POV LED DISPALY

Project Proposal

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ABSTRACT

This project mainly emphasizes the Persistence of Vision technology. In the current era in which energy is the main factor in designing all the applications, maximum and efficient use of energy is very important. A POV display has many advantages over a traditional CRT, LCD or LED display, like power savings, less complexity, easy configuration, attractiveness etc. To overcome the drawback of the old processor we have decided to implement the same display atop a new and advanced microprocessor, the Atmel ATtiny85. This platform brings with it newer coding and a different understanding of peripherals. ATtiny85 provide us with a low-cost, easy-to-use technology to create the project. We also aim to build the newer display to work with modern forms of interfaces.

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

In this project, we will show you how to build a simple POV Display using Atmel ATtiny85 8 pin microcontrollers. This POV display project can be modified to display any text on a rotating LED display. There are few spinning LED display modules available in the market but we thought why not make one ourselves.

POV display as the name suggests, that it's a display that uses the phenomena of persistence of vision. The array of 5 LED rotates at high-speed giving your eyes the illusion that you are seeing a continuous flying message. By the way, we all must have experienced POV in our childhood by looking at the randomly flying insects under a street lamp and their extended tail due to POV. POV works because of the way image is processed in our brain our visual cortex holds the image for a few milliseconds and that's the exact reason why we can see movies, animation or waveforms on CRO, cause the rate is 30 or above 30 frames per second. So, make sure that the motor you are using is not less than 1000 RPM otherwise you will end up seeing flickering.

1.2 NOVELTY OF THE PROPOSED PROJECT

This project involves an ATtiny85 8 pin microcontroller and wireless power transmission also a wireless Infrared sensor switch.

2 BACKGROUND

2.1 ANY PRE-EXISTING WORK

Arduino development boards are just about synonymous with beginner electronics, and for good reason. The boards are designed to make connecting other components extremely easy, they can be programmed using a helpful IDE using nothing but a USB cable, they are open-source, and they have a giant and active community that is always willing to help.

The boards are also well-designed. With a bit of common sense, there are not too many things you can do to brick or kill an Arduino board. The Arduino platform is a great way to get your feet wet with circuit design and programming. But we must agree to use the Atmel ATtiny85 microcontroller.

2.2 REQUIREMENT OF THE PROJECT

First, compared to the microcontroller IC itself, Arduino boards are very large. This makes it difficult to integrate or embed Arduino boards into projects. The typical way to build Arduinos into a larger project is by way of shields, which are boards that plug into the headers on top of the Arduino. But this arrangement makes for some very bulky assemblies that are often simply too large to fit elegantly into other parts of a project.

Although there are a variety of AVR microcontroller options available, we are going to focus on the ATtiny84 compare them to the ATmega328 found in the Arduino Uno.

2.3 MARKET SURVEY

Asian countries like Sri Lanka and India not using AC they are using a ceiling fans than we can build concept POV LED technology under the smart fans. Further, different typed of photographs can be created using this.

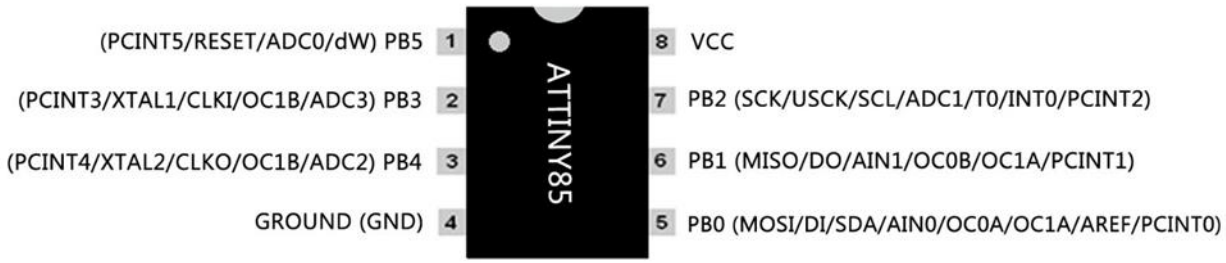
This can be used as an object and by further improving this it can be used as an analog or digital POV LED clock. Moreover, if this concept is developed as micro and nano technology, it can be used in watches as well making a huge impact on the industry.

3 PRELIMINARY STUDIES

3.1 MICROCONTROLLER ATTINY85 ARCHITECTURE

ATtiny85 is a small size 8 pin Microcontroller. It is an advance microcontroller with many good features in its small size. It is another famous microcontroller in 8pins small size microcontrollers. It comes with a lot of features which makes it an ideal small size microcontroller to use in different electronic applications. The 8 kilobytes flash memory, 512 bytes EEPROM and 512 bytes SRAM and many other good features makes it a robust small size microcontroller to run variety of program codes.

3.1.1 ATtiny85 microcontroller pinout



3.1.2 Parametric

Program Memory Type	Flash
Program Memory Size (KB)	8
CPU EEPROM/HEF (byte)	20
Data communication peripherals	512
Digital communication peripherals	1-SPI,1-I2C
Capture/Compare/PWM peripherals	SPWM
Timer	2×8-bit
Number of comparators	1
Temperature range(c)	-40 to 85
Operating voltage range(V)	1.8 to 5.5
Pin count	8

4 RESEARCH METHODOLOGY

4.1 METHODOLOGY USED FOR IMPLEMENTATION OF THE PROJECT

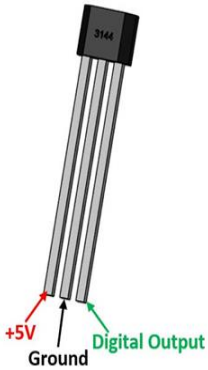
4.1.1 Hardware

4.1.1.1 Components

Component	Quantity
ATtiny85	1
5mm LED (White)	6
LM7805	1
8 pin IC base(2.54mm)	1
Hall effect sensor	1
DC motor	1
10µF	1
0.22µF	1
0.1µF Ceramic capacitor	2
Copper wire(30cm)	1
Schottky diode	1
Infrared sensor	1
General purpose bored	1
switch	1

4.1.2 Sensor

4.1.2.1 Hall effect sensor

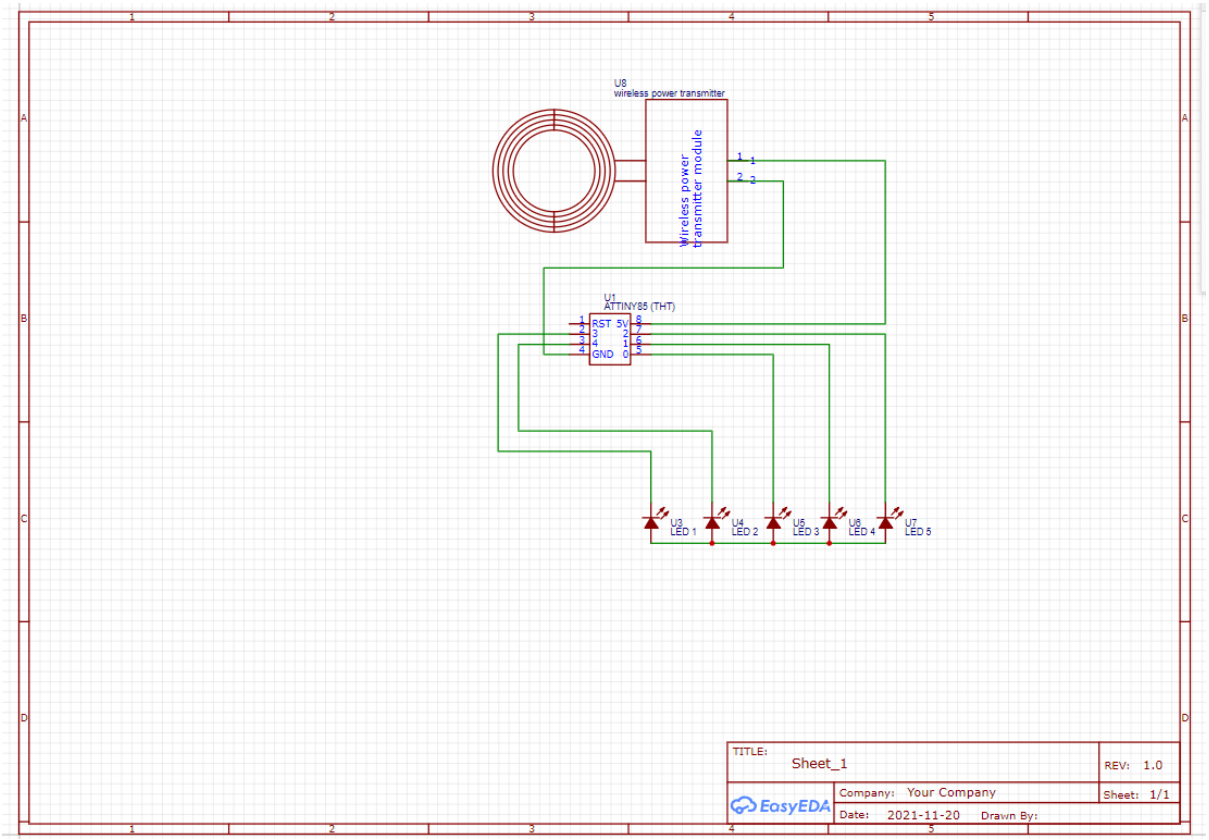


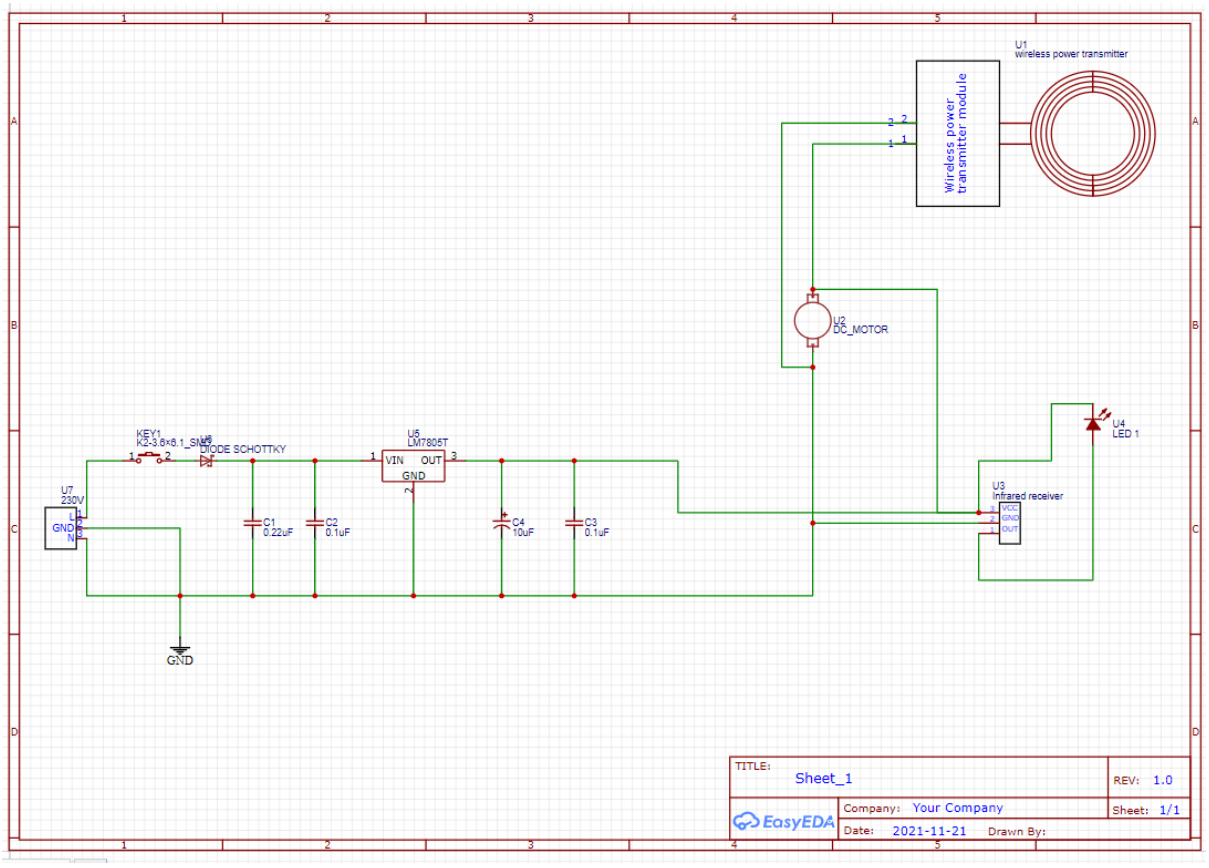
We use Hall Effect sensors to monitor the rotation speed of each motor. The Hall Effect sensor we use is US5881 which has south pole detection and is active low. When the sensor detects the south pole of the magnet, it generates a LOW voltage signal, otherwise, it stays at HIGH. By attaching the magnet to the spinning axle and counting the times that the sensor sends a falling edge signal, and is divided by the time interval, we can calculate the RPM of the motor. Although our motors have encoders for RPM monitoring, it lacks the function of indicating the position of the LED, so we finally choose to use Hall Effect sensor. This measurement is calculated externally and added to the programming.

4.1.2.2 Infrared sensor (IR sensor)

IR sensor is an electronic device, that emits light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as to detect motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations.
In this project we are using this sensor like a switch. We can access in any remotes.

4.1.3 Schematic





4.1.4 Software

4.1.4.1 Arduino (IDE)

We using Arduino (IDE) program microcontroller. We made an Arduino sketch to upload to the ATtiny85, so the Arduino would be the logical choice for uploading to the ATtiny85. After you, hook up the microcontroller, and upload the sketch.

4.1.4.2 EasyEDA

We used a sketch schematic diagram in EasyEDA software.

5 GANNT CHART

5.1 PROJECT TIMELINE INCLUDING A GANNT CHART

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Allocation of task by register no
Starting date of the week	16th Aug	23th Aug	30th Aug	6th Sep	13th Sep	20th Sep	27th Sep	4th Oct	11th Oct	18th Oct	25th Oct	1st Nov	8th Nov	15th Nov	
Proposal making															AA1377
Research															AA1377
Program development															AA1377
Circuit design															AA1377
Assembling															A1377
Error check 1															AA1377
Value addition															AA1377
Error check 2															AA1377

6 BUDGET

6.1 OVERALL BUDGET AND HOW IT IS ALLOCATED AMONG THE GROUP

Component	Unit price (Rs)	Quantity	Total price (Rs)
ATtiny85	350	1	350
5mm LED (White)	2	6	12
LM7805	20	1	20
8 pin IC base(2.54mm)	5	1	5
Hall effect sensor	20	1	20
DC motor	250	1	250
10µF	20	1	20
0.22µF	7	1	7
0.1µF Ceramic capacitor	5	2	10
Copper wire(30cm)	30	1	30
Schottky diode	10	1	10
Infrared sensor	40	1	40
General purpose bored	40	1	40
switch	20	1	20
Net price			834

Expense	Total (Rs)
M.F. Thawfeek ahamed (AA1377)	834

7 REFERENCE

Research

- https://create.arduino.cc/projecthub/theSTEMpedia/persistence-of-vision-pov-display-using-arduino-583d5f
- https://rootsaid.com/arduino-pov-display-tutorial/
- https://maker.pro/arduino/projects/arduino-pov-display

Programming tutorials

- https://youtu.be/UuPsCTvgJAU

Programming ATtiny85 with Arduino Uno

- https://create.arduino.cc/projecthub/arjun/programming-attiny85-with-arduino-uno-afb829

Videos

- Arduino POV display- https://youtu.be/JrcKJOdjQN8
- Infrared receiver switch- https://youtu.be/ks0bJKX4JH0
- Wireless power transmission- https://youtu.be/4UmVLfFNx7U

Data sheets

- ATtiny85- https://www.alldatasheet.com/datasheet-pdf/pdf/174761/ATMEL/ATTINY85.html
- Infrared receiver- https://category.alldatasheet.com/index.jsp?sSearchword=Infrared%20receiver&gclid=Cj0KCQiAtJeNBhCVARIsANJUJ2F1qByVa6INBtbsiTdHAUn2umMBJyIXJUcu4Nam7g-U5G43Qu5gaR4aAjSDEALw_wcB
- LM7805- https://www.alldatasheet.com/datasheet-pdf/pdf/82833/FAIRCHILD/LM7805.html
- Hall effect sensor- https://www.alldatasheet.com/datasheet-pdf/pdf/515289/FCI/FH130.html