PERSISTENCE OF VISION (POV) DISPLAY USING ARDUINO

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Abstract: Persistence of Vision (POV) Wands are a fun way to create interesting long exposure photographs and light displays. This project aims to design and implement a novel Persistence of Vision (POV) display system. Our primary goal is to craft an LED display that not only conserves energy but also minimizes the usage of LEDs, resulting in a compact and efficient display. By leveraging the principles of persistence of vision, this system enables users to wirelessly transmit images to be rendered using LED lights. The rapid rotation of the LEDs creates the illusion of a vivid two dimensional image as perceived by the human eye. Our project centers on addressing the ever increasing demand for innovative advertising solutions.

Keywords—**POV technology, Arduino, Micro controller, LED display, Microprocessor, IR sensor**

1. **Introduction:** Persistence of Vision, often abbreviated as POV, is an intriguing visual experience that occurs when a continuous perception is maintained even when a stream of light is periodically interrupted for very brief moments, during which no light enters our eyes. The concept of Persistence of Vision finds practical application in the world of technology, particularly in the creation of POV displays [1]. These displays utilize the intriguing phenomenon by swiftly moving a linear row of LEDs through a two dimensional space at a rapid frequency, resulting in the perception of a two-dimensional display. The applications of Persistence of Vision are diverse and can be witnessed in various optical devices, such as the Newton Disc, Kaleidoscopic color top, Thaumatrope, or even the classic rubber pencil trick [2]. This phenomenon is believed to be closely tied to a form of visual memory referred to as "iconic memory." An essential point to grasp about these

visual phenomena is that the human eye doesn't function like a traditional camera, devoid of frames per second[3]. In essence, vision is a complex process where the brain interprets the visual information it receives from the eyes to construct a coherent representation of reality.Previous projects related to Persistence of Vision (PoV) have made significant contributions to various fields, including entertainment, art, and technology.
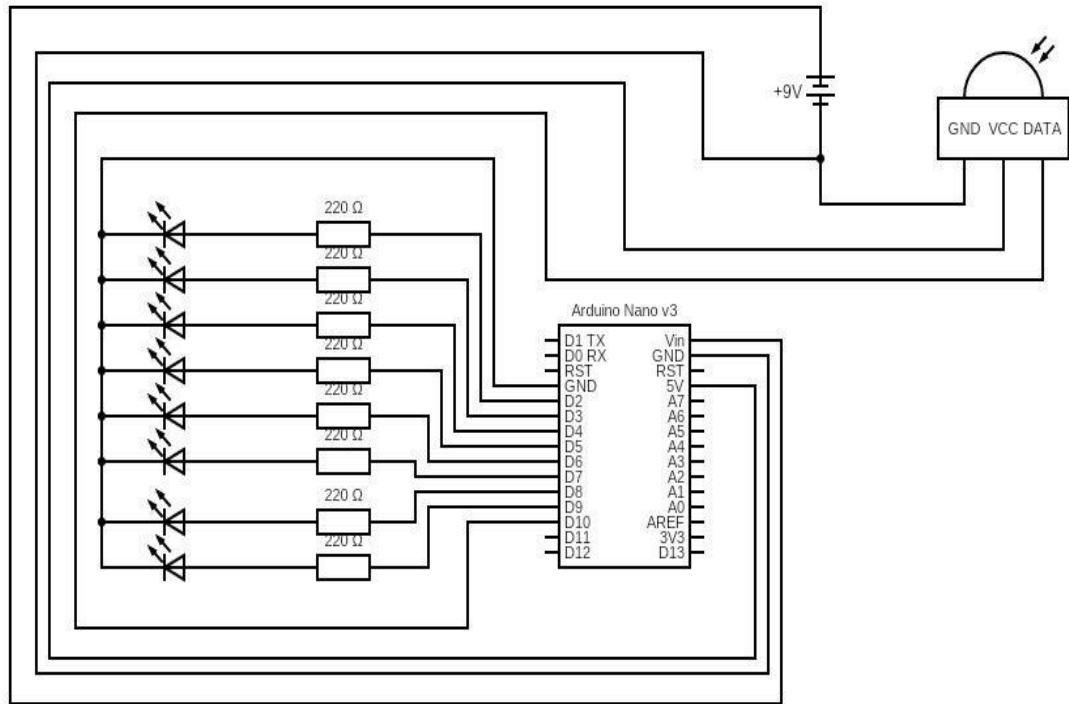
2. Figure and Table:

Simulation and Parameters

Figure 1: circuit diagram

Table1: Required Components

Sl. No	APPARATUS	RANGE	QUANTITY
1	Evive (power supply)		1
2	Arduino		1
3	General Purpose Board		1
4	LEDS		8
5	Resistors	220ohm	8
6	DC Motors		1
7	Battery	9V	1
8	Wires		As per Requirement
9	Glue Gun		1
10	Soldering iron		1
11	White paper		1

3. Result Analysis

The result analysis of "POV using Arduino" circuit is to access it's functionality and performance. When the motor starts rotating the circuit uses its IR sensor to check the starting position, after determining the starting point the LED's connected in the circuit board starts glowing at a predetermined pattern and in a controlled brightness and timing. The code for Arduino Nano is written using Arduino IDE to control the timing and brightness of the LEDs according to the desired pattern. We used the potentiometer to vary the RPM of the motor and we adjust the speed till the desired result.Here are some specific outcomes of the Persistence of vision effects of our project. Illusion of Motion: the primary result is the perception of motion when the individual images are formed rapidly in succession, this effect is achieved through the rotation of LEDs.Smooth animation: After properly leveraging POV results in smooth and fluid animations. Our brain fills in the gaps between frames, create the illusion of a continuous visual experience and we are able to understand the message that is being displayed by our project.

4. Conclusion

Our project's essence lies in the creation and execution of a comprehensive hardware and software system, driven by Arduino technology. This intricate system harnesses a myriad of LEDs and an AC motor to bring the Persistence of Vision phenomenon to life.The development journey encompassed the meticulous design and implementation of software algorithms, electrical infrastructure, and mechanical components, all crafted from the ground up. This collective effort culminated in the realization of our project's primary goal, enabling the vivid display of various images and text on the POV display, thanks to the utilization of an AC motor.

5. References

1. Musburger, Robert B., and Gorham Kindem. Introduction to media production: the path to digital media production. Routledge, 2012.

2. Fonseca, l., vinit, g., gupta, a., miranda, r., & guide, p. P. (2018). Propeller led message display. St.francis institute of techology.

3. Baddeley,A.D(1977).Human memory:Theory and practice.Psychology press

4. d'Arcy,Patrick Sur la durée de la sensation de la vue in Histoire de l'Académie Royale des DCCXV.p.439-451 (1768)

5. Gorham,John (january 1859).The Rotation of Coloured Discs

6. S.Mann, Campus Canada ,ISSN 0823-4531, p55 Feb-Mar 1985, pp58-59 Apr-May 1986, p72 Sep-Oct 1986.

7. 3-D Spherical POV Display with Rotating Semiconductor Line of LEDs Luniewski slawomir,smietanski waldemar and zygmunt bogdan Mechatronics and Aviation Faculty,Military University of Technology,00-908 Warsaw,Poland

8. Aditya patel, asish khandual,kavya kumar,shreya kumar.IOSR Journal of Electrical and Electronic Engineering(IOSR JEE) e ISSN 10 (40),36 40,2015.

9. Himanshu Kashyap,Ashish Jain,Anil Kumar Shukla,Manisha Gururani.2017 International conference of Electronics Communication and Aerospace Technology (ICECA) 2,219 222,2017.

10. Hani Al-Mimi,Ali Al Dahoud,Mohamed Fezari, Mohammad Sh Daoud International Journal of Advanced Sceince and techanology 29 (4),10223-10230,2020.

11. Neyram Hemati,Ming C Leu.IEEE Transactions on Industry Applications 28 (1), 172-180, 1992

12. Undavalli Vivek Chowdary, Kanduru Rohith,Pabolu Sandeep,Mutyala Ramu International Journal of Electrical and Electronics Engineering (IJEEE) 4 (6), 1116, 2015.

13. Mohamed Fezari, Ali Al Dahoud WSN applications, 1-12, 2018.

14. Wavelets and Chirplets: Time-Frequency Perspectives With Applications, Steve Mann,1992.

15. Mann, S. (2018, August). Phenomenological augmented reality with the sequential wave imprinting machine (swim). In 2018 IEEE Games, Entertainment, Media Conference (GEM) (pp. 1-9). IEEE

16. Manihar, M. S. R., Dewangan, M. K. P., & Dansena, M. A. K. (2012). The Design and construction of a low cost propeller LED display. Global Journal of Research In Engineering 12(4F).

17. RamakantA. Gayakwad,Op Amp and Linear Integrated Circuit,2nded, Prentice Hall PTR, 2000

18. Coltheart M. "The persistence of vision." Philos Trans R SocLond B Biol Sci. 1980 Jul 8; 290(1038):57–69.

19. Sharma, M., & Mohan, K. (2015). Low Cost Propeller LED Display. International Journal of Application or Innovation in Engineering & Management (IJAIEM), 4(2), 39-42.