ABSTRACT

This project is a the special kind circular display. With the help of some mechanical assembly, LED count, hardware requirement, and hence overall cost is cut to very affordable price. Also, maintenance and repairing of the display is so easy, that anyone having a little electronic knowledge, can take care of this. All the synchronizing can be implemented through software.

First of its kind, made using the 20 pin DIP AtMega 16 series microcontroller, this project use the principle of space multiplexing. This propeller display is mechanically scanned and displays the characters in digital format. Made from scrap it can be used anywhere and everywhere and the most amazing fact about this display is its crystal clear display. This display consist of 2 Bright LED's to form a outer circle and inner circle which are rotatedto form a circular ring and 7 green LED's, 8 red LED's to form a digital and analog timing respectively to represent a clock.

Conventional methods of displaying images to public are using LCD display and Dot Matrix LED board. Propeller LED display is a device that project and image or time as if the images are floating in the air. The floating image is received because of human eye limitation. Actually the floating image is emerged by synchronizing LED's blink to forman image at particular time and rate.

The programming of PIC (Peripheral interface controller) is using assembly language. This project consist two main circuit; Motor controller circuit and LED circuit.12V DC will be used to supply the power for motor controller circuit. Then the motor controller circuit willprovide power to LED circuit and DC motor. When DC motor is rotating, the floating image will appear. The synchronization of DC motor speed and LED blink cause the image visible. So the desired image such as clock, date or symbol can be programmed and displayed.

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CHAPTER 1

INTRODUCTION

1.1 MOTIVATION

As the world is evolving day by day, there are some electronic devices come into picture. Now days we are used to simple Analog or Digital clock. Let's be more attractive enough in developing a clock using led, rather than a simple Analog or digital clock. So we came forward to develop a led moving clock. It can be used in hotels and even at homes which gives us essence of richness.

1.2 PROBLEM STATEMENT

Analog or Digital clock has One dimensional LED system which can be viewed From one or two side at a time But **Propeller LED pendulum clock** has three dimensional display and has the benefit of being viewable from any direction around the system.

Analog or Digital clocks are not much attractive so to gain essence of richness and attractiveness we are developing LED moving clock.

1.3 OBJECTIVE OF PROJECT

This project is designed to display messages in a scrolling format on an alphanumeric led display.

This type of led display board circuit is available in public places like railway platforms, transport vehicles, banks, schools, hospitals, industries etc to display information.

1.4 DESIGN APPROACH

Firmware Design & Development

- Requirement Gathering
- Software Design Document
- Firmware Design and Development
- Coding

Testing

- Module Testing (Hardware modules)
- Unit & Integration testing of the software
- System Testing

CHAPTER 2

HARDWARE DESIGN

2.1 BLOCK DIAGRAM

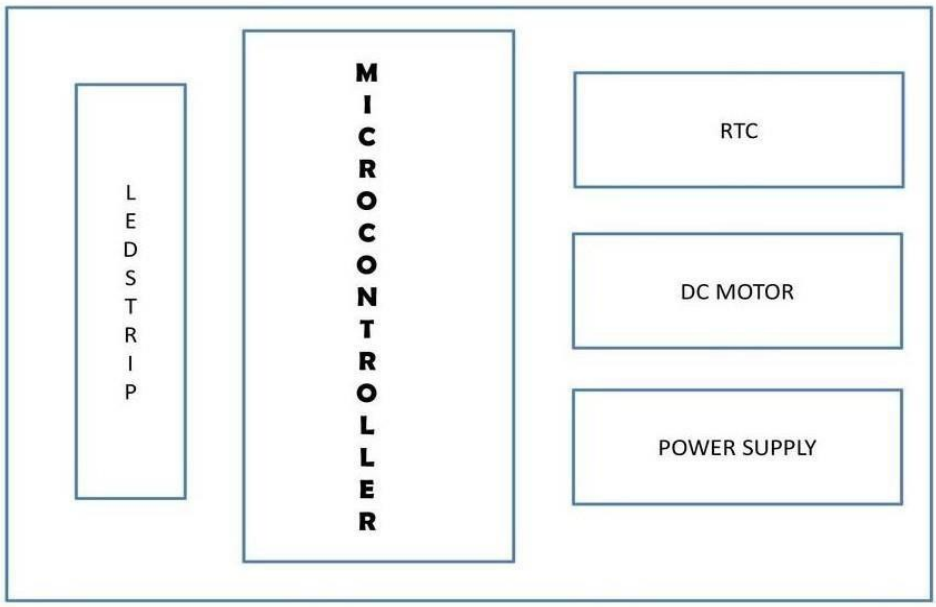


Figure 1: Block Diagram

When we give the power supply of 12V to the DC motor which is of 1000 RPM ,the PCB board which is connected to the DC motor rotates, giving the output of a clock. We are using RTC (remote timing control) in which we are using IR receiver and a remote to set the timing of a clock.

ON the PCB board we have used 19 LED's in which there are 7 green LED's ,3 yellow LED's, 8 red LED's and 1 blue LED. Green LED's will show the timing in digital format and red LED's will show the timing in analog format.

We are using ARDUINO NANO a microcontroller in which the program is dumped to get a specified output that is the clock.

The power supply of 3.3V is given only to the 1st and 2nd LED to form a outer circle and inner circle respectively to form a border and the remaining LED's are blinked using a HALL SENSOR in which the magnetic field is converted to electrical signal.

2.1.1 CIRCUIT DIAGRAM (PROPELLER LED CLOCK)

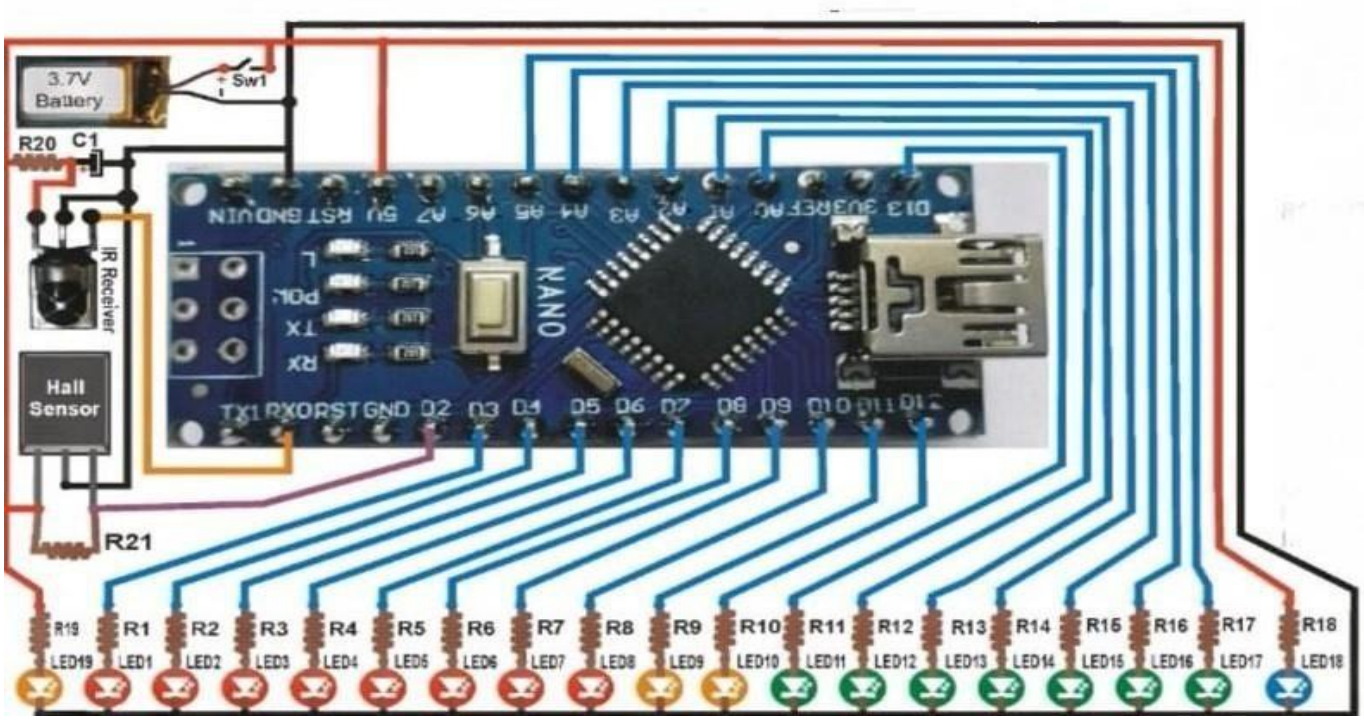


Figure 2: Circuit Diagram(PCB Strip)

2.1.2 CIRCUIT DIAGRAM (REMOTE/38KHZ IRTRANSMITTER)

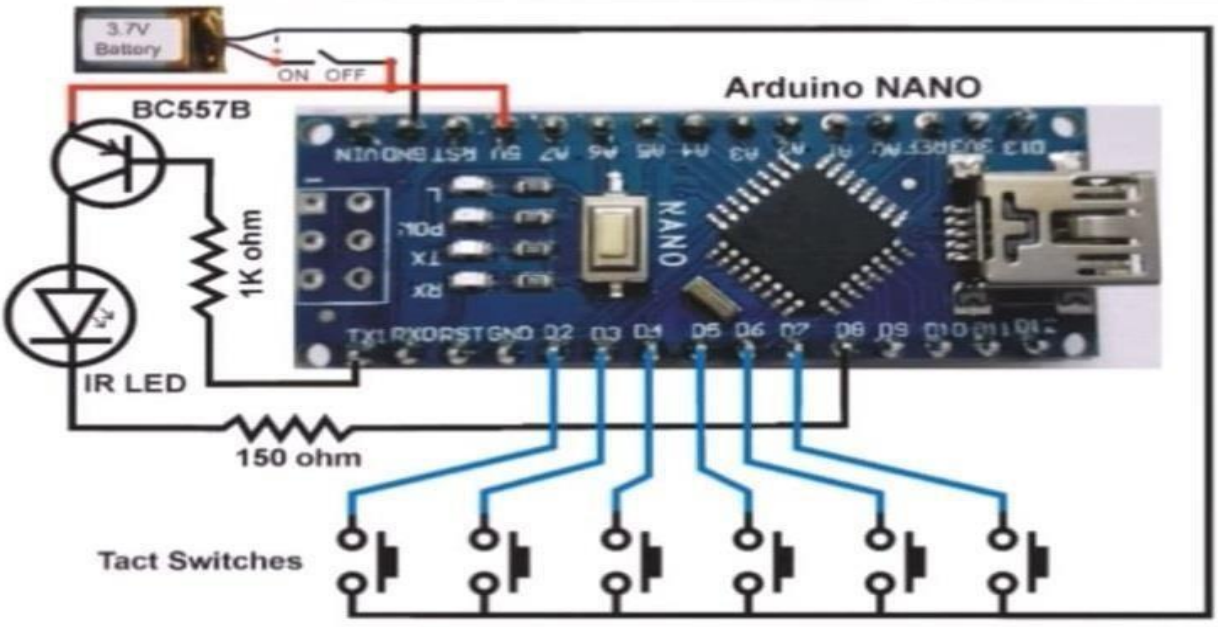


Figure 3: Circuit Diagram (Remote)

2.2 EXPLAINATION OF EACH BLOCK WITH PROPER NAMES AND THEIR FEATURES AS FOLLOWS

2.2.1 ARDUINO NANO

The **Arduino Nano** is a small, complete, and breadboard-friendly board based on the ATmega328P released in 2008. It offers the same connectivity and specs of the Arduino Uno board in a smaller form factor.[1]

The Arduino Nano is equipped with 30 male I/O headers, in a DIP-30-like configuration, which can be programmed using the Arduino Software integrated development environment (IDE), which is common to all Arduino boards and running both online and offline. The board can be powered through atype-B mini-USB cable or from a 9 V battery.

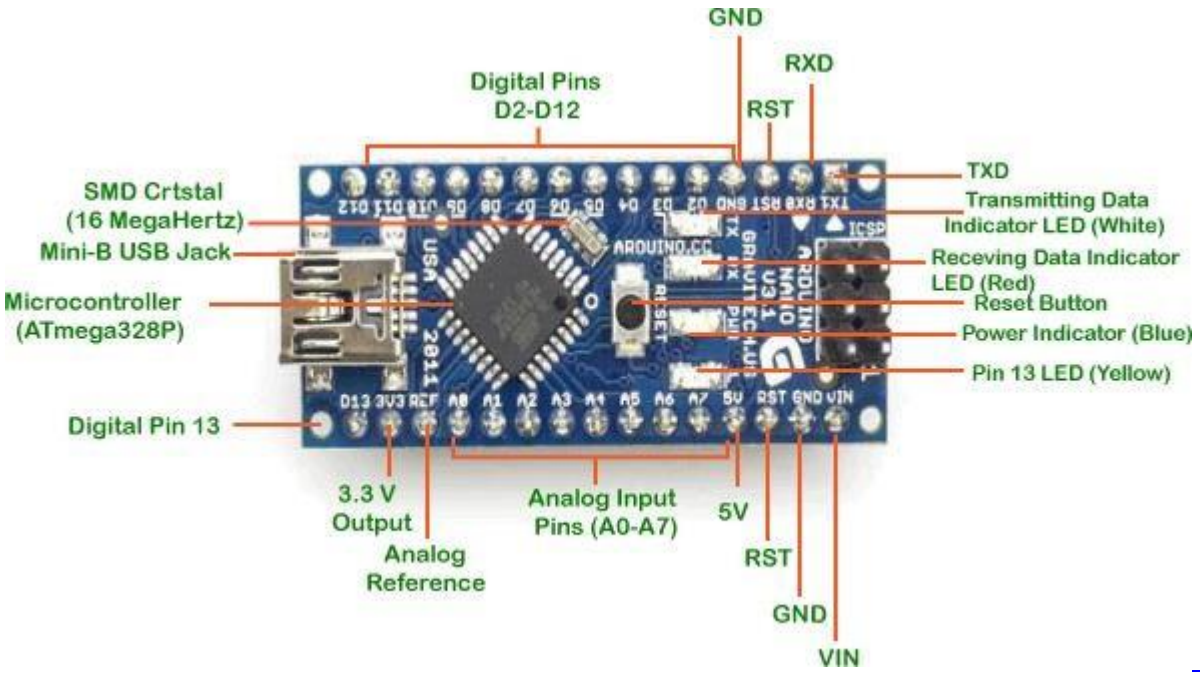


Figure 4: Arduino Nano

2.2.2 LED’s

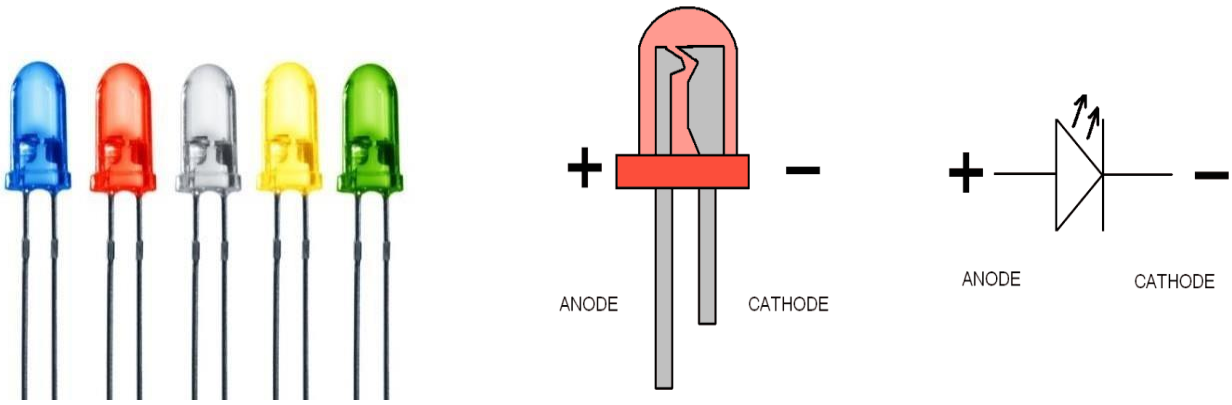


Figure 5: LED’s

LED stands for light emitting diode. LED lighting products produce light up to 90% more efficiently than incandescent light bulbs.

ON the PCB board we have used 19 LED’s in which there are 7 green LED’s ,3 yellow LED’s, 8 red LED’s and 1 blue LED. Green LED’s will show the timing in digital format and red LED’s will show the timing in analog format.

The power supply of 3.3V is given only to the 1st and 2nd LED to form an outer circle and inner circle respectively to form a border and the remaining LED’s are blinked using a HALL SENSOR in which the magnetic field is converted to electrical signal.

2.2.3 HALL SENSOR

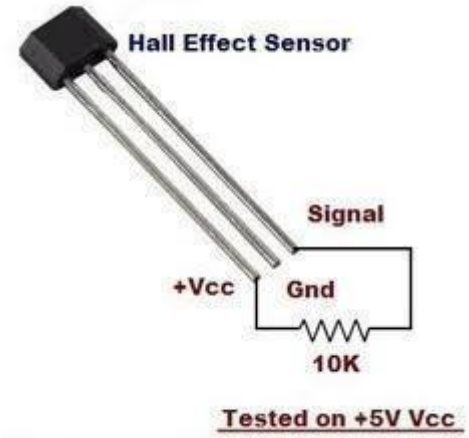
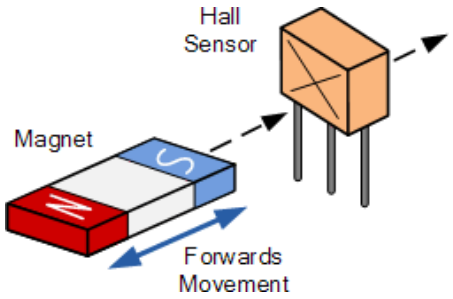


Figure 5: Hall sensor

Magnetic sensors are designed to respond to a wide range of positive and negative magnetic fields in a variety of different applications and one type of magnet sensor whoseoutput signal is a function of magnetic field density around it is called the Hall Effect Sensor.

Hall effect sensors all have a thin piece of semiconductor material inside them, which passes a continuous electrical current through itself to generate a magnetic field. When thedevice is placed near an external magnet, the magnetic flux exerts a force on the semiconductor material



Hall sensor / magnetic sensor gets the magnetic information and converts it into the Electrical signal. When the magnets move closer to the sensor, the 17 LED's are turned onas an output and receive an input signal from the hall sensor.

2.2.4 IR RECEIVER

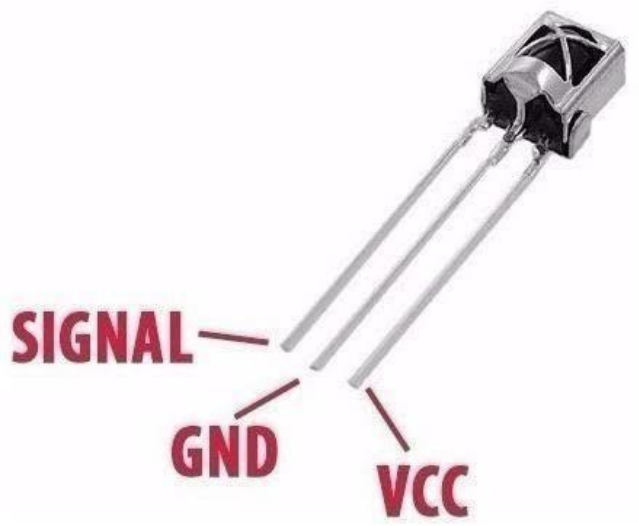


Figure 6: IR Receiver

An infrared receiver, or IR receiver, is hardware that sends information from an infrared remote control to another device by receiving and decoding signals. In general, the receiver outputs a code to uniquely identify the infrared signal that it receives.

An IR receiver can detect bursts of infrared light sent by a common remote controller (like for a television), and then output a pattern of high/low signals to a Propeller I/O pin.

The IR receiver is looking for infrared light (in the 980 nanometer range) that is pulsing at around 38 kHz. The IR remote sends short bursts of 38 kHz infrared light, in a different on-off pattern for each button on the remote. While the IR receiver detects these bursts it sends a 0 the Propeller I/O pin and a 1 when it does not. The “sirc” library does the work of decoding the on-off pattern detected by the I/O pin. The name “sirc” stands for SONY Infrared Remote Code, since it decodes signals that use the SONY remote protocol. This is why you must use a remote that is set up to control SONY devices

2.2.5 DC MOTOR

Figure 7: 12V DC Motor

All types of motors used to convert electrical energy into mechanical energy. Motors can be found in VCR's, CD players, toys, robots, fans, etc. The motor performance is very important in circuit design. This is because the electrics motors directly affect its speed andpushing capability.

The motor will run smoothly between the voltage range 6 to 18 V DC and give you 1000 RPM at 12V supply. It provides the torque of 1 kg-cm at 1000 RPM.

2.2.6 POWER SUPPLY REQUIRED

Figure 8: 12VDC – 1.5A Power Adaptor

Specifications:

- Input Voltage : 100~240V
- Output Power : 12W
- Output Voltage : DC 12V ±5%
- Output Current : DC 1.5A
- Frequency : 50/60 Hz
- AC Inlet Mode : 2 Pins AC Cord

2.2.7 PHOTOTRANSISTOR

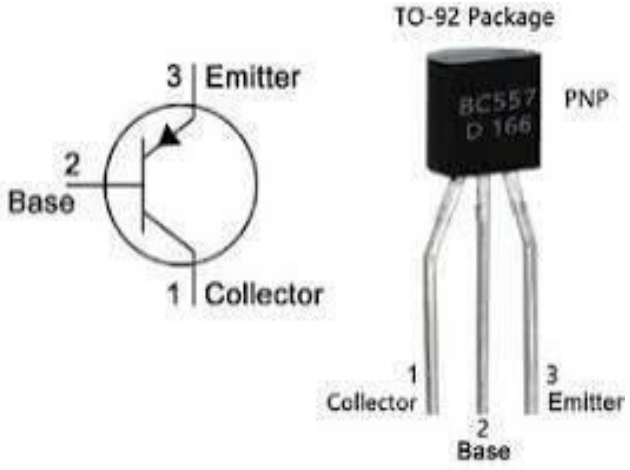


Figure 9: Phototransistor

Working Principle of BJT:-

The emitter-base junction of BJT is forward-biased, whereas the collector-base junction is reverse biased. The forward bias of the emitter-base junction causes the emitter current to flow and this emitter current entirely flows in the collector circuit. Therefore, the collector current depends upon the emitter current and nearly equal to the emitter current.

A bipolar transistor allows a small current injected at one of its terminals to control a much larger current flowing between the terminals, making the device capable of amplification or switching.

2.2.8 INFRARED LED

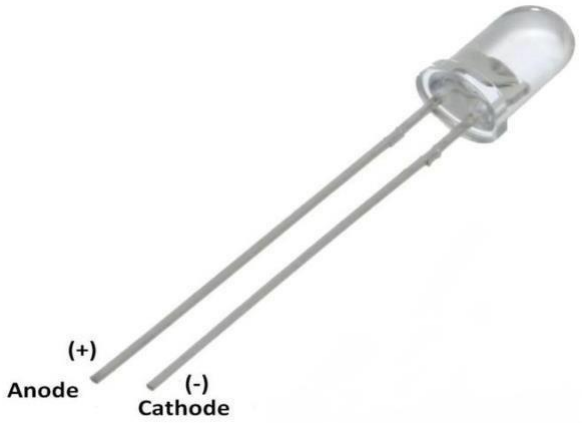


Figure 10: IR LED

An Infrared LED (IR), also known as Infrared transmitter, is a special purpose LED that transmits infrared rays with nanometer range of wavelength. IR transmitters along with IR receivers are commonly used as sensors. The appearance is same as a most common LEDs.

Since the phototransistor is only triggered by the IR radiation, an IR LED must be placed nearby. The intensity of the IR radiation determines how much current is generated in the photo transistor. Therefore a large current must flow through the LED to create a higher intensity.

CHAPTER 3

SOFTWARE DESIGN

3.1 PROGRAMMING LANGUAGE

- Embedded C

3.2 DEVELOPMENT TOOLS

- Arduino nano

3.3 ARDUINO IDE

Arduino software is needed to program Arduino boards and must be downloaded from the Arduino website and installed on a computer. This software is known as the Arduino IDE (Integrated Development Environment). Drivers must be installed in order to be able to program an Arduino from the Arduino IDE.

3.1 DESIGN

3.4.1 MAIN FLOW DIAGRAM

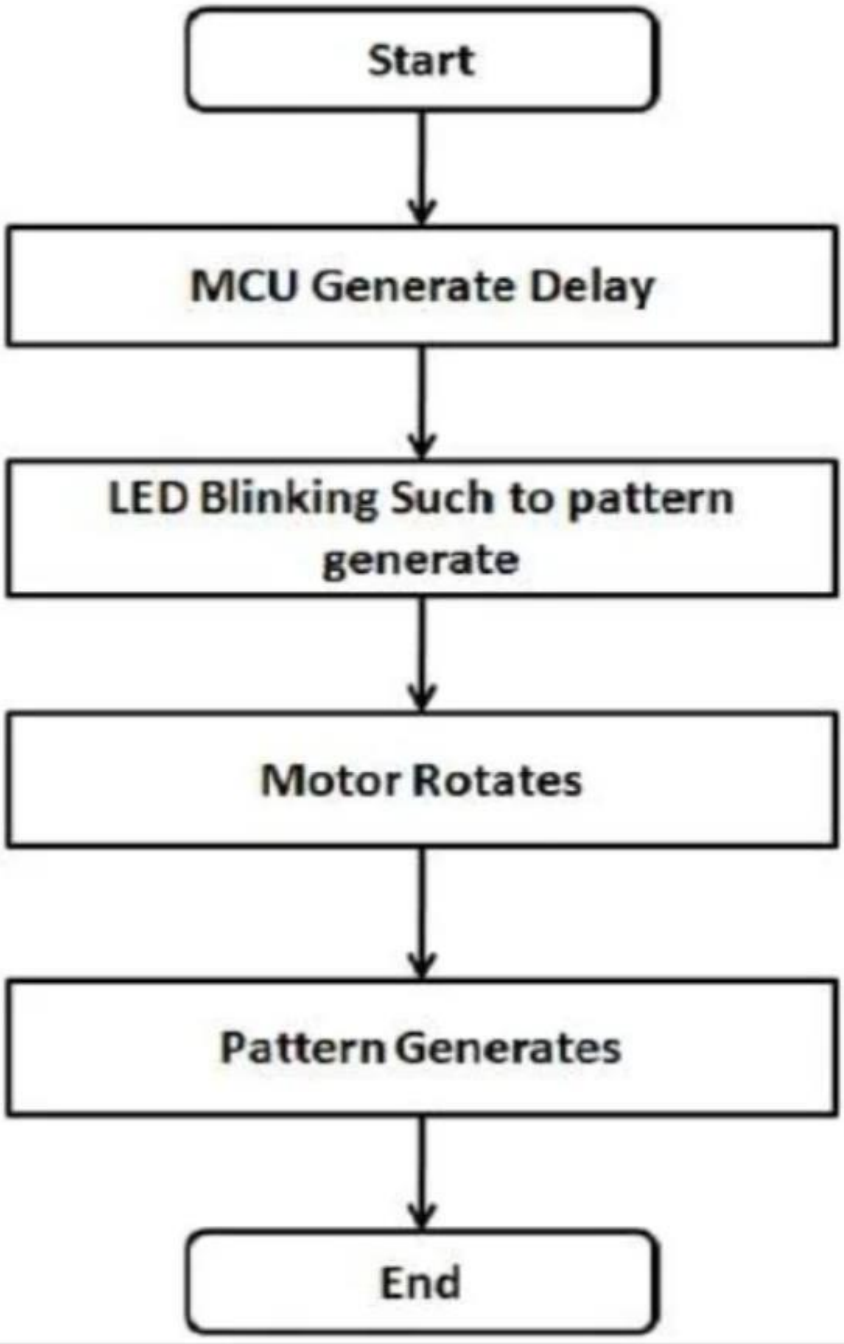


Figure 11: Flow chart

CHAPTER 4
APPLICATIONS

1. It can be use as wireless data transfer such as TEXT MESSAGES, PICTURE.
2. It is used as Automatic Display.
3. Mostly used in Railway platforms , Transport vehicles, Bank , Schools, Hospitals to
    - Display information
    - For monitoring behavior
4. It gives us 3 Dimensional display which can be viewed from any directions.

4.1 ADVANTAGES

1. HALL SENSOR is the main advantage by which we can blink the LED's using a magnet.

. **2.** Due to the presence of hall sensor by which the magnetic field is converted to electrical signal, the power is given only to the first and last LED, due to which the power consumption is less .

3. It shows essence of richness , due to which it can be used at many places.

4.2 DISADVANTAGES

1. Suppling power to a moving object is not a simple task, therefore we have to use wireless power transmission to control the circuit, which is a moving object.

2. The main disadvantage is that it cannot be captured fully in camera, there will be a slight dislocation in forming a circle or the half of the clock isn't visible , this is due to the **PERSISTANCE OF VISION**.

CHAPTER 5

RESULT

Figure 12: Result

In our project we are implementing the design on a PCB (printed circuit board), which consist of 19 LED's. In which we are supplying 3.7V voltage for first and last LED to form an outer circle and the inner circle and then the remaining LED's will blink with the help of a HALL EFFECT SENSOR in which the magnetic field is converted to the electrical signal.

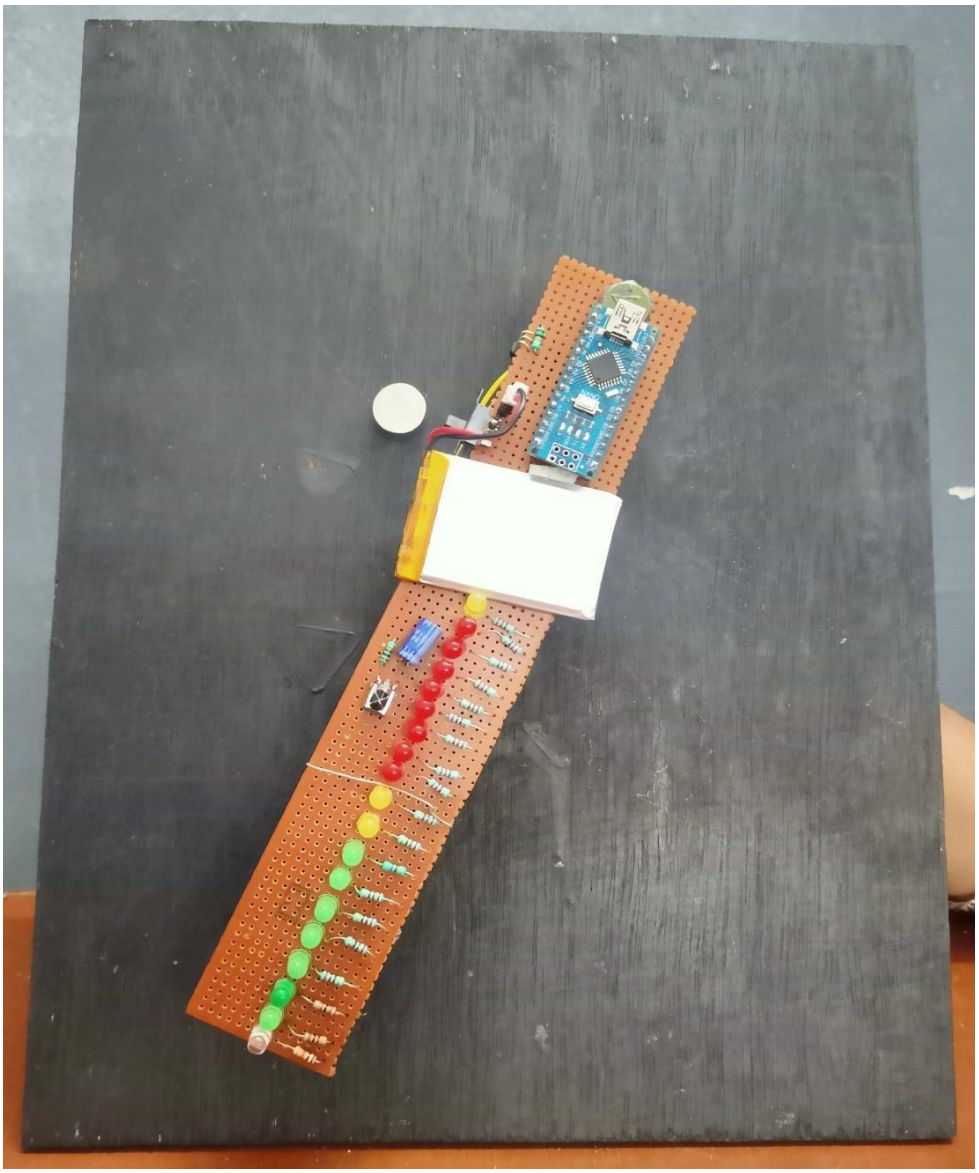
When we rotate the PCB with the help of a DC motor which is 12V 1000RPM, then with the help of ARDUINO NANO placed on the PCB in which the code of program is dumped, according to that we will get **a PROPELLER LED PENDULUM CLOCK** whose timing can be adjusted using the REMOTE.

We are using Arduino nano which is placed on the PCB, in which the code of program is dumped to make a remote.

We are also placing an IR RECEIVER on the PCB to receive the transmitted signal from the remote just to set the timing of clock. Using remote i.e. the switches placed on the remote we can set the hours, minutes and seconds.

CHAPTER 6

CONCLUSION



Thus, this is how our main system has been built up. More and more knowledge involving the whole system has been gained with time and through more research. We have completed this project successfully and have successfully made a 12 hour digital clock with an alarm and an A.M. /P.M. display.

FUTURE SCOPE

1. With the help of propeller LED display we can display information like -Name and Title.

2. We can make 3 dimensional version of this display.

3. Though we have tried our best to minimize the cost of project but it can further be made cost efficient by cost cutting components.

4. This device can be modified as a Computer Based display board. A wireless system can be used to communicate between the PC and the device. This would let the user to display any message easily on propeller display.

5. We can use less number of LED(approximate 8 LED). We can display more number of words.

6. We can use an external real time clock(RTC) module has the clock.

7. The project can be made more compact with effective arrangement of all the components.

8. It give time with 100% accuracy.

9. LED patterns can be display using this device. We have to modify the program for LED patterns.

10. Once developed at a large scale and multicolour LEDs can be used to replace LED screen.

11. This project explains about a basic principle of **PERSISTANCE OF VISION** using simple low cost circuit.

CHAPTER 7

REFRENCE

1. Mitchell‟s modular LED x-y (horizontally and vertically digitally scanned array system) was cited in the 29th International Science and Engineering Exposition "book of abstracts", page 97,published by the "Science Service", Washington D.C.
May1978.

2. Technical reference detailing the LED display array, RF interface and scanning circuit was included as part of the 1978 29th ISEF exhibition Anaheim, CA. Coltheart M. "The persistence of vision." Philos Trans R Soc Lond B Biol Sci. 1980 Jul 8; 290(1038):57–69. PMID 6106242. “The 8051 microcontroller and Embedded Systems” by M.A.Mazidi.

3. Propeller Display Rennes‟s H8 Design Contest 2003 Entry H3210

4. An Analog & Digital propeller clock I made! By Luberth Dijkman www.luberth.com

CLOCK-

https://youtu.be/mqAh5nV1zAw
https://youtu.be/ssaZ4E2PFyk

REMOTE-

https://youtu.be/UzC5BpFpd-M