

LEGO Power Brick Sorter

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Abstract

A team was assigned to a faculty advisor, Dr. Demir, to demonstrate specific engineering tools and the extra skills being taught in both the Mechanical and Electrical Engineering departments at NIU. Our assignment was to create a LEGO machine that sorts bricks by color. The LEGOs will have their pictures taken by a light sensor and will be sorted into bins based on their color with an Arduino board. Our team implemented strategies that accomplished a favorable outcome that resulted in sorting the LEGOs as programmed.

Introduction

LEGO was founded in 1932 by Ole Kirk Kristiansen and is currently one of the world's largest manufacturers of toys. They were created to simulate happiness and promote imagination, creativity and development. It was our mission to design an automated machine to sort LEGO bricks to remove the time spent by humans in order to provide more time for building creations, while also recycling existing sets to create something new.



Figure 1. Examples of LEGO bricks

Methods and Materials

Our prototype combined a light system (sensor), programming, DC motors (drive) and 3D components (Figures 2-4) to sort LEGO bricks by color.



Figure 2. Chute

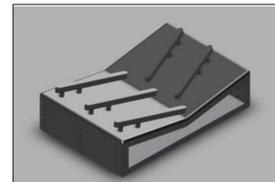


Figure 3. V-Plate

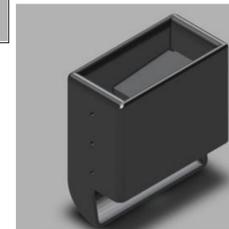
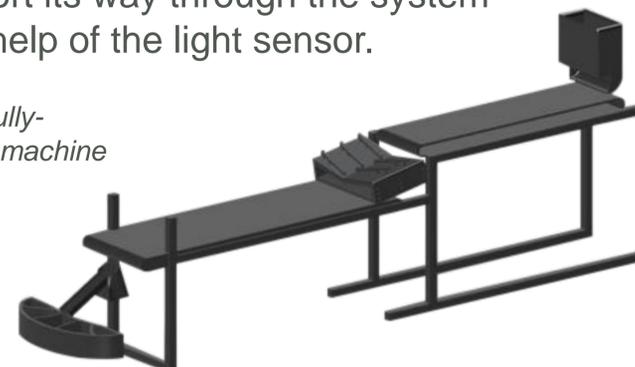


Figure 4. Feeder

Results

Using the light sensor and the Arduino, we were successfully able to sort our LEGOs by color. The sensor was able to read the code and distinguish what bin the LEGOs should be placed in. When the bricks fell into the chute system, they did pile up in the funnel, but was able to sort its way through the system with the help of the light sensor.

Figure 5. Fully-assembled machine



Discussion

Although there are other versions of a LEGO Brick Sorting machine, we invested many hours to create a new way to efficiently sort bricks. With the help the Arduino board, we created code to read and sort LEGOs based on color. Due to awaiting parts and unplanned modifications, we were unable to fully execute the project by also sorting bricks by weight. A more compact design for easy maneuvering is an improvement to be considered.

Conclusions

Our project provides a solution to sorting LEGO bricks, which is a tedious and time-consuming task. While the overall design is simple, we were faced with trial-and-error situations that ultimately altered our initial design. In conclusion, the project requirements were satisfied while staying under budget and passing safety guidelines.

Acknowledgements

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