LCD shift order, LCD clear, LCD address and so on and Data register is utilized for storing data which is to be shown on LCD. when convey the empower message of the LCD is affirmed, the information on the pins is hooked in to the information register and information is then moved automatically to the DDRAM and consequently is shown on the LCD. Information Register isn't just utilized for sending off LCD. Let examine more on LCD guidance set further in this instructional exercise.

Table 3.4 Frequently used commands and instructions for LCD

No.	Instruction	Hex	Decimal
1	Function Set: 8-bit, 1 Line, 5x7 Dots	0x30	48
2	Function Set: 8-bit, 2 Line, 5x7 Dots	0x38	56
3	Function Set: 4-bit, 1 Line, 5x7 Dots	0x20	32
4	Function Set: 4-bit, 2 Line, 5x7 Dots	0x28	40
5	Entry Mode	0x06	6
6	Display off Cursor off	0x08	8
7	Display on Cursor on	0x0E	14

8	Display on Cursor off	0x0C	12
9	Display on Cursor blinking	0x0F	15
10	Shift entire display left	0x18	24
12	Shift entire display right	0x1C	30
13	Move cursor left by one character	0x10	16
14	Move cursor right by one character	0x14	20
15	Clear Display (also clear DDRAMcontent)	0x01	1
16	Set DDRAM address or cursor positionon display	0x80+add*	128+add*
17	Set CGRAM address or set pointer toCGRAM location	0x40+add*	64+add**

Table 3.4 clarifies guidance registers (IR) and the information register (DR) of the LCD can be constrained by the MCU. Prior to beginning the interior activity of the LCD, control data is briefly put away into these registers to permit interfacing with different MCUs, which work at various paces, or different fringe control gadgets. The interior activity of the LCD is dictated by signals sent from the MCU. These signs, which incorporate register choice sign (RS), read/compose signal (RW), and the information transport (DB0 to DB7), make up the LCD guidelines.

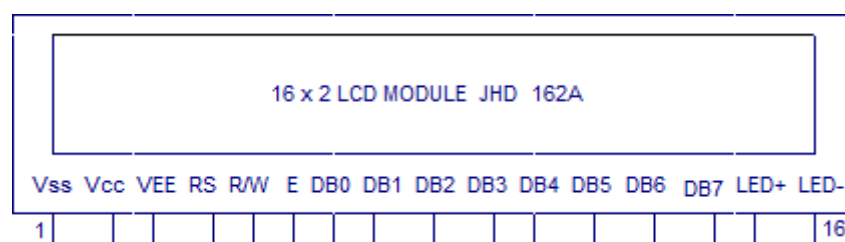


Fig 3.3 Pin Diagram of LCD

The Figure 3.3 clarifies pin chart of LCD it is normally used found in the market today are 1 Line, 2 Line or 4 Line LCDs which have just 1 controller and support all things considered of 80 characters, though LCDs supporting more than 80 characters utilize 2 HD44780 regulators.

There are four categories of instructions that:

- ❑ Designate LCD functions, such as display format, data length, etc.
- ❑ Set internal RAM addresses.
- ❑ Perform data transfer with internal
- ❑ RAM Perform miscellaneous functions

Although looking at the table that can make it own commands and test them. Below is a brief list of useful commands which are used frequently while working on the LCD.

The LCD standard requires 3 control lines and 8 I/O lines for the data bus.

- 8 data pins D7:D0
 - Bi-directional data/command pins.
 - Alphanumeric characters are sent in ASCII format.
- RS: Register Select
 - RS = 0 -> Command Register is selected
 - RS = 1 -> Data Register is selected
- R/W: Read or Write
 - 0 -> Write, 1 -> Read
- E: Enable (Latch data)

The '8' data lines are connected to PORT 1 of 8051 microcontroller. The three control lines (RS, RW and EN) are connected to PORT 3.5, 3.6 and 3.7 respectively.

FEATURES OF EXISTING SYSTEM

- Use of Human effort for the control of door movement.
- Dam maintenance and level measurements done by manually.
- The disadvantage is that the measurements are done periodically. Hence data may not be helpful at all times.
- Human Intervention needed to convey information for higher authorities.

Drawbacks of Existing System

- Manual power is required.
- Human imprudent may influence the checking
- It causes calamity.
- Cost effective instruments are utilized in proposed framework
- A trash channel is likewise utilized in the proposed model to shield the dam gate from unwanted channel trash.

CHAPTER 4

PROPOSED METHODOLOGY

This chapter deals with the advance use of proposed components like IOT, GSM module and APR voice module.

4.1 INTRODUCTION TO PROPOSED METHODOLOGY

In this proposed approach, a modified dam water level sensor and controller structure are used. In this technique, the system uses sensors to recognize the water level and thereafter opens the dam entrance as shown by the water level. The structure uses different water level sensors hence. The sensors are mounted at three unmistakable levels to check the water levels and give signals properly. Right when the water shows up at the main sensor it is distinguished by it and all the dam entrances are closed. Exactly when the water shows up at the second sensor it offers a hint to the microcontroller and it opens one dam entryway. At the point when the water level shows up at the third sensor, it hails the microcontroller and the microcontroller then signals the motor to run, which is appeared as opening all the dam doorways. A LCD mount is used to show the information that is being dealt with. A GSM module is used to send information to the higher experts so fundamental prudent steps are taken. A ringer is used to alert people nearby to make care about going to a safer spot. As such, the proposed structure thinks about customized dam entrance opening subject to water level identifying.

4.2 WATER LEVEL SENSOR

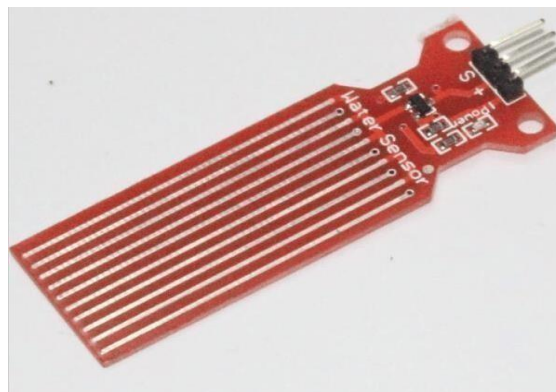


Fig4.1 water level sensor

Specifications

Fig 4.1 shows the water level sensor is provided to 5V or 3.3V on VCC and GND pins. The pin S will give us a simple worth among VCC and GND. Thus, can use the S pin as simple info associating Arduino, the worth read will be higher depending on the sensor surface is covered with water. This is on the grounds that the water goes about as a conductor, given that the water can be use in stores not be unadulterated water (H₂O), since if water is nonconductive. However, infrequently will utilize this sort of sensors to quantify the water level in a tank of unadulterated water.

Table 4.1 Water level sensor parameters

Power supply	3,3V ~ 5V
Current	< 20Ma
Humidity sensitivity range	10% ~ 90%
Pinout	+: VCC -: GND S: Analog output

Table 4.1 describes about the parameters of water level sensors it should be power supply, current, humidity and pinout.

Uses and Advantages

To utilize it as level finder in a store need to introduce the sensor within the tank at the level where to control the water level. The sensor should be situated so that equal lines are opposite to the sensor water level. The pin S will give us a more noteworthy worth as the sensor is drenched.

Use As Rain Detector

To distinguish whether it is coming down with this sensor need to situate it on a level plane so that downpour falling on the sensor, as raindrops fall on the sensor film of water on a superficial level will be shaped by expanding the estimation of the pin.

4.3 INTERNET OF THINGS

In this proposed approach, an altered dam water level sensor and regulator framework are utilized. In this method, the framework utilizes sensors to recognize the water level and therefore opens the dam entrance as shown by the water level. The construction utilizes distinctive water level sensors consequently. The sensors are mounted at three specific levels to check the water levels and give flags fittingly. Precisely when the water appears at the key sensor it is recognized by it and all the dam entryways are shut. Precisely when the water appears at the second sensor it offers a clue to the microcontroller and it opens one dam entrance. Exactly when the water level appears at the third sensor, it hails the microcontroller and the microcontroller then signals the engine to run, which is showed up as opening all the dam entryways. A LCD mount is utilized to show the data that is being managed. A GSM module is utilized to send data to the higher specialists so major cautious advances are taken. A ringer is utilized to caution individuals close by to make care about going to a more secure spot. Along these lines, the proposed framework considers adjusted dam entrance opening dependent on water level distinguishing.

Infrastructure

The Internet of Things will end up being significant for the surface of ordinary everyday presence. It will end up being significant for as a rule establishment particularly like water, power, telephone, TV and most actually the Internet. In spite of the fact that the current Internet routinely interfaces full-scale PCs, the Internet of Things (as an element of the Future Internet) will connect customary articles with a strong coordination into the real world.

Plug and Play Integration

On the off chance that take a gander at IoT-related innovation accessible today, there is a tremendous heterogeneity. It is normally conveyed for quite certain reasons and the design requires critical specialized information and might be lumbering. To accomplish a genuine Internet Of Things need to move away from such limited scope, vertical application storehouses, towards an even framework on which an assortment of uses can run at the same time.

Infrastructure Functionality

The framework needs to help applications in discovering the things required. An application may run anyplace, remembering for the things themselves. Finding things isn't restricted to the beginning up season of an application. Programmed adaptation is required at whatever point significant new things become accessible, things become inaccessible or the situation with things changes. The framework needs to help the observing of such changes and the variation that is needed because of the change.

Physical Location and position

As the Internet of Things is unequivocally established in the actual world, the thought of actual area and position is vital, particularly for discovering things, yet in addition for inferring information. Along these lines, the foundation needs to help discovering things as indicated by the area (for example geo-area based revelation). Considering portability, limitation advancements will assume a significant part for the Internet of Things and may get installed into the framework of the Internet of Things.

Security and Privacy

Moreover, a framework needs to offer help for security and protection capacities including distinguishing proof, privacy, honesty, non-renouncement validation and approval. Here the heterogeneity and the requirement for interoperability among various ICT frameworks sent in the foundation and the asset restrictions of IOT gadgets (e.g., Nano sensors) must be considered.

Data Management

Data management is a crucial aspect of the Internet of Things. When considering a world of objects interconnected and constantly exchanging all types of information, the volume of the generated data and the processes involved in the handling of those data become critical. A long-term opportunity for wireless communications chipmakers is the rise of Machine-to-Machine (M2M) computing, which one of the enabling technologies for the Internet of Things. This technology spans abroad range of applications. While there is consensus that M2M is a promising pocket of growth, analyst estimates on the size of the opportunity diverge by a factor of four Conservative estimates assume roughly 80 million to 90 million M2M units will be sold in 2014, whereas more optimistic projections forecast sales of 300 million units.

Compact MP3 players and stopping automations for vehicles, it is accepted that unit deals in M2M could ascend by as much as a factor of ten throughout the following five years. There are numerous advancements and elements engaged with "information the executives" inside the IoT setting. The absolute most important ideas which empower us to comprehend the difficulties and chances of information the executives are Semantic Sensor Networking.

- Virtual Sensors.
- Big Data.
- Data Collecting and Analysis.
- Complex Event Processing. Data Collecting and Analysis.

Applications Areas

Preposterous a few years, the headway of business areas and applications, and in like manner their monetary potential and their impact in keeping an eye on social examples and challenges for the accompanying numerous years has changed radically. Social examples are collected as prosperity and wellbeing, transport and movability, security and prosperity, energy and environment, correspondence, and e-society, these examples set out basic open entryways in the business areas of client equipment, auto contraptions, clinical applications, correspondence, etc The applications here advantage directly from the More-Moore and More-than-Moore semiconductor progresses, correspondences, associations, and programming improvement.

4.4 ESP-12E BASED NODEMCU

ESP-12E Wi-Fi module is made by Ai-plan Team. Focus processor ESP8266 in more unobtrusive sizes of the module typifies Tensilica L106 fuses industry-driving very low-power 32-bit MCU smaller than expected, with the 16-digit short mode, Clock speed support 80 MHz, 160 MHz, maintains the RTOS, facilitated Wi-Fi MAC/BB/RF/PA/LNA, on-board accepting wire.. Customers can use the add modules to a current contraption frameworks organization or building an alternate association controller. ESP8266 is high blend distant SOCs, proposed for space and power constrained compact stage originators. It gives unfathomable ability to embed Wi-Fi capacities inside various systems or to fill in as an autonomous application, with the less costs.

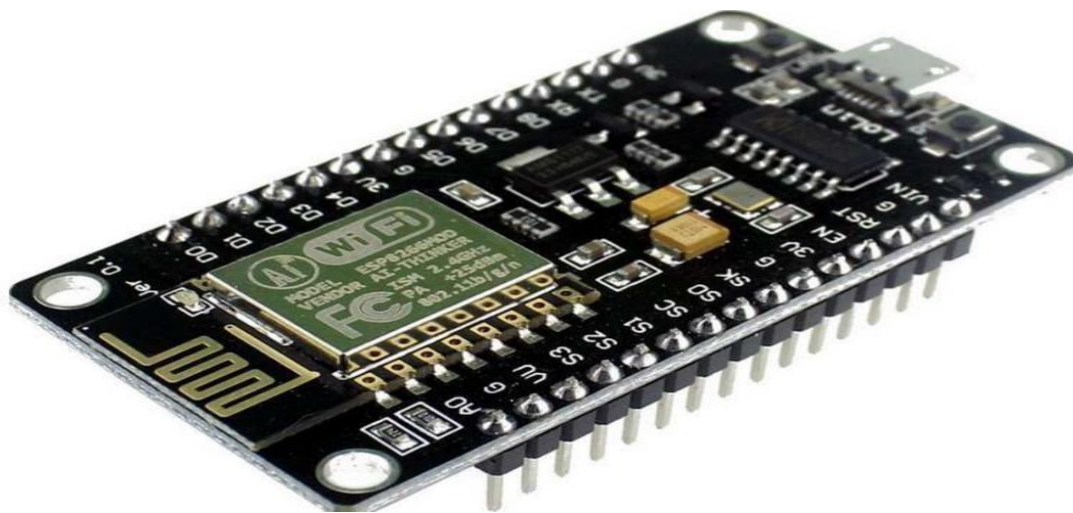


Fig 4.2 ESP-12E

Fig 4.2 explains the ESP8266 is the name of a small controller arranged . The ESP8266 itself is an autonomous Wi-Fi sorting out game plan offering as a platform from existing small controller to Wi-Fi and is also prepared for running free applications. This module goes with a certain USB connector and a rich assortment of pin-outs. With a smaller than normal USB interface, can relate Node MCU devkit to PC and burst it with no trouble, really like Arduino. It is furthermore rapidly breadboard very much arranged.



Fig 4.3 ESP-12E offers an aggregate and free Wi-Fi coordinating plan; it will in general be used to have the application or to offload Wi-Fi arranging limits from another application processor. Exactly when ESP8266EX has the application, it boots up directly from an external streak. In has facilitated save to improve the display of the structure in such applications. On the other hand, filling in as a Wi-Fi connector, far off web access can be added to any smaller than normal controller based arrangement with clear accessibility (SPI/SDIO or I2C/UART interface). ESP8266EX is among the most joined Wi-Fi chip in the business; it organizes the radio wire switches, RF balun, power intensifier, low clatter get enhancer, channels, power the chiefs' modules, it requires unimportant external equipment, and the entire course of action, including front-end module, is proposed to include immaterial PCB region.

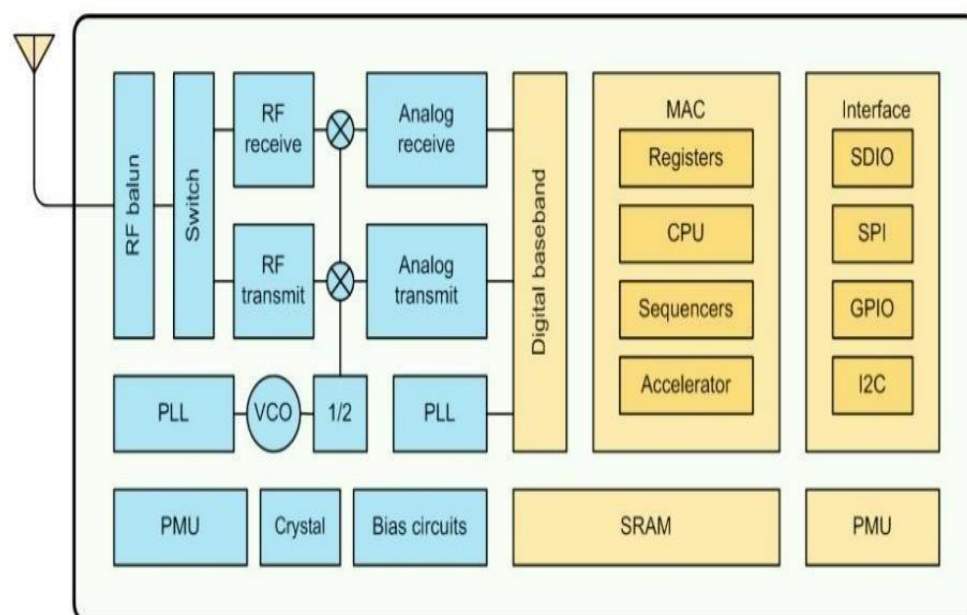


Fig4.4 ESP-12E Architecture

The Fig 4.4 ESP-12E additionally coordinates an upgraded variant of Ten silica's L106 Diamond arrangement 32-cycle processor, with on-chip SRAM, other than the Wi-Fi functionalities. ESP8266EX is frequently incorporated with outside sensors and other application explicit gadgets through its GPIOs; codes for such applications are given in models in the SDK. Express if Systems' Smart Connectivity Platform (ESCP) shows refined framework level highlights incorporate quick rest/wake setting for the

energy-efficient VoIP, adaptive radio biasing. For low-power operation, advance signal processing, and spur cancellation and radio co-existence features for common cellular, Bluetooth, DDR, LVDS, LCD interference mitigation.

Features

- 802.11 b/g/n
- Integrated low power 32-bit MCU
- Integrated 10-bit ADC
- Integrated TCP/IP protocol stack
- Integrated TR switch, balun, LNA, power amplifier and matching network
- Supports antenna diversity
- Wi-Fi 2.4 GHz, support WPA/WPA2
- Support STA/AP/STA+AP operation modes
- Support Smart Link Function for both Android and iOS devices
- SDIO 2.0, (H) SPI, UART, I2C, I2S, IRDA, PWM, GPIO
- STBC, 1x1 MIMO, 2x1 MIMO
- A-MPDU & A-MSDU aggregation and 0.4s guard interval
- Deep sleep power < 5uA
- Wake up and transmit packets in < 2ms
- Standby power consumption of < 1.0mW (DTIM3)
- +20dBm output power in 802.11b mode
- Operating temperature range -40C ~ 125C

Functional Description

MCU - ESP8266EX is introduced with silica L106 32-digit microcontroller (MCU), which incorporates extra-low power use and 16-cycle RSIC. The CPU clock speed is 80MHz. It can moreover show up at a biggest assessment of 160MHz. ESP8266EX is much of the time consolidated with outside sensors and other unequivocal contraptions through its GPIOs; codes for such applications are given in models in the SDK.

Memory Organization

Inside SRAM and ROM. ESP8266EX Wi-Fi SoC is installed with a memory regulator, including SRAM and ROM. MCU can visit the memory units through us, dBus, and AHB interfaces. All memory units can be visited upon demand, while a memory authority will choose the running grouping as indicated by when these solicitations are gotten by the processor. As indicated by the current adaptation of SDK gave, SRAM space that is accessible to clients is appointed as beneath:

RAM size < 36kB, that is to say, when ESP8266EX is working under the station mode and is connected to the router, programmable space accessible to the user in heap and data section is around 36kB. There is no programmable ROM in the SoC, therefore, the user program must be stored in an external SPI flash.

External SPI Flash

This module is mounted with a 4 MB outer SPI glimmer to store client programs. On the off chance that larger definable extra room is required, a SPI streak with a bigger memory size is liked. Hypothetically talking, up to 16 MB memory limit can be upheld. Proposed SPI Flash memory limit:

- OTA is disabled: the minimum flash memory that can be supported is 512 kB;
- OTA is enabled: the minimum flash memory that can be supported is 1 MB. Several SPI modes can be supported, including Standard SPI, Dual SPI, and Quad SPI.

Crystal

At this moment, the repeat of jewel oscillators maintained fuses 40MHz, 26MHz, and 24MHz. The exactness of the valuable stone oscillators applied should be $\pm 10\text{PPM}$, and the functioning temperature reach should be between -20°C and 85°C . While using the downloading gadgets, mercifully make a point to pick the right valuable stone oscillator type. In-circuit plan, capacitors 'C1' and 'C2', which are related with the earth, are added to the information and yield terminals of the diamond oscillator separately. The assessments of the two capacitors can be versatile, going from 6pF to 22pF, in any case, the specific capacitive assessments of C1 and C2 depend upon extra testing and change on the overall execution of the whole circuit. Commonly, the capacitive assessments of 'C1' and 'C2' are inside '10pF' if the valuable stone oscillator repeat is 26MHz, while the assessments of 'C1' and 'C2' are 10pF.

NODEMCU GPIO For LUA

The GPIO(General Purpose Input/Output) licenses us to induction to pins of ESP8266, all of the pins of ESP8266 got to using the request GPIO, all the passageway relies upon the I/O document number on the Node MCU dev packs, not within GPIO pin, for example, the pin 'D7' on the Node MCU dev unit is intended to the internal GPIO pin 13, if they need to turn 'High' or 'Low' that particular pin to need to call the pin number '7', not the internal GPIO of the pin. When programming with ordinary ESP8266 this confusion will arise, which pin ought to be called during programming, if they are using Node MCU devkit, it has come organized working with Lua interpreter which can without a doubt program by looking at the pin names related with the Lua board. If they are using a traditional ESP8266 contraption or some other merchant sheets sympathetically imply the table underneath to know which IO record is connected with the inside GPIO of ESP8266. D0 or GPIO16 can be used particularly as a scrutinize and make pin, the same decisions like PWM/I2C are maintained by this pin. The model in gleaming the blue LED, the blue LED is related with GPIO2, which is described as Pin4 (D4) in Lua content.

Single-Chip USB-To-UART Bridge

The CP2102/9 is a highly-integrated USB-to-UART Bridge Controller providing a simple solution for updating RS232 designs to USB using a minimum of components

and PCB space. The CP2102/9 consolidates a USB 2.0 max choke work controller, USB handset, oscillator, EEPROM or EPROM, and strange serial data transport (UART) with full modem control signals in an insignificant 5 x 5 mm QFN-28 group. No other external USB sections are required. The on-chip programmable ROM may be used to adjust the USB Vendor ID, Product ID, Product Description String, Power Descriptor, Device Release Number, and Device Serial Number as needed for OEM applications. The programmable ROM is changed on-board through the USB, allowing the programming step to be helpfully fused into the thing amassing and testing measure. Distinction free Virtual COM Port (VCP) contraption drivers given by Silicon Laboratories license a CP2102/9-based thing to show up as a COM port to PC applications. The CP2102/9 UART interface does all RS-232signals, including control and handshaking signals, so existing system firmware shouldn't be changed. In many existing RS-232 plans, all things needed to update the plan from RS-232 to USB is to supersede the RS232 level-mediator with the CP2102/9. Direct access driver support is open through the Silicon Laboratories USB Xpress driver set.

4.5 SERVO MOTOR

The Servomotors are not a particular class of engine albeit the terms Servomotor is regularly used to allude to an engine reasonable for use in a shut circle control system. The engine is matched with some sort of encoder to give position and speed feedback. In the easiest case, just the position is estimated. The deliberate position of the yield is contrasted with the order position, the outer contribution to the regulator.

On the off chance that the yield position contrasts from that required, a blunder signal is created which at that point makes the engine pivot one or the other way, depending on the situation to bring the output shaft to the proper position. As the positions approach, the blunder signal decreases to nothing, and the engine stops. A servomotor is a shut circle servomechanism that utilizes position criticism to control its movement and last position. The contribution to its control is some sign, either analog advanced, addressing the position instructed for the yield shaft.



Fig 4.5 Servo Motor

Fig 4.5 clarifies that servomotor is a rotational actuator or direct actuator that takes into consideration exact control of precise or straight position, speed and speed increase. It comprises of a reasonable engine coupled to a sensor for position criticism. It likewise requires a generally refined regulator, regularly a committed module planned explicitly for use with servomotors.

Features

- ☐ Supply voltage: 5VDC
- ☐ Control signal: Analog or Digital
- ☐ High-precision positioning.

Applications

- ☐ Conveyors
- ☐ Solar Tracking System
- ☐ Antenna Positioning
- ☐ Camera Auto Focus
- ☐ It is used to measure the speed of the output shaft.

4.6 GSM MODEM

Fig 4.6 explains the GSM modem is a far off modem that works with a GSM distant association. A far off modem acts like a dial-up modem. The rule contrast between them is that a dial-up modem sends and sorts data through an out-telephone line while a distant modem sends and gets data through radio waves. The working of the GSM modem relies upon orders, the orders reliably start with AT (which infers Attention) and complete a <CR> character. For example, the dialing request is ATD<number>; ATD3314629080; here the dialing request closes with a semicolon.

The AT orders are given to the GSM modem with the assistance of a PC or regulator. The GSM modem is sequentially interfaced with the regulator with the assistance of MAX 232. Here max 232 goes about as a driver which changes over TTL levels to the RS 232 levels. For sequential interface, the GSM modem requires the sign dependent on RS 232 levels. The T1_OUT and R1_IN pin of MAX 232 is associated with the TX and RX pin of the GSM modem

SYSTEM BLOCK DIAGRAM

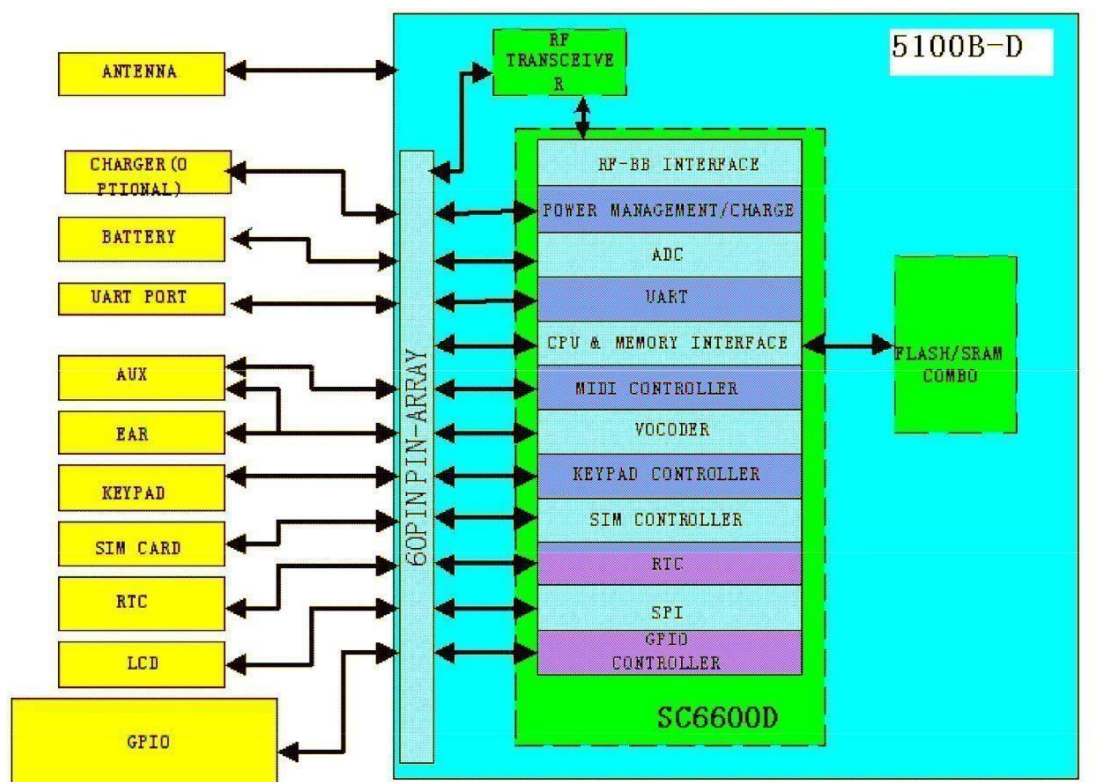


Fig 4.7 GSM Block Diagram

The Fig 4.7 shows the block diagram of GSM network along with added elements for transmission of signals between MS and BSS.

Product Overview

Table 4.2 GSM Product Overview

Temperature range	Normal range: -10°C to +55°C (full compliant) Storage: -40°C to +85°C
Weight	< 9g
Physical dimensions	35.0X39.0X2.9 mm (typical)
Connection	60 pins
Power supply	VBAT: 3.3V to 4.2V range, 3.6V typical.

From the table 4.2 provides the information of temperature range, weight, physical dimensions, connections and power supply of GSM module.

Functional Description

The functional description of GSM module is to establish communication between computer and GSM system.

RF Functionalities OF GSM

The RF part of this module converts RF signals to baseband for receiver chain and translates base band signals into RF frequency spectrum.

The operating frequencies are:

Rx (EGSM 850): 869 to 894MHz

Tx (EGSM 850): 824 to 849MHz

Rx (EGSM 900): 925 to 960MHz

Tx (EGSM 900): 880 to 915MHz

Rx (DCS 1800): 1805 to 1880MHz

Tx (DCS 1800): 1710 to 1785MHz

Rx (PCS 1900): 1930 to 1990MHz

Tx (PCS 1900): 1850 to 1910MHz

Baseband Functionalities

The baseband some portion of SM5210 is made out of a SPREADTRUM's SC6600D chip. This chipset is utilizing 0.18 μ m contradicting message CMOS innovation which allows gigantic joining just as low force utilization. SC6600D gives single-chip answer for remote Quad-band phone handsets and information modems affirming to the EGSM 900, GSM 850, DCS 1800 and PCS 1900.

Memory Functionalities

The memory used in this module is a combination of 32-megabit (2m x 16- bit) CMOS 3.0v volt-only, simultaneous operation flash memory and 4 megabit (256k x 16-bit) static ram.

Interface and Functionalities

GSM modem is used as an interface between the central server and GSM network. It acts as data terminal equipment that combines traditional modem and GSM wireless mobile communication system.

Power Supply

The force supply is one of the main points of contention in the planning GSM terminals. Due to the 577us radio burst outflow in GSM each 4.615ms, power supply should have the option to convey high current tops in a brief timeframe. During these pinnacles, waves and drops on the inventory voltage should not surpass a specific breaking point.

Table 4.3 VBAT Pin Description

	Pin number	VMIN	VNOM	VMAX	Ripple max
VBAT (V)	1,3,5,7	3.3V (*)	3.6V	4.2V (**)	50mVPPfor freq<200KHZ 2mVPP for freq>200KHZ

From the table 4.3 shows that (*): This value has to be guaranteed during the burst (with 2.0A Peak in GSM or GPRS mode). (**): max operation Voltage Stationary Wave Ratio. When supplying the module with a battery, the total impedance (battery + protections + PCBS) should be less than 150mOhms.

Table 4.4 GND Pin Description

	Pin number	Description
GND	9,11,13,15,17	Ground
	Shielding can install pin(*)	

In the table 4.4 can be seen that the ground pin numbers of the GSM modem. That the given numbers are indicate the grounded pins of GSM.

Power Consumption

The power consumption of GSM is nearly '1' microampere to '480' mA. The asset tracker wait for an event all time. The 480 mA get by GPRS class 10 in GSM power level.

Table 4.5 Power consumption in OFF mode

Mode	Condition	Condition	I(Max)
Off mode	Off	50 uA	100uA

In the table 4.5 indicates the power consumption of GSM modem when it is in off mode. It the current value in typical and maximum position.

Table 4.6 Power consumption in ON mode

Mode	Condition	I(Typical)	I(Max)
GSM850/900mode	During TX bursts @PCL5*	1.6 A	2 A
GSM850/900 mode	During RX bursts	100 mA	130 mA
GSM850/900 mode	Average @PCL5*	350 mA	400 mA
GSM850/900 mode	Average @PCL8*	250 mA	300 mA
GSM850/900 mode	Average idle mode	13 mA	20 mA

From the table 4.6 shows the force utilization of GSM in off mode. The GSM modem are exists in various modular numbers and conditions each has it regular and most extreme current qualities. (*): PCL: Power control level PCL5: 2W discharge mentioned(maxpower)PCL8:0.5W emanation mentioned.

4.7 APR 9600 VOICE IC

The APR9600 is a negligible exertion world class sound record/replay IC intertwining a blast basic storing strategy. The recorded sound is held even after the power supply is dispensed with from the module. The replayed sound presentations top type with a low upheaval level. The testing rate momentarily recording period is 4.2 kHz that gives a sound record/replay bandwidth of 20Hz to 2.1 kHz. Regardless, by changing an influencing resistor, a looking at rate extremely high cultivated. This truncates the outright length of sound account to 32 seconds.

Hard and fast solid account time can be moved from 32 seconds to 60 seconds by changing the assessment of a lone resistor. The IC can work in one of two modes: consecutive mode and equivalent mode. In successive access mode, sound can be recorded in 256 regions. In equivalent access mode, sound can be recorded in 2, 4, or 8 portions. The IC can be controlled fundamentally using press button keys. It is also possible to control the IC using external progressed equipment like little controllers and PCs.

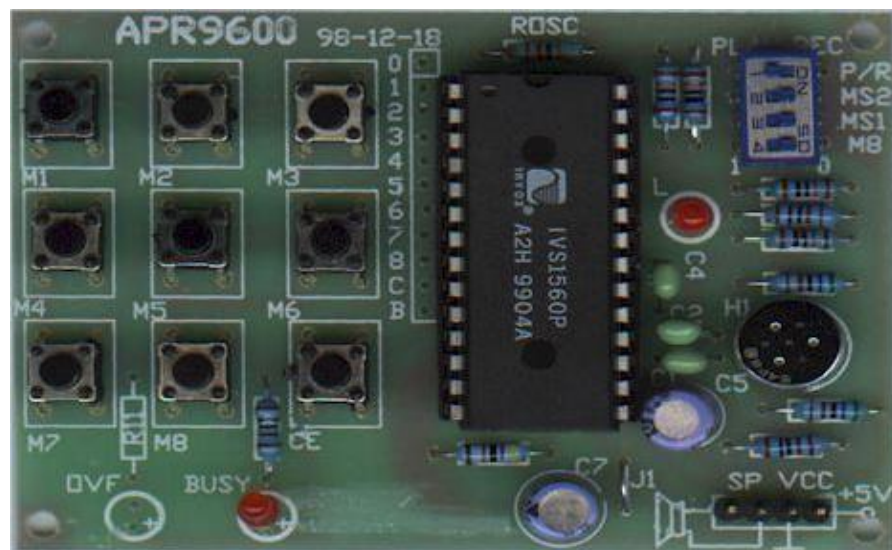


Fig 4.8 APR9600 Experimental board

From the Fig 4.8 explains that APR9600 has a 28 pin DIP package. Supply voltage is between 4.5V to 6.5V. During recording and replaying, current consumption is 25mA

Out of gear mode, the current drops to 1 mA. The APR9600 trial board is a gathered PCB board comprising of an APR9600 IC, an electrets microphone, support parts and essential changes to permit clients to investigate all elements of the APR9600 chip. The swaying resistor is picked so the all out recording period is 60 seconds with an inspecting pace of 4.2 kHz. The board estimates 80mm by 55mm.

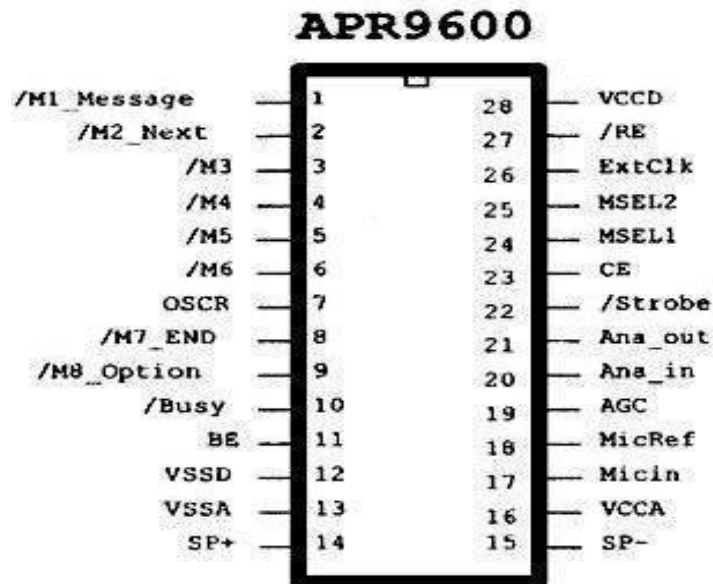


Figure 4.9 Pin Diagram of APR9600

The Fig 4.9 shows the pin diagram of APR9600 voice module. It is 28 pin device used to record and playback maximum of 8 messages.

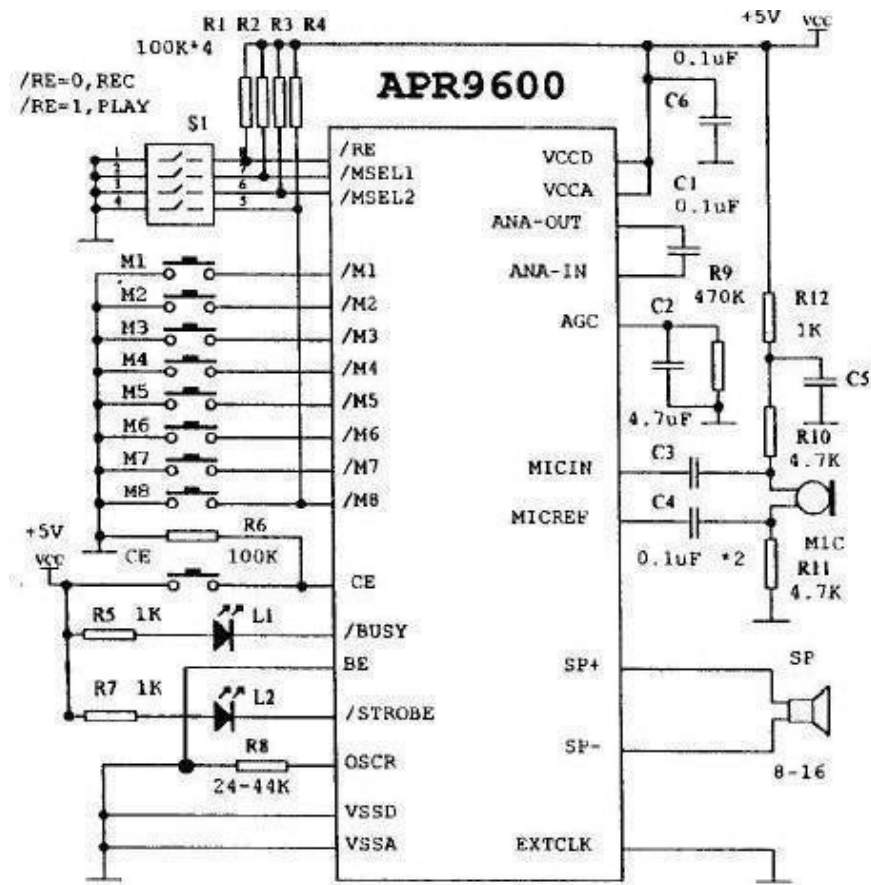


Fig. 4.10 Typical connections of the APR9600

Fig 4.10 shows the circuit chart of the APR9600 module. The module comprises of an APR9600 chip, an electrets receiver, support parts, a mode determination switch (-RE, MSEL1, MSEL2, and -M8), and 9 keys(-M1 as well -M8 and CE). The swaying resistor is picked so the absolute account period is 60 seconds with an inspecting pace of 4.2 kHz. Clients can change the estimation of the ROSC to get other testing frequencies. It ought to be noticed that if the sampling rate is expanded, the length of recording time is diminished. An '8-16' Ohm speaker is to be utilized with the module. Clients can choose various modes utilizing the mode choice switch. The module is estimated 80mm'55mm. Association focuses ('0-8', 'C', and 'B') can interface with different switches or outer computerized circuits.

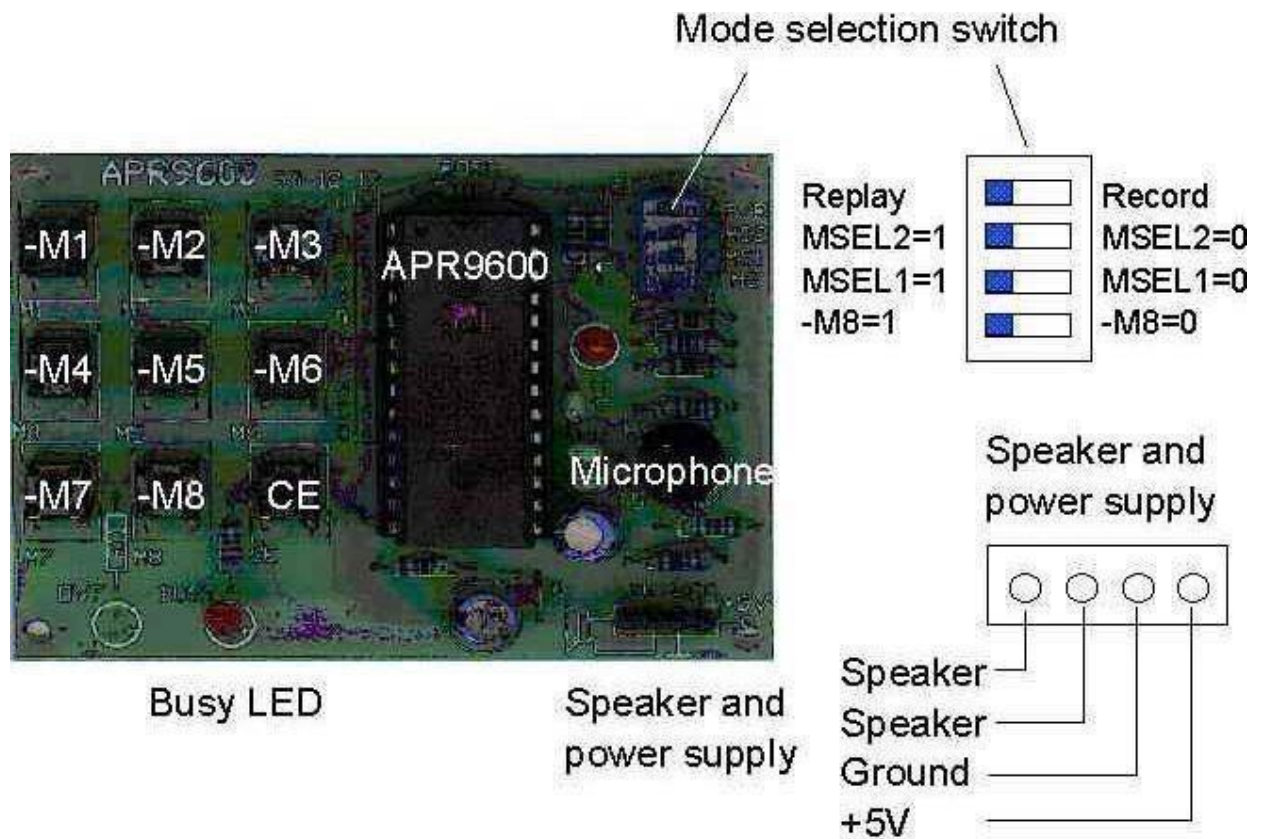


Fig. 4.11 APR9600 module with connector details

The Fig 4.11 clarifies the working of APR9600 module. To record in equal mode, the switch setting ought to be same as shown previously. To record, the top switch ought to be on the right-hand side. To replay, the top switch ought to be on the left.

Tips for better sound replay quality

1. Use a good quality 8 Ohm speaker with a cavity such as speakers for computer sound systems. Do not use a bare speaker which gives the degraded sound.
2. For better sound replay quality, speak with a distance to the on-board microphone and speak clearly. Also keep the background noise as low as possible.
3. For even better sound replay quality, use microphone input or Audio Line In input. If Audio Line In is used, the amplitude of input signal should be < 100 mV p-p.

4.8 SOFTWARE REQUIREMENTS

- 1 Embedded C
- 2 Arduino IDE

Arduino Ide

The Arduino/Genuino Uno can be modified with the (Arduino Software (IDE)). Select "Arduino/Genuino Uno from the Tools > Board menu (as per the microcontroller on the board). The ATmega328 on the Arduino/Genuino Uno comes preprogramed with a bootloader that permits to transfer new code to it without the utilization of an outside equipment software engineer. It conveys utilizing the first STK500 convention (reference, C header records). It can likewise sidestep the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header utilizing Arduino ISP or comparable; see these directions for subtleties. The ATmega16U2 (or 8U2 in the rev1 and rev2 sheets) firmware source code is accessible in the Arduino vault. The ATmega16U2/8U2 is stacked with aDFU bootloader, which can be initiated by.

On Rev1 sheets: associating the weld jumper on the rear of the board (near the guide of Italy) and afterward resealing the 8U2. On Rev2 or later sheets: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it simpler to place into DFU mode. It can utilize Atmel's FLIP programming (Windows) or the DFU developer (Mac OS X and Linux) to stack another firmware. Or on the other hand can utilize the ISP header with an external programmer (overwriting the DFU bootloader).

Drawbacks Of APR9600 Module

The Arduino/Genuino Uno has resettable poly wires that shield the PC's USB ports from shorts and overcurrent. Albeit most PCs give their own inside assurance, the wire gives an additional layer of insurance. On the off chance that in excess of 500 mA is applied to the USB port, the wire will consequently break the association until the short or over-burden is eliminated.

Differences with other boards

The Uno contrasts from all former sheets in that it doesn't utilize the FTDI USB-to-chronic driver chip. All things being equal, it includes the Atmega16U2 (Atmega8U2 up to rendition R2) modified as a USB-to-chronic converter.

Embedded C

Implanted C is a bunch of language expansions for the C Programming language by the C Standards board of trustees to address shared trait gives that exist between C augmentations for various inserted frameworks. Verifiably, implanted C programming requires nonstandard expansions to the C language to support exotic highlights, for example, fixed-point number juggling, numerous unmistakable memory banks, and essential I/O activities.

In 2008, the C Standards Committee stretched out the C language to address these issues by giving a typical norm to all executions to hold fast to. It incorporates various highlights not accessible in typical C, for example, fixed-point number-crunching, named address spaces, and fundamental I/O equipment tending embedded.

Embedded C uses most of the syntax and semantics of standard C, e.g., `main()` function, variable definition, datatype declaration, conditional statements (if, switch case), loops (while, for), functions, arrays and strings, structures and union, bit operations, macros, etc.

Advantages

- ❑ It is small and simpler to learn, understand, program and debug.
- ❑ Compared to assembly language, C code written is more reliable and scalable, more portable between different platforms.
- ❑ C compilers are available for almost all embedded devices in use today, and there is a large pool of experienced C programmers.
- ❑ Unlike assembly, C has advantage of processor-independence and is not specific to any particular microprocessor/microcontroller or any system. This makes it convenient for a user to develop programs that can run on most of the systems.
- ❑ As C combines functionality of assembly language and features of high-level languages, C is treated as a 'middle-level computer language' or 'high level assembly language'.
- ❑ It is fairly efficient.
- ❑ It supports access to I/O and provides ease of management of large embedded projects.
- ❑ Java is also used in many embedded systems but Java programs require the Java Virtual Machine (JVM), which consumes a lot of resources. Hence it is not used for smaller embedded devices.
- ❑ In Embedded applications there is a need to read/write data on a given address, and in C it is easy to access and modify addresses, because of the pointers which are a language feature.
- ❑ Other High-level programming languages like PASCAL, FORTRAN also provide some of the advantages.

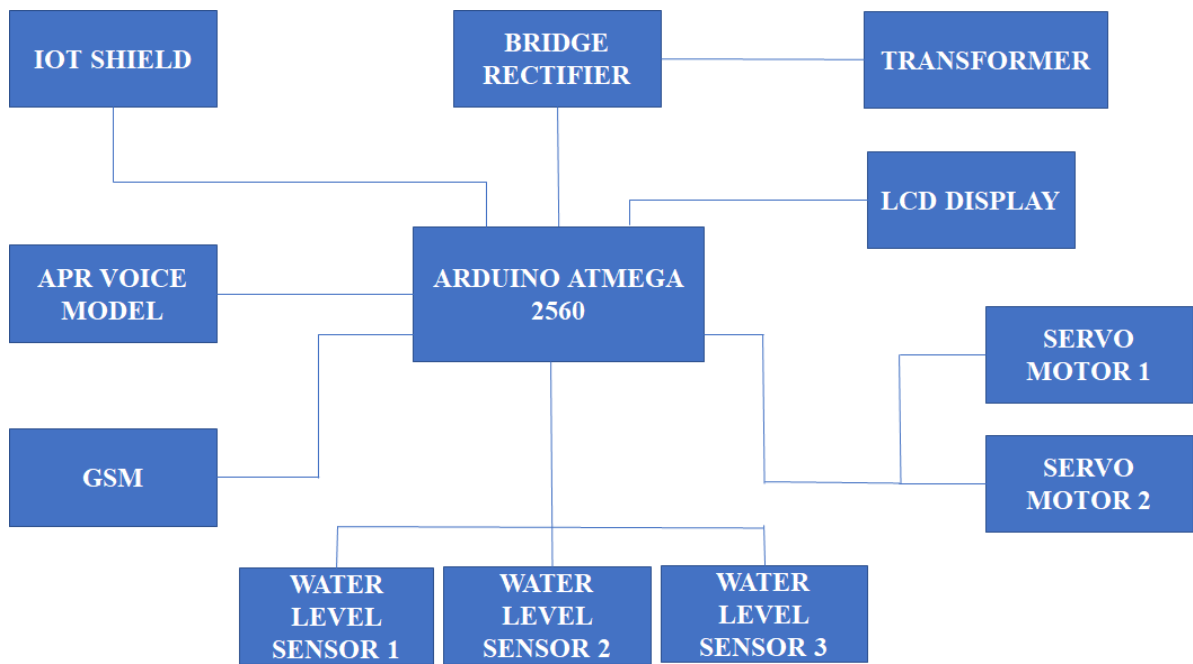


Fig 4.12 Block Diagram for the proposed system

Fig 4.12 explains about the list of components used in the project. The Bridge rectifier used to convert 5V AC supply to DC supply. The water level sensors is used to sense the water at different positions. By the LCD display can see the status of water level position. The GSM modem is used to send messages to the mobile device. IOT shield works on the basis of WEB protocol can check the status of damin mobile device at any position by connecting hotspot with IOT module. The ArduinoMega board acts as center part and connect all the devices to operate. Servo motoris used to shut up and shut down the door easily.

4.9 FEATURES AND PROPOSED SYSTEM

- ❑ Automatic Dam Doors opening using information received from the Proximity Level Sensors.
- ❑ GSM module used for sending Precaution signals.
- ❑ Buzzers are used for alarming the people in the flood prone area.
- ❑ Arduino Mega board is used for controlling activates.

Advantages of proposed system

- ☐ Death rate due to sudden opening of dam gates will be reduced.
- ☐ Large, rapid flow water can be released during high intense rains.
- ☐ Human Intervention is not needed.
- ☐ Automatic Dam door openings based on the water level obtained from the sensors.

CHAPTER 5

RESULT AND DISCUSSION

This chapter deals with the complete output and results obtained in the project. Each and every output is mentioned in below screenshots.

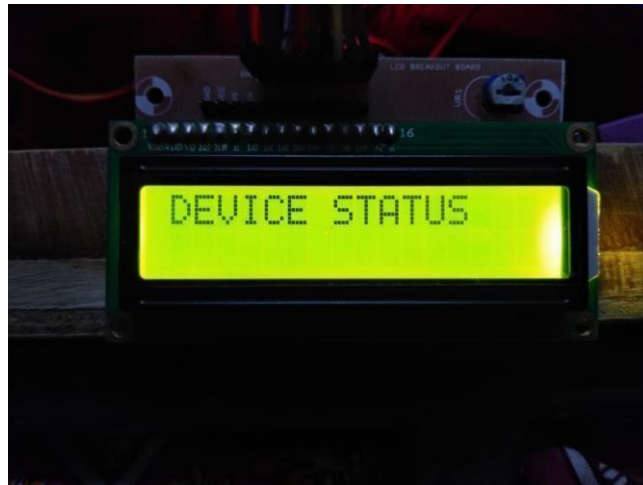


Fig 5.1 Device Status

Fig 5.1 shows the information thus processed in the Arduino can be monitored through the LCD. It knows the device status of dam at different position.



Fig 5.2 Water Level – LOW

Fig 5.2 shows that when the water level senses the lower sensor immediately the both servo motors make the dam door close. The status of the dam door can be seen in LCD display.



Fig 5.3 Water Level – MEDIUM

Fig 5.3 shows that when the water level senses the middle sensor immediately the servo motor makes the one dam door open. The status of dam door can be seen in LCD display. It means that water level is medium.



Fig 5.4 Water Level – HIGH

Fig 5.4 shows that when water level reaches the maximum position it senses the sensor at third position and makes the all doors open.



Fig 5.5 Sending SMS1 through GSM

Fig 5.5 shows through the GSM module can send the message about the position of the dam. It sends the message to particular number given in the program with in a second it sends the message to given number.



Fig 5.6 Sending SMS2 through GSM

From Fig 5.6 can be seen that it sends the message to multiple devices in which it is the multiple numbers given in the program.

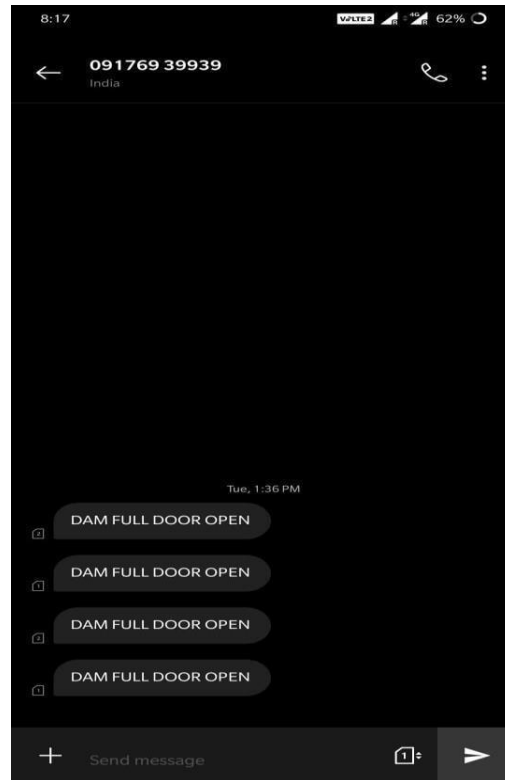


Fig 5.7 Data Reception through GSM Modem

Fig 5.7 shows that messages getting to the device about the dam door positions. It shows the accurate information of dam no need to check manually.



Fig 5.8 Data Transmission through IOT

Fig 5.8 shows that the IOT data is uploading to know the status of dam through the web portal.

LogID	DATA	DATE_TIME
1	DAM_FULL	30/1/2019 8:23:53
2	DAM_LOW	30/1/2019 8:24:37
3	DAM_MEDIUM	30/1/2019 8:41:21
4	DAM_MEDIUM	30/1/2019 8:41:33
5	DAM_MEDIUM	30/1/2019 8:41:58
6	DAM_MEDIUM	30/1/2019 8:42:11
7	DAM_FULL	30/1/2019 8:42:54
8	DAM_LOW	30/1/2019 8:44:22
9	DAM_LOW	30/1/2019 9:9:5
10	DAM_LOW	30/1/2019 9:9:20
11	DAM_MEDIUM	30/1/2019 9:9:31
12	DAM_MEDIUM	30/1/2019 9:9:45
13	DAM_FULL	30/1/2019 9:9:57
14	DAM_LOW	30/1/2019 9:10:29
16	DAM_FULL	1/1/1970 8:0:42
17	DAM_FULL	1/1/1970 8:1:7
18	DAM_MEDIUM	30/1/2019 20:8:6
19	DAM_LOW	30/1/2019 20:8:31
20	DAM_LOW	30/1/2019 20:8:57
21	DAM_LOW	30/1/2019 20:9:22
22	DAM_LOW	30/1/2019 20:9:47
23	DAM_MEDIUM	30/1/2019 20:11:35
24	DAM_MEDIUM	30/1/2019 20:12:1
25	DAM_MEDIUM	30/1/2019 20:12:26
26	DAM_LOW	30/1/2019 20:13:0
27	DAM_LOW	30/1/2019 20:13:25
28	DAM_MEDIUM	30/1/2019 20:14:3
29	DAM_FULL	30/1/2019 20:14:28
30	DAM_MEDIUM	30/1/2019 20:14:54
31	DAM_FULL	30/1/2019 20:15:19
32	DAM_MEDIUM	30/1/2019 20:15:45
33	DAM_FULL	30/1/2019 20:16:10

Fig 5.9 Data Reception through IOT

Fig 5.9 shows the complete information about the dam clearly for this an internet is required to know the water level status. This information can get in every mobile device.

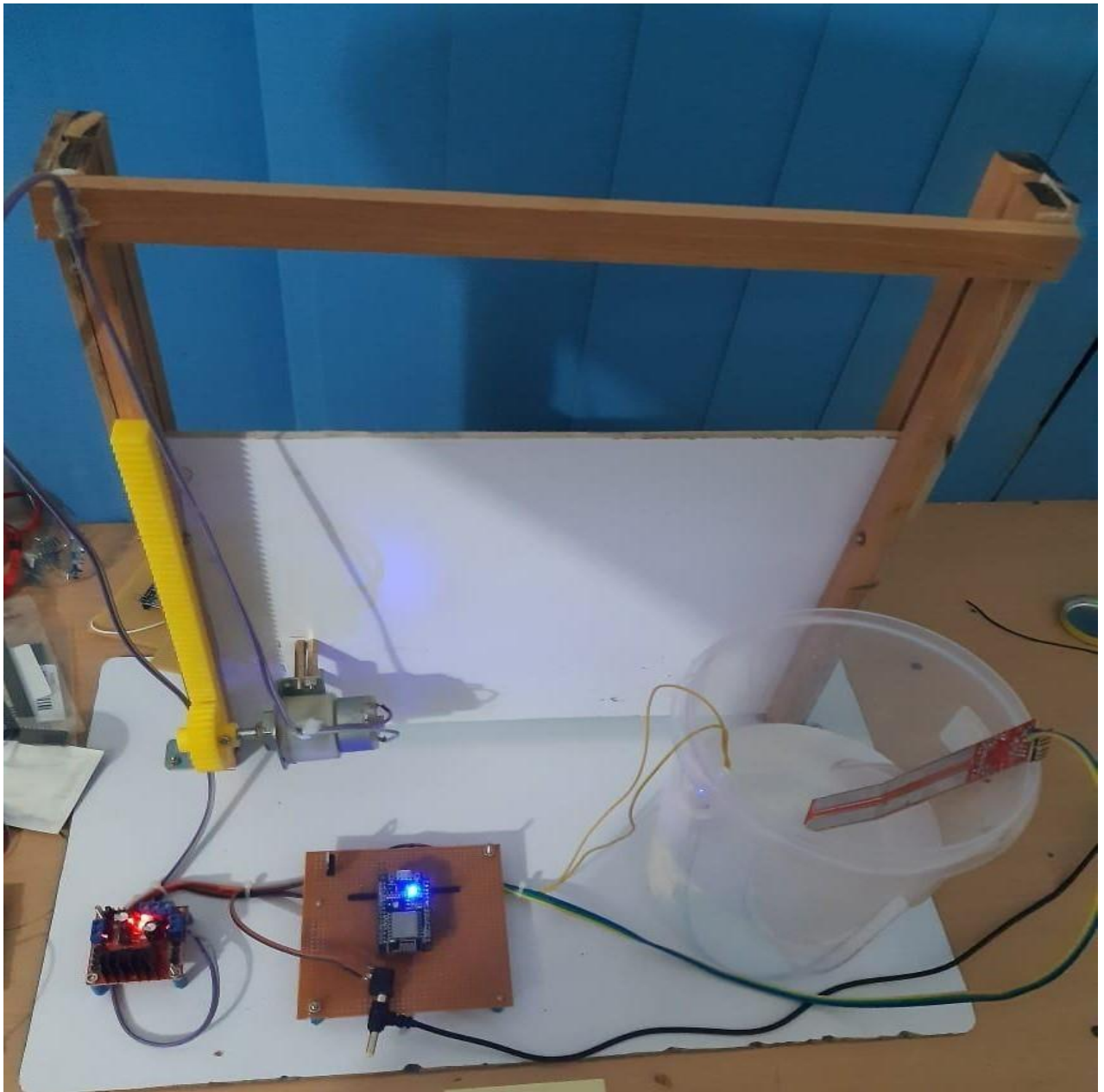


Fig 6.0 Hardware Setup

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

CONCLUSION

An epic plan for computerization of dam entryway opening dependent on water level present in the dam. This framework utilizes various water level sensors mounted at various statures. At the point when water arrives from the outset sensor it is detected by it and both the dam doors entryways gets shut. At the point when water arrives at second sensor it gives a sign to the microcontroller and it opens one dam entryway. When the water level arrives at the third sensor, it flags the microcontroller and the microcontroller then signals the engine to run, which is exhibited by opening two doors. All the data that is handled is shown through LCD mount. A GSM module is utilized to send data to the higher specialists so essential moves are made. This framework will help dam position to know the dam boundaries without checking physically by the mean of Display, SMS Notification and Web entryway. It depends on IOT. Consequently the speed of information transmission is high and likelihood of losing genuine time will be less. This framework is dependable and less expensive to introduce in each dam and a web-based interface can give itemized boundaries, all things considered. A ringer is utilized to alert individuals close by to make mindfulness about going to a more secure spot.

Future Scope

Later on, the proposed framework can be utilized to screen and examine water use of the particular water space in this way requires growing such rationale for the application. The framework can likewise be utilized to gather and study the ecological information of water source and its encompassing territory by incorporating other sensor to the framework. The investigation may incorporate area information, water quality, temperature, moistness and different components. For instance, Arduino GPS can be coordinated in the framework to get area information of water sources progressively.

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