International Journal of Current Engineering and Technology
E-ISSN 2277 – 4106, P-ISSN 2347 – 5161

Available at http://inpressco.com/category/ijcet

General Article

A Real Time Implementation of Microcontroller Based Propeller Clock

Abhijeet Chincholkar†, Pragati Sawarkar†*, Krutika Bobade†, Puja, Kolhe†, Snehal Tayade† and Swapnil Kharate†

†J.C.E.T Yavatmal, Maharashtra, India

Accepted 02 March 2015, Available online 05 March 2015, **Vol.5, No.2 (April 2015)**

Abstract

The propeller clock is an array of LEDs which rotates at a high speed and creates a display. The array of light emitting diodes is turns ON and turns OFF with the help of microcontroller and it shows angular clock floating display. Microcontroller is programmed to generate appropriate signals to display words by lightning light emitting diodes in sequential manner. The floating images of angular clock will appear by the use of rotating DC motor. Propeller clock is mainly consisting of Persistence of vision. Persistence of vision is "What we watch is combination of what we are watching and what we were watched in a fraction of time". Naturally human eye responds slowly to capture an impression of light image to read the display. Real Time Clock tracks the current time with the help of computer clock. This versatile propeller clock can shows the messages, the real time, images and many more. Automatic switching just like an analog to digital mode switching of display can be achieved by using an Infrared remote control. Other features such as time setting and selecting function which make this work more advantageous.

Keywords: *Light Emitting Diodes, Real Time Clock, Persistence of Vision, DC motor.*

1. Introduction

Propeller is a term having relation with a rotating object to create a circular display. The propeller clock is an understanding of light emitting diodes which being rotate at a high angular velocity to create a circular display. The first propeller clock was created by Bob Blick, a single array of LEDs to produce the display. Propeller clock uses extremely small LEDs for displaying the typescript and symbols on its assembly in an appropriate way. Propeller clock was started with a very simple principle known as Persistence of Vision which is repeatedly comes in our daily life. Accurate date and time is being shown by propeller clock but for this the circuit must have memory capacitor to track the clock current time even when the power is not supplied to the circuit but the memory capacitor are high-priced, bigger in size and heavy. For the replacement of memory capacitor, we have used IC DS1307 which is known as the 'Real Time Clock (RTC)', whose property is to provide the current time when accessed. The main difference of our project is the use of RTC IC which is absent in the existing 'Propeller Clock' which shows the typescripts and also operated on remote control for ON-OFF switching operation. Propeller clock gives representation of analog or digital numbers/characters are floating in the air.

2. Working Principle

The heart of the propeller clock is Microcontroller ATMEGA328P, which have been interfacing with RTC DS1307. RTC gives current time having output is connected to the input of microcontroller ATMEGA328P. Here, we have used 17 LEDs and negative terminal of LEDs are joined together and connected to ground and positive terminals are connected to the port of microcontroller. When the motor is turn ON with high speed, connected LEDs get ON one by one by the sequence of programming and create the display which is seen by observer. By using 5*7matrix notation, we can display each number.

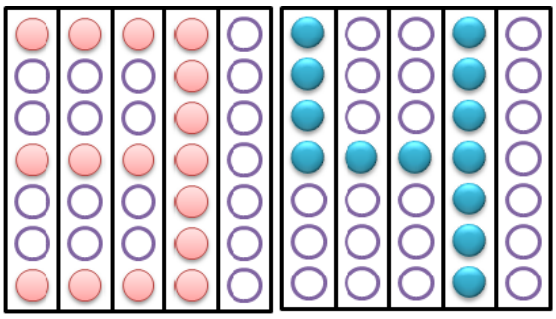


Fig.1 (a) 5*7 matrix notation

*Corresponding author **Pragati Sawarkar**, **Krutika Bobade, Puja, Kolhe, Snehal Tayade** and **Swapnil Kharate** are B.E. (EXTC Final Year) Students; **Abhijeet Chincholkar** is working as Assistant Professor

3. Block Diagram of Propeller Clock

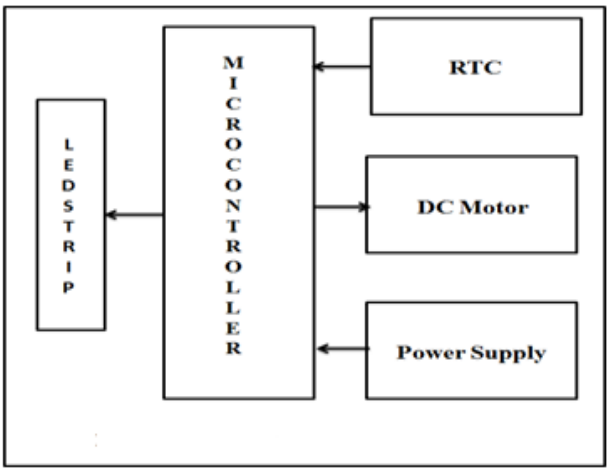


Fig. 2(b) Block Diagram of Propeller Clock

4. Hardware Description

4.1. Microcontroller Atmega328P

The ATMEGA328P is high-performance 8-bit microcontroller with 32Kbytes of in-system programmable Flash memory. It is having 28 pin DIP IC package.ATMEGA328P is small sized IC, mainly used because of its reduced weight and has maximum memory space. It improves the performance of the display, because of its reduced weight and also increases RPM of motor. It provides following customary features like programmable 32Kbytes flash memory, Internal RAM of 2KBytes, having 23 programmable Input/output lines, powerful instruction set (131 instructions), and 32 general purposes working registers, programmable locking system for software security, 2 Timer/Counters (8-bit).

4.2. LEDs Module

LEDs unit is consisting of 17 intensive LEDs which are fixed in one side of our PCB board. To one of the port of microcontroller, the intensive LEDs get attached with a series resistor of 270 ohm. Then, the columns of seven LEDs are used to display clock digits and time period for analog clock. One LED is used to make a circular frame and other is used to make numbers in the analog clock. LEDs are located on the PCB, as it rotates with high speed it used to convert electrical signal to optical signal for the human eyes and we can easily see the display.

4.3. Real Time Clock (RTC)

Real Time Clock-DS1307 is a serialized clock having low power and an inbuilt power circuit to detect the faults. The information about seconds, minutes, hours, day, date, month, and leap year is usually given by the RTC.

4.4. Dc Motor

We have used DC motor for the continuous rotation of the rotating board with 1000 rpm speed which acts as a prime mover. Voltage regulator IC LM7805 is used to produce constant +5V power supply which consists of a bridge rectifier, filter capacitors. Between the output terminal and ground the other capacitor is connected which is used to cancel out any abnormal effect due to long distribution leads and also sink the output distortion.

5. Mechanical Assembly

Proper functioning of this project is done by using mechanical assembly. We have provided one small metallic strip of fan for weight adjustment, and that can be attached or detached by adding / removing metallic nuts. The assembly of PCB board is mounted on the top of motor for the real implementation of the project. It can improve the overall efficiency as well as stability of the display if the assembly is balanced perfectly.

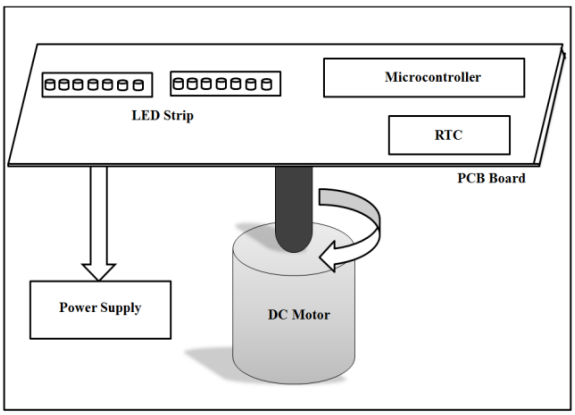
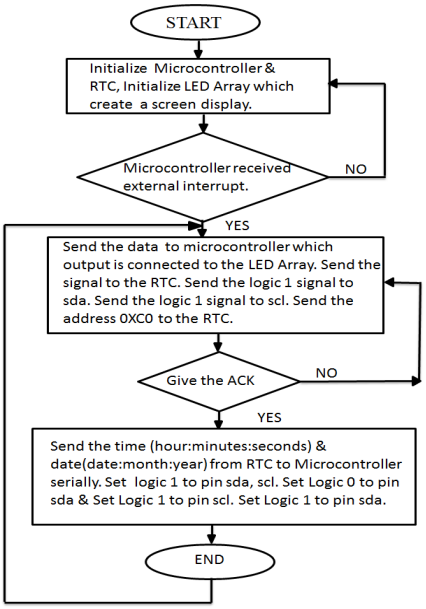


Fig.3 (c) Mechanical Assembly of Propeller Clock

6. Algorithm



7. Software Simulation

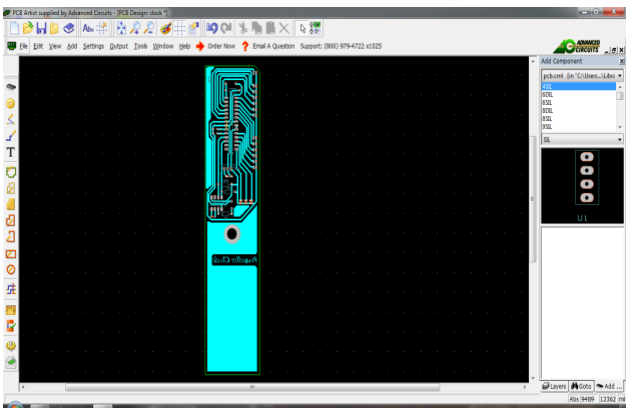


Fig.4 (d) Software Simulated diagram of PCB.

8. Advantages

1) In propeller clock display, lengthy text remains same as that consumed in smaller clock.

2) Propeller clock can be used as wireless data transfer such as text, messages, and pictures if there exists a wireless communication channel between the source and the propeller clock.

3) Propeller clock is useful where there is need of automatic display.

4) It can be used in organization, industries, public places.

Conclusion

The idea behind proposed project was to use the propeller clock mechanism to design a display. The propeller clock should build as lighter as possible which provides more stability. It gives clear display by using bright light LEDs.

The propeller clock works in analog mode as well as in digital mode and also it has interesting feature that it shows date in clock by using digital mode display.

Future Scope

1) It is used as spy watch for security purposes.

2) It is also used for monitoring the internal behavior of the industry.

References

A.P. Godse and U.A. Bakshi (2009), Electronic devices and circuits, Technical Publications Jan 1, ISBN 8184316836, 964 pages.

Sheikh Rafik Manihar, Komal Prasad Dewangan , Ajay Kumar Dansena March(2012), An Analog & Digital propeller clock I made! , Global Journals Inc. (USA), Volume 12 Issue 4 Version 1.0, 5 pages

Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D Mckinlay (2011), The 8051 Microcontroller and Embedded Systems, Prentice Hall 2000, Volume 1,435 pages.

Ramakant A. Gayakwad (2000), Op- Amp and Lineair Integrated Circuit, Prentice-Hall Of India Pvt. Limited, 1997,639 pages.

K R Botkar (2003), Integrated Circuits, 2nded, Khanna Publisher (2010), created by Tushar Kashyap Edition: 5, 67 pages.

DS1307 64*8(Jan 29, 2013), Serial Real Time Clock Specification in Maxim Integrated REV: 100208. https:// learn.adafruit.com/ds1307-real-time-clock, 14pages.

George John P., Togis Thomas, Vishnu Balakrishnan(2014), Design and Implementation of Microcontroller Based Propeller Clock, International Journal of Advanced Research in Electrical, Electronics and Instrumentation engineering, Vol. 3, Issue 2, 8 pages.