Propeller LED Pendulum Clock using Arduino NANO

Synopsis Report Submitted in
Partial Fulfillment of the Requirement
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BACHELOR OF TECHNOLOGY
(ELECTRONICS & COMMUNICATION ENGINEERING)

TO

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FEROZE GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY, RAEBARELI

SYNOPSIS OF PROPOSED PROJECT

[1] Name of Group Members:

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[2] Field : Arduino Based Project

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1. **Title Page (one page)**
1. **Brief Introduction (one page) :**
2. **Expected Impact on Academics/ Industry (one page) :**
3. **Methodology of the Research Work (one-two pages) :**
4. **Major Inputs (infrastructure) Required (one page) :**
5. **List of up- to-date References (in standard format):**
   (Books, international journals, national journals, reports, etc.)
6. **Schedule of Activities (PERT Chart) (one page):**

Signature of the Candidates

Name and Signature of Supervisor **Signature of the Head of Department**

INTRODUCTION

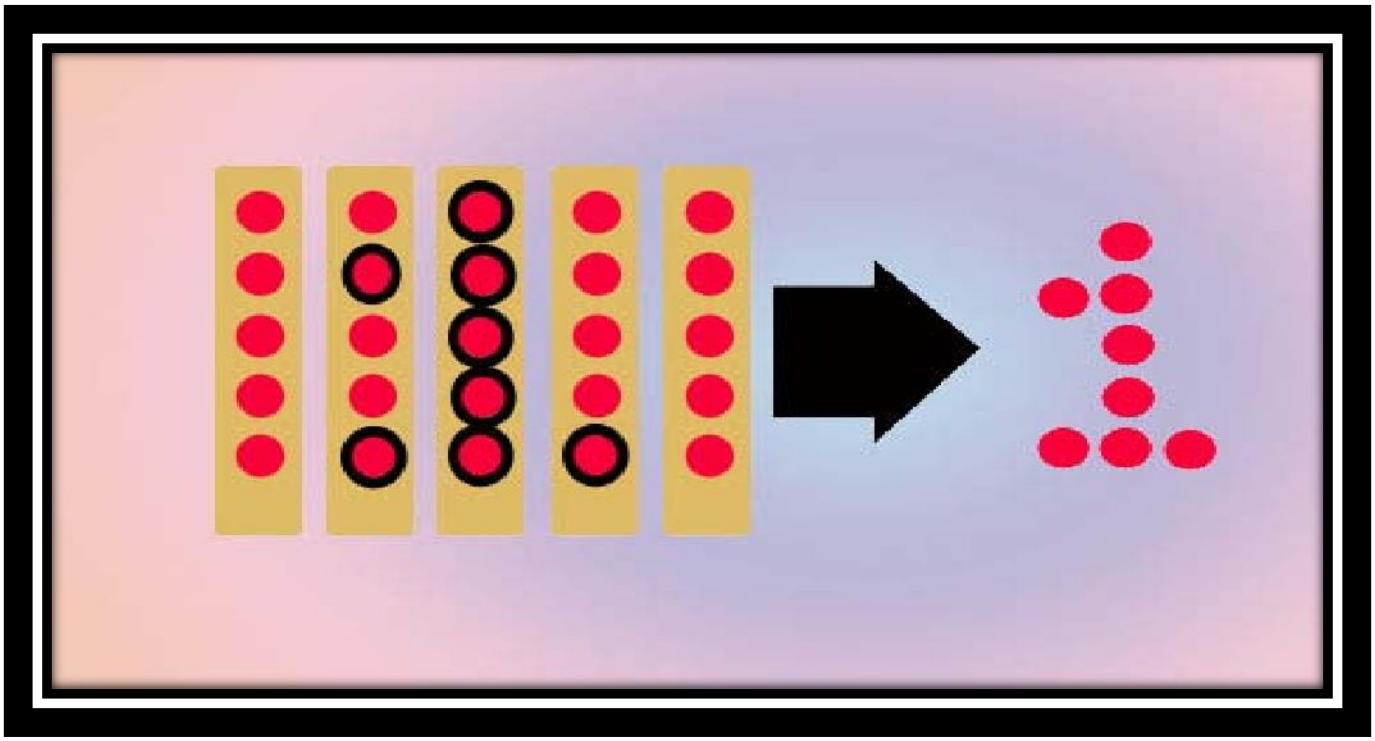
The propeller clock is a linear array of light emitting diodes, rotating at a high angular velocity to generate a circular screen.

Now by synchronising these light emitting diodes, and keeping in mind the concepts of persistence of vision and limit of resolution, we can display a clock.

Persistence of vision:

"What we see is a blend of what we are viewing and what we viewed a fraction of a second before"

For example, if '1' has to be displayed, then the series of lighting up of diodes would be like following:



Exepected Impact on Academics/Industry :

My "Propeller Clock" is a mechanically scanned LED clock with seven light emitting diodes that spin, giving the illusion of numbers floating in the air. This is the first clock I ever built. I've built a few LED signs, but they get boring because I already know the message.

This clock utilizes only a few relatively inexpensive electronic components and a recycled motor from a VCR or floppy drive.
The main objective of this project is to implement the following:

1 - Determine the power consumption of the system especially the maximum current requirement so that it matches with the specified ratings of the wireless power transfer module.
2 - Design hardware system (PCB) which is fairly balanced and as light as possible so that it can be mounted on the rotating arm of the motor to provide balanced and stable rotation with sufficient RPM.
3 - Design precise time delays using timers interrupts to flash the LEDs at precise location.
4 – Design hardware and algorithm for compensating the change in RPM (to display a stable clock face - avoid rotation/dragging of clock face) using reed switch.

COMPONENTS USED IN CIRCUIT

INPUT DEVICES
1. Batteries.
2. Hall Sensor.

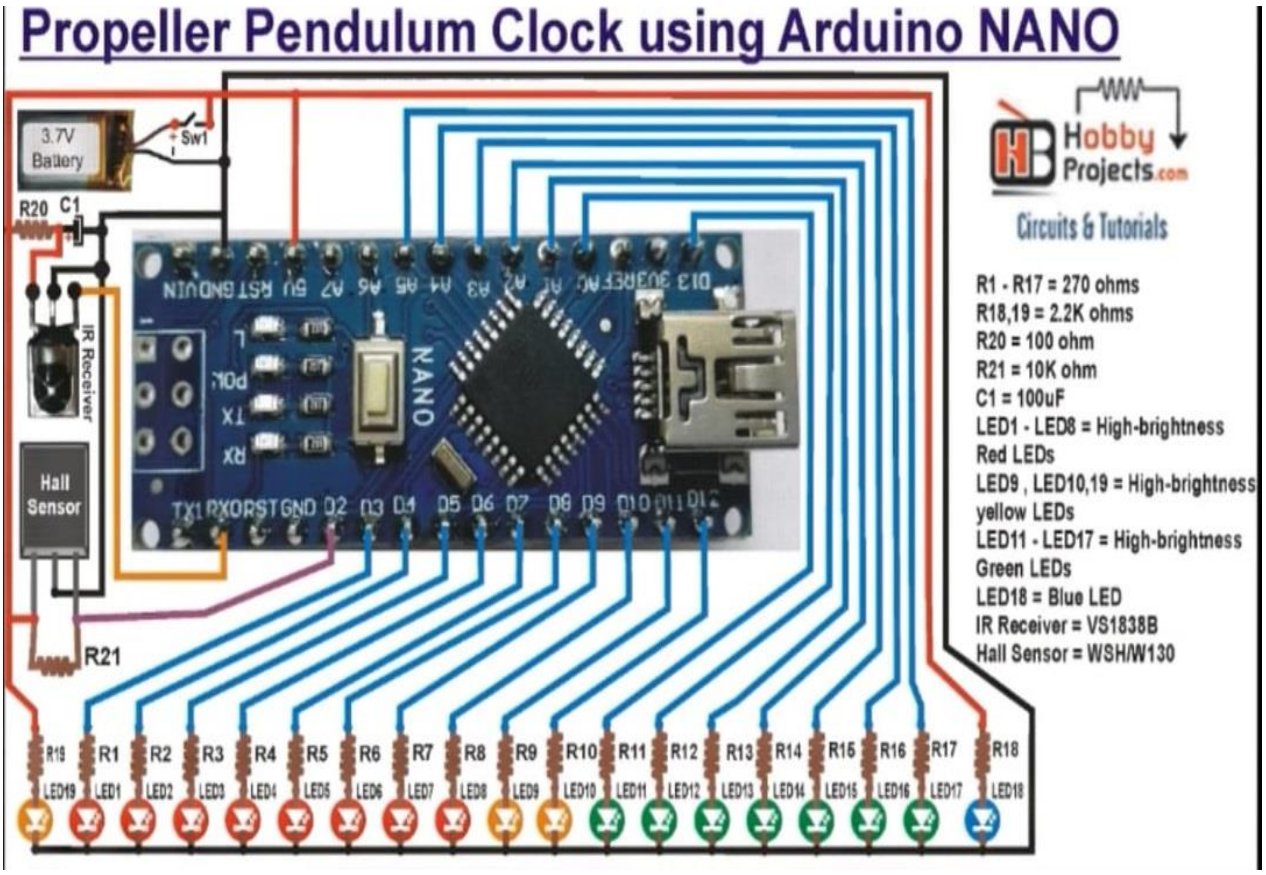
OUTPUT DEVICES
1. 12v Dc Motor.
2. Leds "with different colors“

NETWORKING/PROCESS DEVICES
1. IR Receiver.
2. Hall Sensor.

MATERIAL NEEDED.
1. Arduino NANO
2. Leds with different colors.
3. Resistors with different values.
4. VS1838B 38KHz IR Receiver Sensor.
5. WSH/W130 Hall Sensor.
6. Female header connectors.
7. Male header connectors.
8. 3.7V Battery.
9. ON OFF Switch.
10.PCB.
11. Magnet.
12. DC Motor.

CIRCUIT DIAGRAM

The following is a schematic diagram of the circuit of the propeller clock:



The motor rotates at a quasi-constant angular velocity (about 1000 rpm). The MCU generates a 38kHz pulse for the IRLED which the mirror reflects once every rotation and is sensed by TSOP sensor to trigger an external interrupt which counts the number of microseconds elapsed between 2 successive triggers, thereby getting the instantaneous time period of the rotation. Now depending on what has to be displayed, the LEDs are synchronised. An internal clock keeps the record of time in hours, minutes, and seconds format for display. For full code, contact us.

Methodology of the Research Work

The biggest problem was the making of the hardware setup as the whole system had to be a light weight, evenly balanced and yet a strong one. Even slight variation of centre of mass from the axle resulted in large scale wobbling of the system.

For board, we used the high quality blank circuit board. It had an outlining equipotential surface which we used as the common ground. For the purpose of making it light and compact, we used insulated copper wires. The LEDs were mounted on a female port

after being chiselled from their edges to form a close packing.

The problem of power transfer was overcome by making our own slip ring by riveting a circular conductor around the axis. Apiece of

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Arheostat was used to adjust the range of the infrared so that it could distinguish a black background from a mirror. Instead of

attaching a resistance to each of the LEDs, a common resistor was used.

Programming the microcontroller was not simple either. Alot of experiments were done to get proper display of characters

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

George John P., Togis Thomas, Vishnu

Specification in Maxim Integrated REV: 100208.

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.