Princess Sumaya University for Technology

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Princess Sumaya University for Technology
جامعة الأميرة سميّة للتكنولوجيا

EMBEDDED SYSTEMS - 22442

PERSISTENCE OF VISION ANALOG CLOCK

DESIGN PROJECT DOCUMENTATION

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Abstract

The merging of microcontroller technology—specifically, the PIC16F877A—and cutting-edge electronics applications is studied in this collection. The LED Propeller Clock and the 12V DC Motor with PWM Speed Control are the two major projects on display. With the help of LEDs, the LED Propeller Clock uses the PIC16F877A to produce an eye-catching timepiece with an active, floating clock face. In the meantime, a different microcontroller powers a 12V DC motor, which demonstrates the reliability of pulse width modulation (PWM) speed control. These projects demonstrate the versatility of microcontrollers, ranging from precise motor control to captivating time displays.

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1 INTRODUCTION

A propeller clock is a device that uses the persistence of vision phenomenon to create the illusion of a clock or message floating in the air. It typically consists of an array of LEDs mounted on the end of a spinning arm or propeller. As the LEDs spin at a high speed, It is believed that an afterimage lasts for around 1/25 of a second, making this a miracle of human vision ability. Therefore, in the unlikely event that someone is seeing the photos at a pace of twenty-five per second, they appear to be continuous at that time (creating the appearance of a solid image). The pictures we take of ourselves painting lights—using light sticks—are the best example of this characteristic. In reality, a propeller clock is created by using a DC engine to spin a PCB board that contains the parts needed to light up the LEDs. The LEDs will all light up in response to the MikroC program that is integrated into the PIC 16F877a microcontroller when the board is rotating. The 12v dc motor is connected to a separate PIC 16f877a microcontroller. Pulse Width Modulation (PWM), an advanced technology that enables engineers and enthusiasts to precisely control the motor's speed, lies at the heart of this collaboration.

1.1 COMPONENTS AND MATERIALS

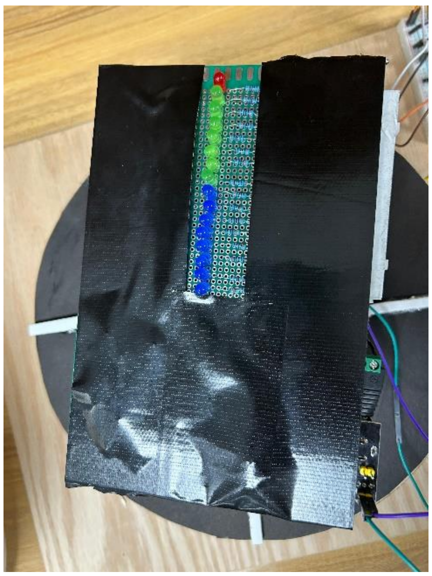
1. 12V Motor for spinning the PCB board
2. 16 multicolor LED’s
3. Microcontroller 16F877a.
4. 8 MHZ oscillator.
5. Different kind of wires.
6. PCB.
7. 9V battery.
8. Function generator.
9. DC-DC step down module.
10. Resistors;x16 300 ohm resistors.
11. A cutomized table/base combo.
12. Super Glue.
13. Soldering iron.
14. IR module sensor.
15. Bread board
16. potentiometer

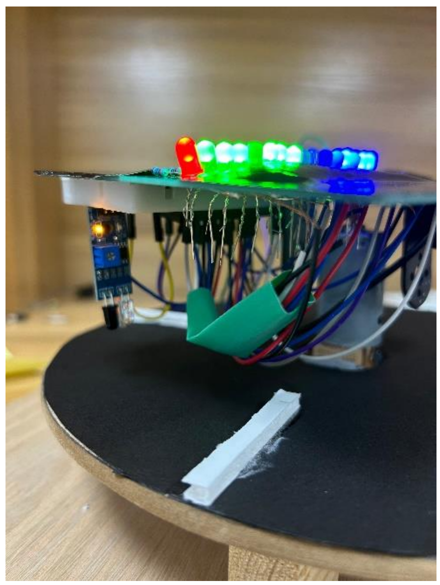
Composition:

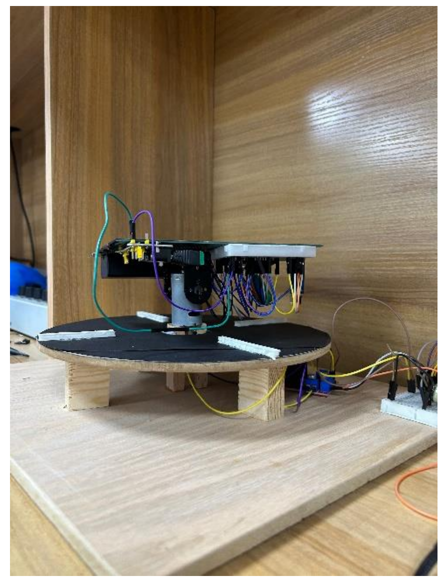
In our project we have a unique way of assembling the components. Firstly, we decided on working with 2 PIC16f877a microcontrollers due to multiple reasons which include practicality, overall aesthetic and the separate function each PIC will carry out. The first part of our project consisted of the connection of the LEDS,resitors,IR sensor,9v battery and the step down voltage regulator.we connected these components using tools like the soldering iron which helped in keeping the LEDS in place and a breadbord which connected the microcontroller with the rest. As for the second part, the function of the microcontroller was to run the DC motor. Potentiometer was used to control the speed of this device by the help of the PWM which we implemented in the code. Lastly, we connected both parts by customizing a coupler for the dc motor and connecting them to the Pcb.

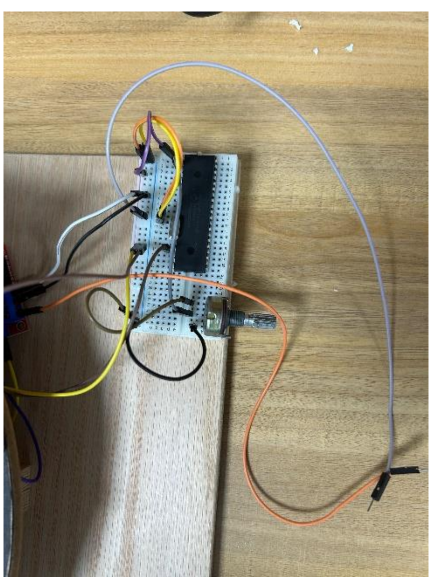
2 PROCEDURE AND METHODS

2.1 DESIGN (MECHANICAL, ELECTRICAL, & SOFTWARE)









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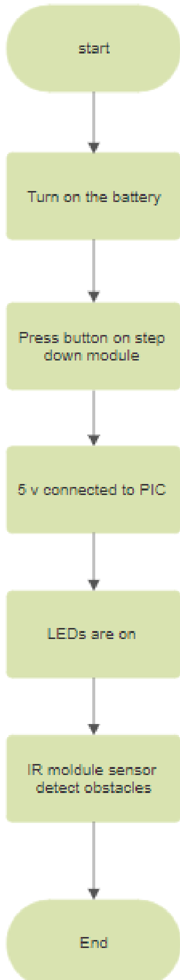
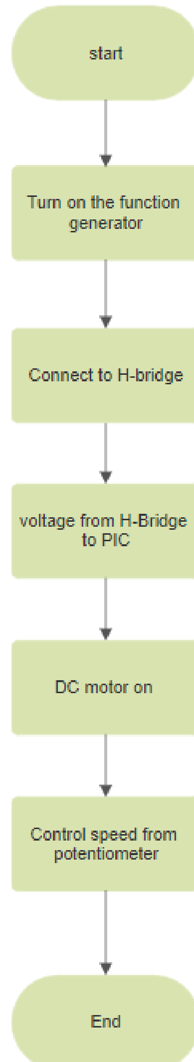
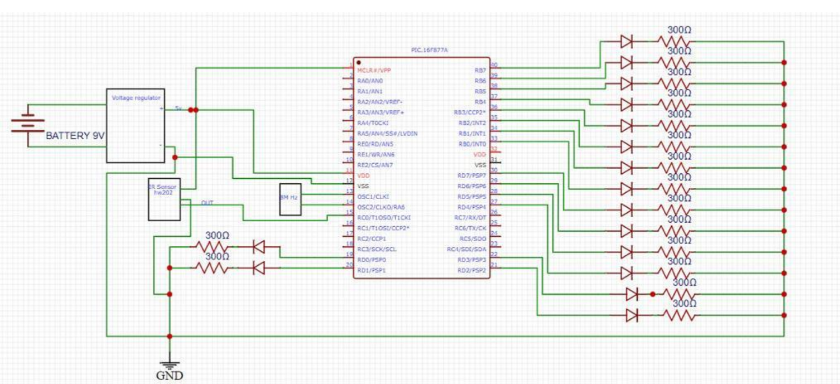
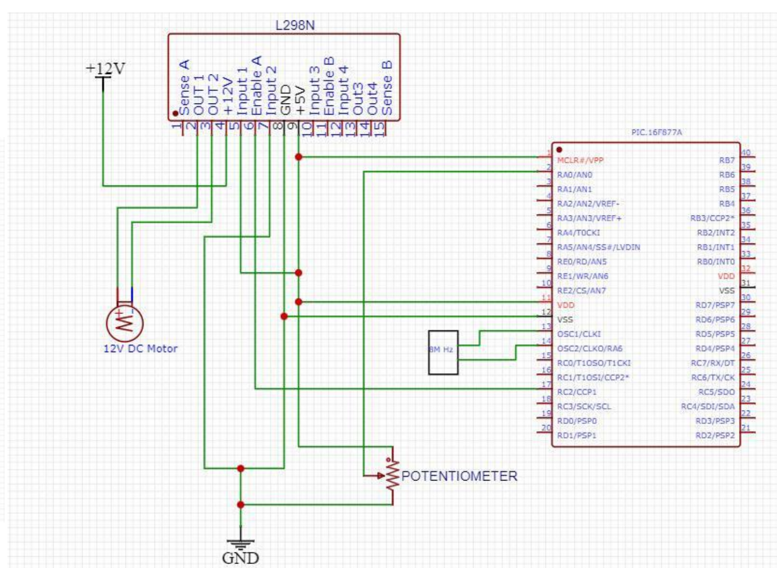
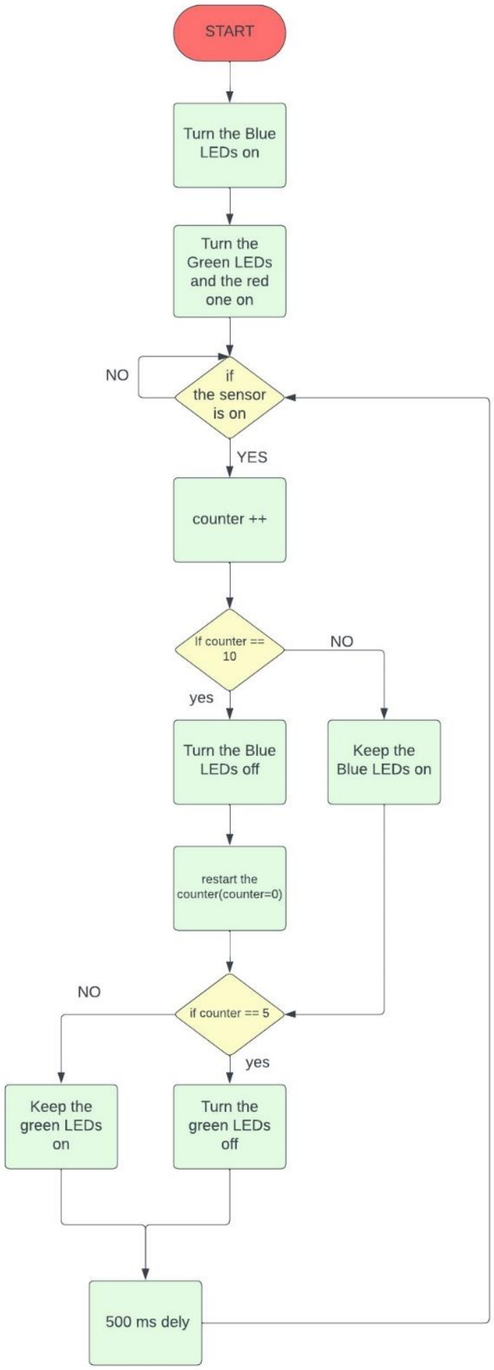


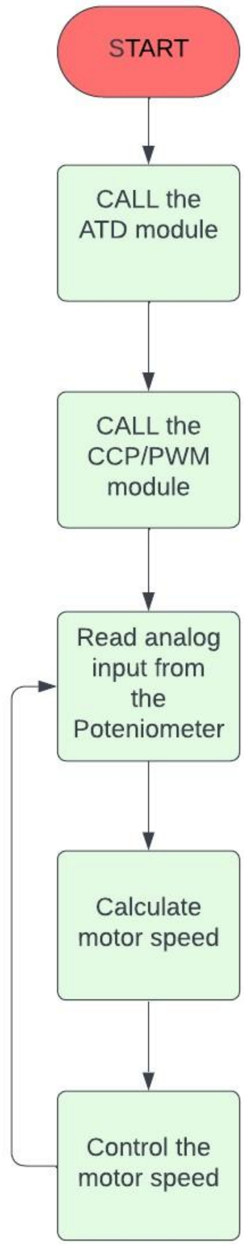






SOFTWARE FLOWCHARTS:





3 PROBLEMS AND RECOMMENDATIONS

- controlling the speed of our dc motor on the same pic16f877a microcontroller was very impractical. So we concluded that a 2 PIC solution will work best for our project.
- the original dc motor(24v) was impossible to work with so we traded it with a 12v one.
- We first started working with a 7805 voltage regulator but it was not working so we switched to a DC-DC step down module instead.
- Exhaution and sleep deprivation was an issue due to long hours of work and failed attempts.

4 conclusion

In wrapping up our dive into microcontroller applications, it's clear that there's more to these projects than just circuits and code. The LED Propeller Clock and the 12V DC Motor with PWM Speed Control are like little victories in the world of electronics – not groundbreaking, but certainly satisfying.

What makes these ventures special is the relatability factor. Behind the lines of code and motor rotations, there are late-night debugging sessions and a fair share of trial and error.