

DESIGN AND IMPLEMENTATION OF ELECTRONIC CONTROL FOR THE MALTESE CROSS MECHANISM

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Abstract

The Maltese cross mechanism is used for operations requiring intermittent drive. In motion control, speed and driving direction is important. Nowadays, various electronic circuits for acceleration and deceleration of a movement is designed. In this study, the Maltese cross mechanism designed and implemented physically. Hall effect sensors are placed on this mechanism. Whereby the rotation speed and direction, is detected. motor speed was controlled according to the information received. Atmega-based Arduino MEGA 2560 is used for control. It is also programmed an LCD screen to be seen the user's information.

Keywords: THE MALTESE CROSS MECHANISM, ELECTRONIC CONTROL

INTRODUCTION

Maltese cross mechanism, known as the Geneva drive mechanism has been found by the Geneva watchmaker.[1] There are two circular wheels moving in this mechanism. While one wheel rotates at a constant speed, the other is working intermittently. This mechanism is used in many fields. Maltese cross mechanism shown in figure 1.

Examples of systems that use this mechanism are as follows; hour production, wrapping system can be stress test.[2, 3]



Fig. 1. Maltese Cross Mechanism

Maltese cross mechanism is designed to be physical in this study. Sensors are placed on the designed mechanism.

Thus, the rotational speed and direction of these mechanisms have been identified. Speed

and direction control is performed. for mechanism with developed electronic circuits.

MATERIAL AND METHOD

Mechanism is made of a polymer based material mechanically. Wheels is bearing in accordance with the design.

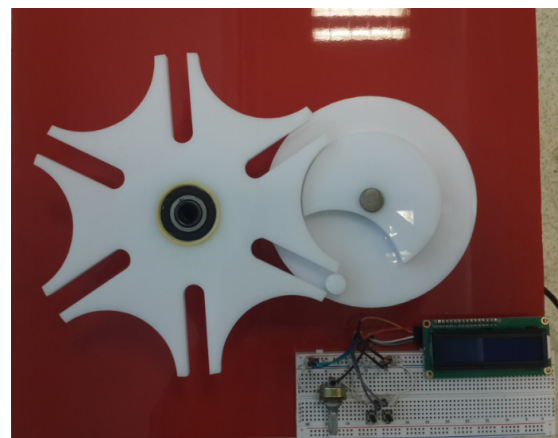


Fig 2 - Produced Maltese cross mechanism

Two sensors mounted on the wheels by a circular motion. These sensors will detect the

rotation speed and direction. Hall effect are used as sensors.(fig 3) [4]

This sensor detects the magnetic field. This reason, magnet is placed across to the sensor.

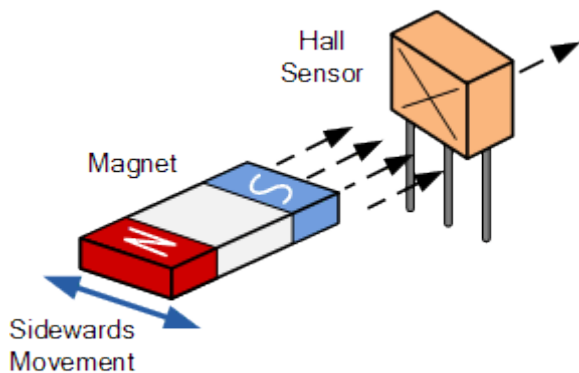


Fig 3. Hall Sensor (Ugn3177)

The processing of sensor information is made on Arduino. Arduino based microcontroller ATmega is a platform. There are digital and analog inputs and outputs, USB communications port. The Improvement of the program and Uploading to Arduino are made by software free and open source. Arduino hardware and software is shown on figure 4.[5]

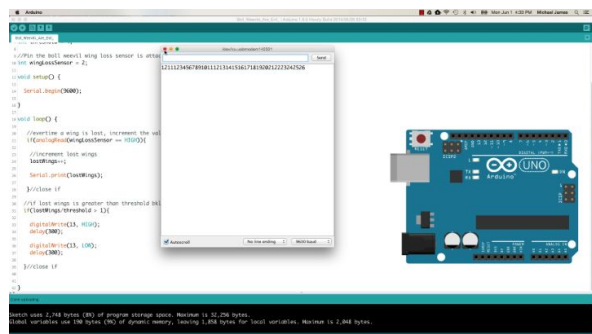


Fig 4. Arduino and Software

Software for speed and direction control mechanism has been developed. 16x2 LCD display is used for data entry and tracking.

In practice, 200rpm 12V DC geared drive motor (Fig 5) is used. As the motor drives, the Arduino motor shield (Fig 6) is used.



Fig 5. 12v 200rpm DC Motor



Fig 6. Arduino motor shield

10K potentiometer to adjust the motor speed and direction of rotation is used to change the two push buttons on board. (Fig 7)

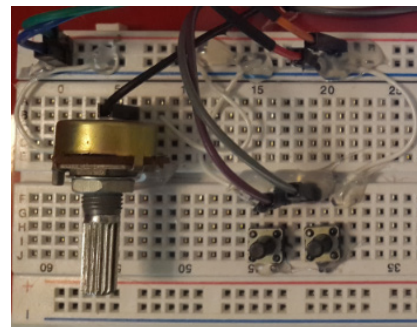


Fig 7. Potentiometer and Pushbuttons

For starting the rotation of the motor must be pressed together for 3 seconds to enter in both directions. The same process step is applied to stop the engine. 16x2 LCD display to show the direction of rotation and the instant rotation speed (Fig 8) is used.

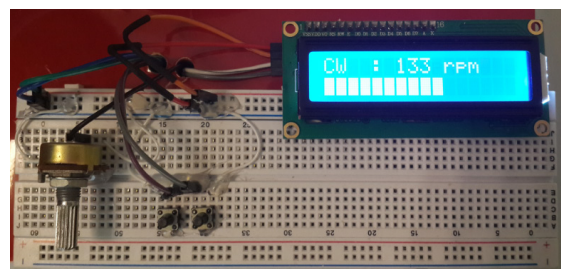


Fig 8. 16x2 LCD display

CONCLUSION

In this study, the Maltese cross mechanism is designed physically. Rotation direction and rotation speed of the mechanism being controlled without physical contact with Atmel Mega2560 Arduino-based development board. Rotation direction and rotation speed can be easily changed by the buttons and potentiometers on the board. This information also can be tracked in real time on the LCD

screen. In conclusion, this study will contribute to researchers working the Maltese cross mechanism.

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