Automated Chess Board System

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Introduction

Chess is an ancient strategy game in which you aim to move pieces strategically to defeat your opponents and finally checkmate them. We want to combine the time-tested chess techniques with automation technology with our Automated Chess Board System. Chess players now have a platform to practice and enjoy the game by competing against artificial intelligence (AI). Players may successfully develop their skills and view their strategies play across the board. It transforms commands into movements on an electronic chessboard.

Design

➢We used two drivers for two motors one on each axis, here's a schematic for one of the motors

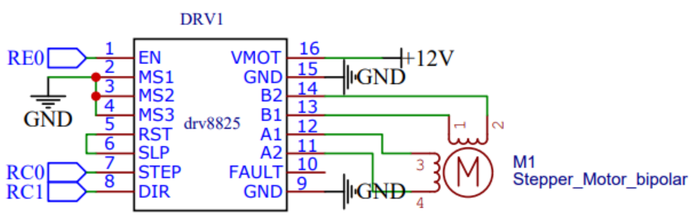


Figure 1: DRV8825 Driver, Nema 17 stepper motor.

The NEMA17 stepper motors, were linked to DRV8825 drivers. These motors function by converting a negative edged step signal into precise 1.8-degree rotational movement.

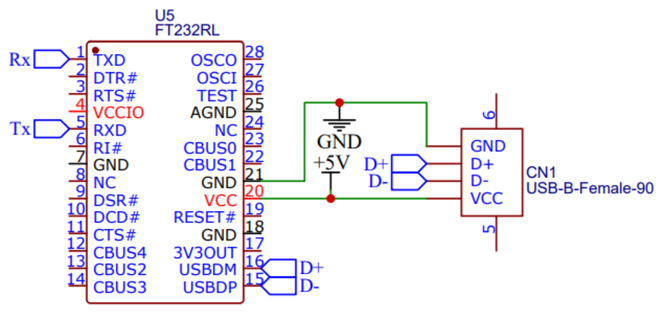


Figure 2: USB to serial chip DT23RL

With the physical components in place, the system's code was developed to interpret and execute chess moves received via serial communication from a Python script. The received data contains information on the type of move and the specific board squares involved. The microcontroller's program was refined to respond accurately to the serial commands, translating them into the precise movements of the chess pieces on the board.

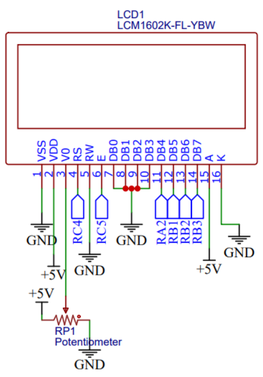


Figure 3: LCD Screen

The LCD screen provides real-time updates on the game's status, indicating whether it's currently the player's round or the bot's round. It also displays whether the game is in progress or waiting for the user to initiate it. Additionally, the difficulty level is seamlessly controlled through a potentiometer, allowing users to fine-tune the challenge to their preference before starting the game.

Results

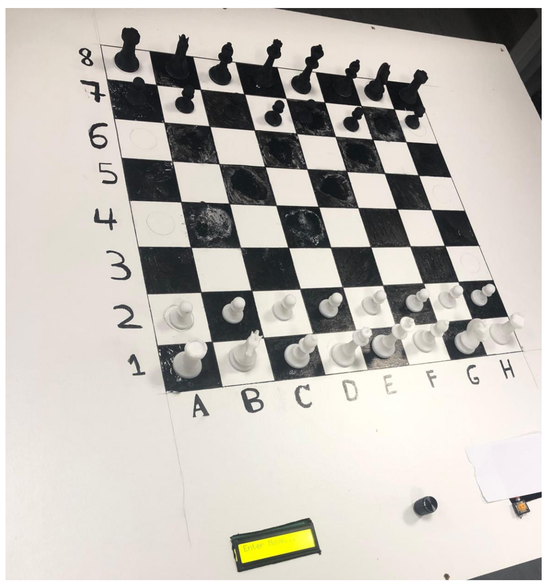


Figure 4: Chess Board

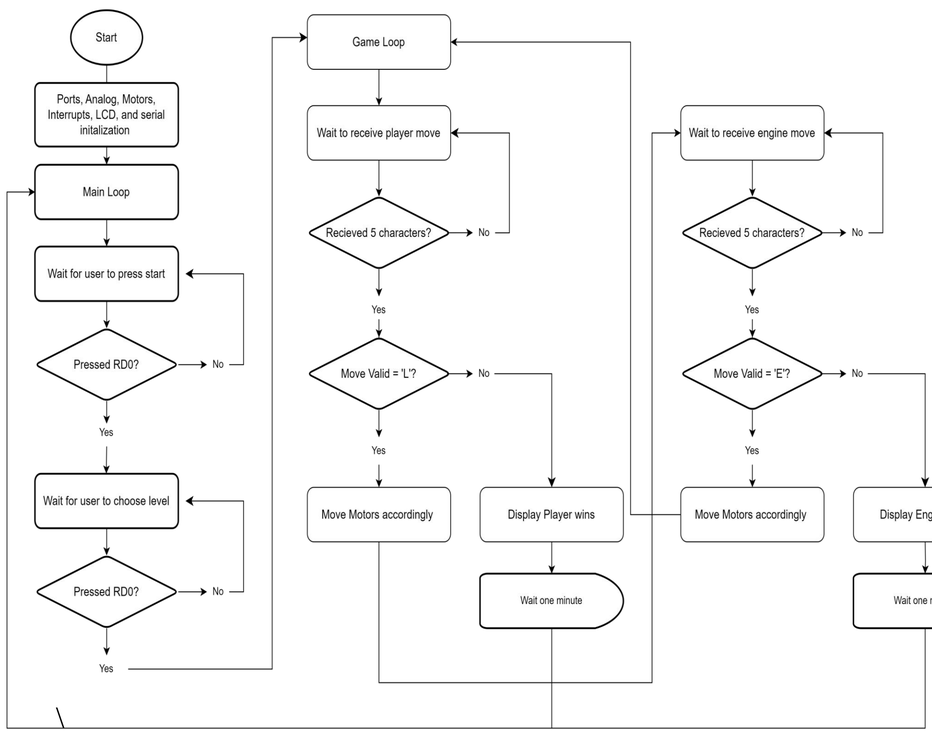
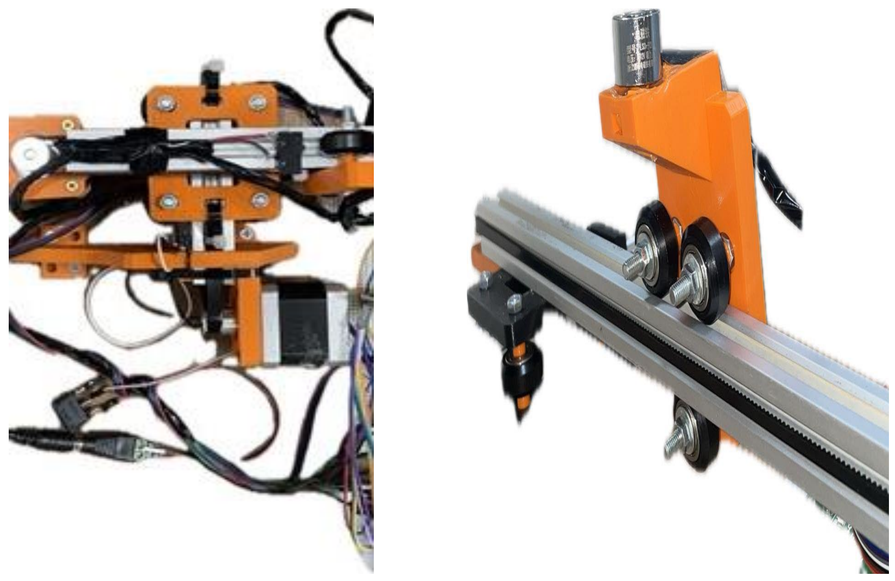


Figure 5: Software flowchart



(a) **(b)**

Figure 6: (a)) X and Y Axes , (b) Electromagnet

The physical structure of the chessboard was constructed using 3D-printed parts, attached to aluminum profiles and GT belts for the X and Y axes.

Electromagnet was added for piece manipulation. The electromagnet was attached to a custom 3D-printed part.

Conclusion

With an astounding 80% accuracy in piece movement, the Automated Chess Board System demonstrates the effective integration of artificial intelligence with mechanical chess. Further improvement is possible, especially in the area of magnet alignment.