ELECTROMAGNET ACCELERATOR

HASAN TIKIR
AHMET EMRE SOYSAL
MUHAMMET ÖZUFACIK
PROF DR AHMET METE VURAL

Department of Electrical and Electronics Engineering, Gaziantep University,Turkey.

GAZİANTEP ÜNİVERSİTESİ

Abstract

The project created an electromagnetic accelerator with a circular path and four coils to propel a metal ball. Controlled by an Arduino Uno, the system used proximity sensors for precise speed regulation and coil deactivation, ensuring continuous motion. Powered by a 12V, 25A supply and an Arduino-controlled DC-DC converter, it achieved a minimum speed of 50 cm/s, showcasing the potential of electromagnetic systems for efficient, sustainable high-speed transportation.

Block Diagram

Main Compenents

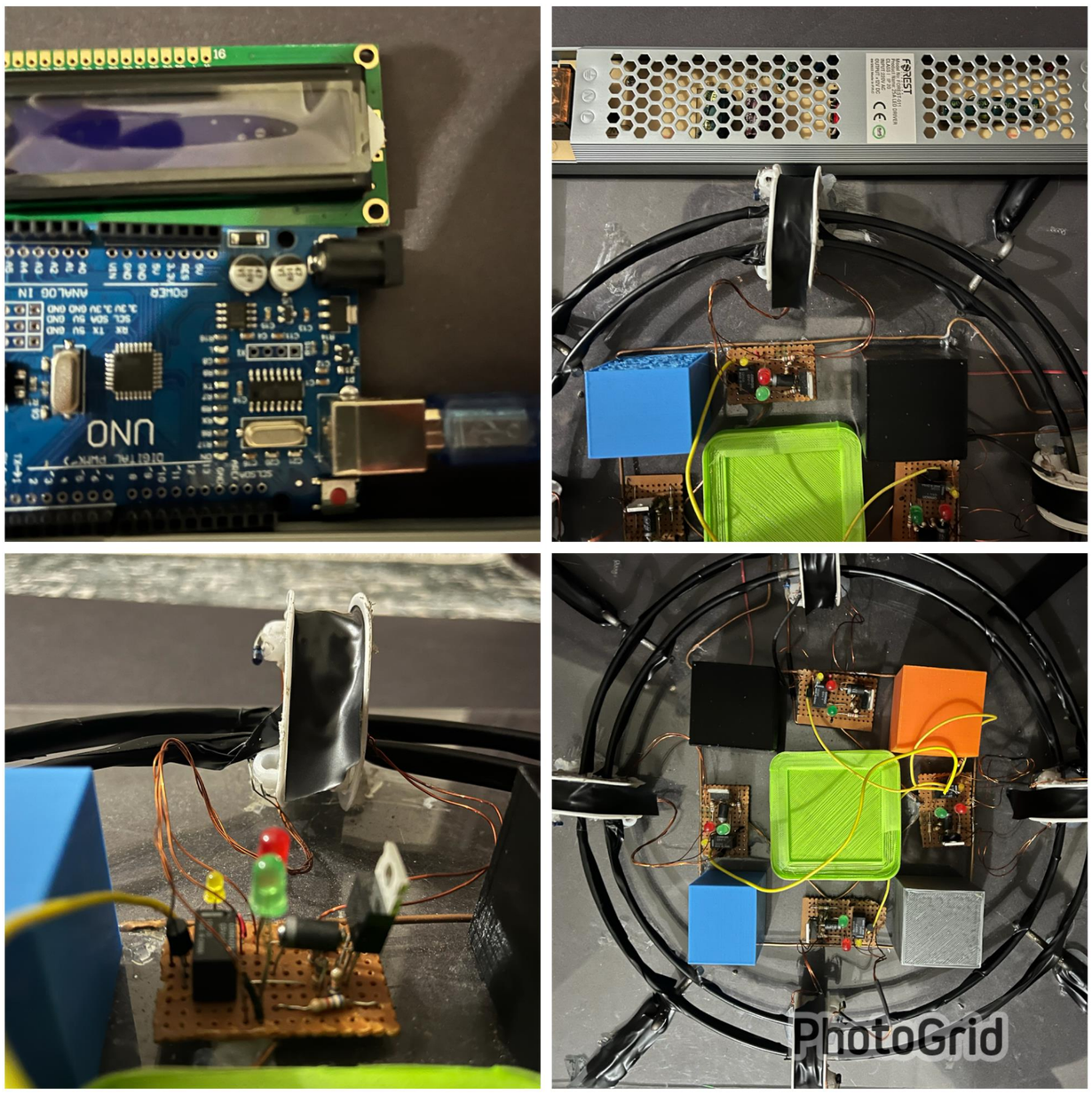
POWER SUPPLY(12V/25A), DC-DC CONVERTER
COILS (COPPER CABLE),
PHOTODİODE,PHOTOTRANSISTOR
OMRON, BJT (BİPOLAR JUNCTION TRANSISTOR), MOSFET
LED, BALL TRACK, RESISTOR

Working Principle

The operation begins with a 12V, 25A power supply that powers the entire system. The Arduino Uno uses a DC-DC converter to adjust the voltage and current, allowing for the fine-tuning of the ball's speed. Proximity sensors are integrated into the setup to detect the position of the ball as it moves along the circular path. These sensors provide real-time feedback to the Arduino, which then deactivates the coils at the appropriate times to maintain continuous motion.

As the ball approaches each coil, the Arduino activates the coil to create a magnetic field, propelling the ball forward. Once the ball moves past the coil, the proximity sensors signal the Arduino to deactivate the coil, reducing energy consumption and preventing unnecessary magnetic interference. This cycle repeats for each coil, creating a smooth and continuous motion of the ball along the path.

An LCD screen connected to the Arduino Uno displays the ball's speed, providing a visual representation of the system's performance. The project highlights the potential of electromagnetic systems in developing sustainable and efficient high-speed transportation solutions.



Conclusıon

Utilizing a circular path with strategically placed coils, the system, managed by an Arduino Uno and monitored via proximity sensors, achieved continuous and efficient propulsion of a metal ball. The inclusion of a DC-DC converter enabled precise control over the ball's speed, while an LCD screen provided real-time speed data. This endeavor not only demonstrated the viability of electromagnetic propulsion but also underscored its potential for future high-speed transportation solutions, highlighting the promise of sustainable and efficient propulsion echnologies .

References

Erickson, R.W., & Maksimovic, D. (2007). *Fundamentals of Power Electronics*. Springer
Knight, J.D. (2004). *Coils and Magnets: An Introduction to Electromagnetic Devices*. Springer.
Purcell, E.M., & Morin, D.J. (2013). *Electricity and Magnetism*. Cambridge University Press