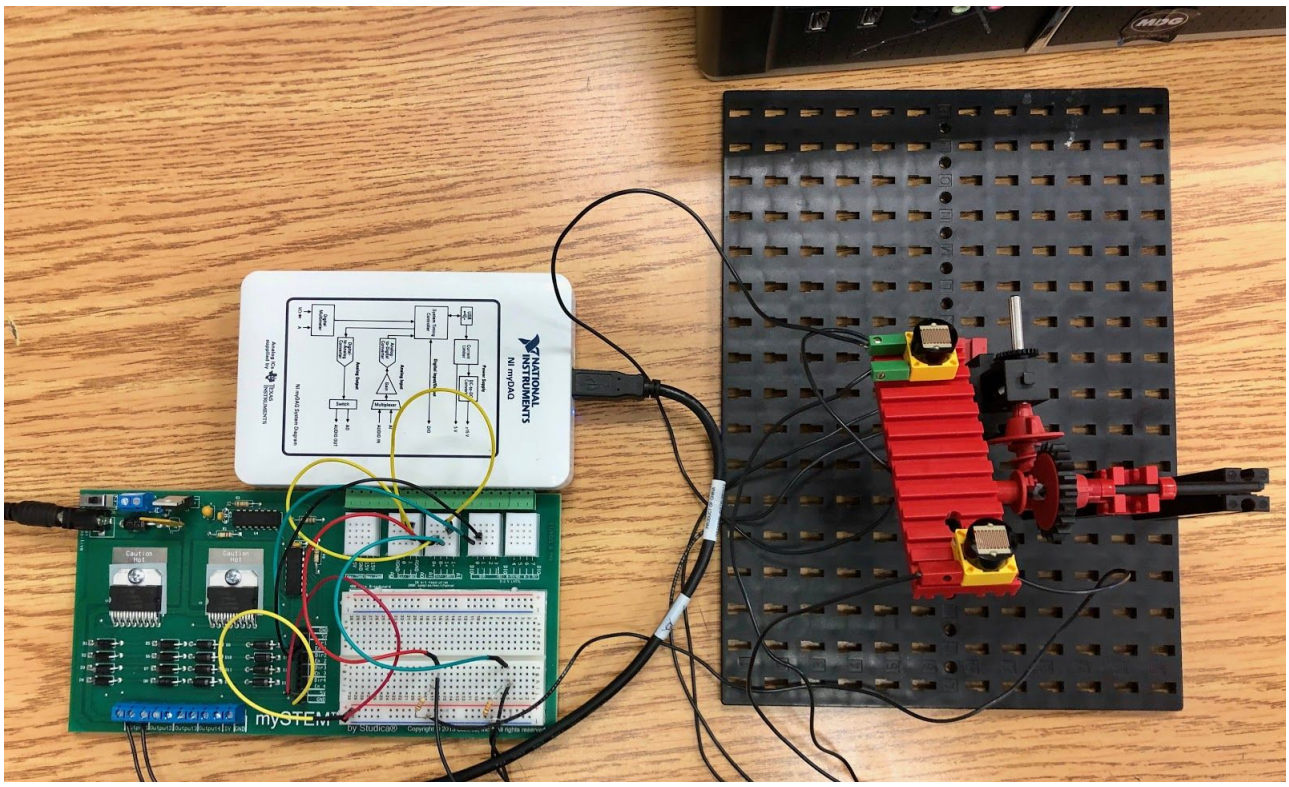
Creating a Labview Solar-Tracker



ABSTRACT

The world's demand for energy is increasing every day. Since the earth is coming closer towards the drastic implications of climate change, it is becoming crucial that society transitions towards a more sustainable source of energy. Solar energy is one of the many renewable and sustainable energies that are available to us. It is inexhaustible and clean source of energy produced by the sun; which has the potential to save society from a pitfall.

INTRODUCTION

The goal of this project was to create a functional solar-tracker using technology provided by National Instruments. The project was constructed through the use of the myDAQ system and the program was compiled using LabVIEW. The structure of the solar-tracker consisted of plastic building blocks provided by FischerTechnik.

FEATURES

The solar-tracker had the ability to track light in one plane by moving both left and right. The direction the tracker would move was dependant on which photoresistor had the greater reading for voltage. For instance, if the left photoresistor had a higher voltage reading, it would cause the motor to spin and move the solar-tracker towards the light. To improve the movement of the solar-tracker, a worm gear with a relatively large radius was utilized. Additionally, the way the program interprets the input from the sensor was changed by using the mean values to determine whether to move or not. This resulted in the platform moving at a

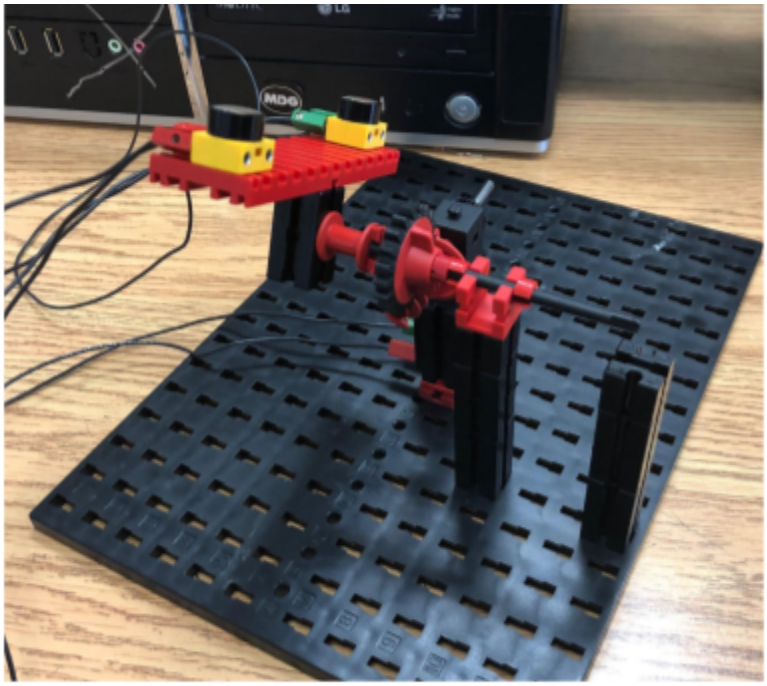


Figure 1 - Solar-Tracker Setup

slower and more consistent speed. The solar-tracker utilized a motor to move the platform in the direction of the light source (where the light is coming from). A picture of the solar-tracker is setup is shown in figure 1. The code blocks that implement these functions are shown in Figure 2. As shown, a digital voltage meter shows the current voltage reading for both photoresistors. Note that the larger truthy and falsy code blocks are relatively the same for both the left and right photoresistor.

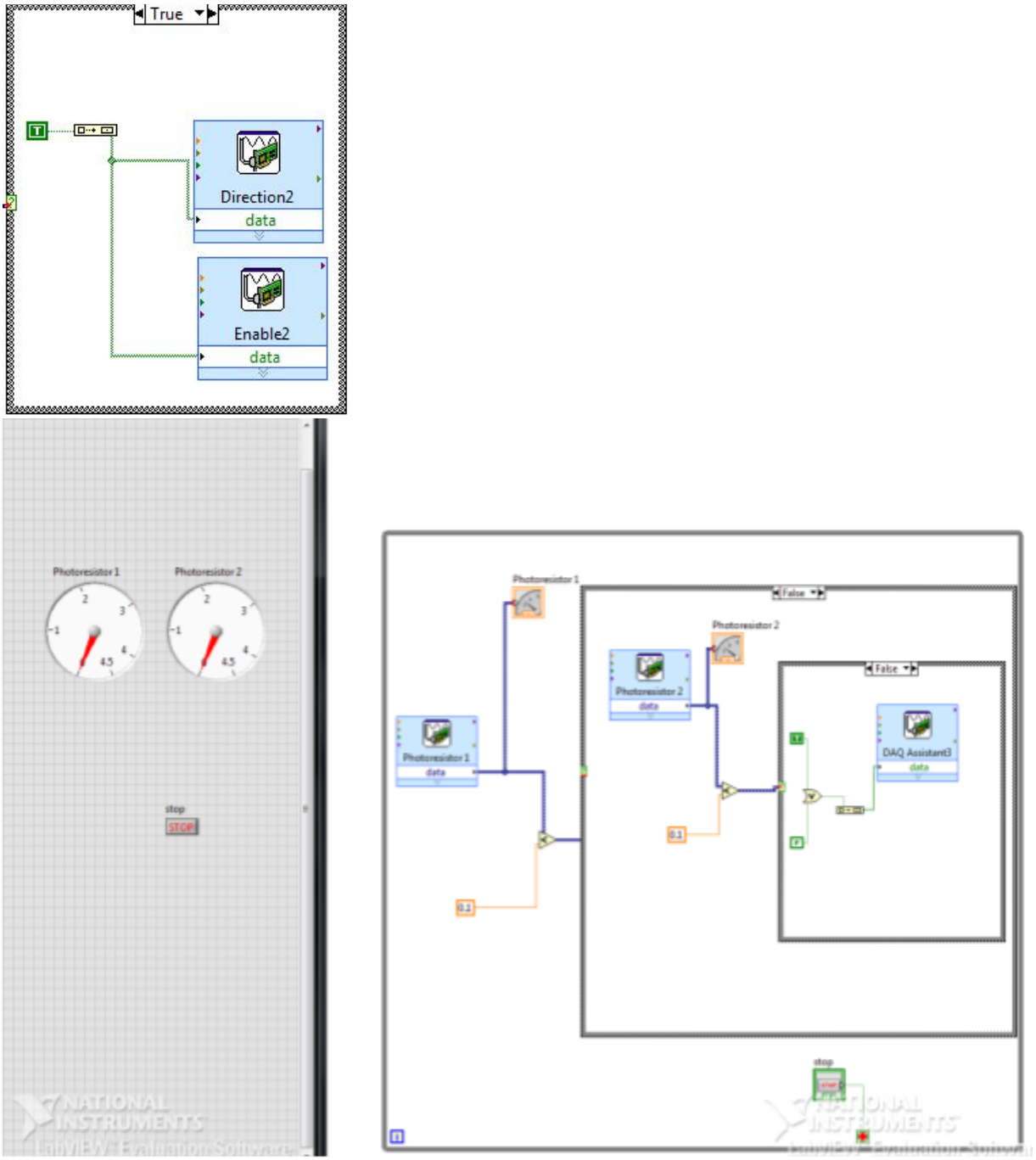


Figure 2 - LabVIEW Code

CHALLENGES

When constructing the solar-tracker, there were many obstacles that needed to be quelled. One of the problems faced while designing the solar-tracker was an adequate way to control the speed of the motor. Several resources stated that a motor controller chip was necessary to control the speed of the motor. Since this chip was not provided to us, we had to get creative in the way that we slowed down the motor. To do this we drastically changed the design of our solar-tracker, such that it would require the rotation of a worm gear consisting of a large radius. This slowed down the movement of the solar-tracker because of the fact that a worm gear increases the force applied to another gear but decreases the speed at which the gear moves (due to contact time).

NEXT STEPS

While designing and building the solar-tracker, many different ideas about how to improve its functionality were thought of. However, due to time and resource constraints, these ideas were not able to come to life. Nonetheless, given more time and resources, many features would be implemented that would help increase the efficiency of the solar-tracker and use it in a variety of applications. For instance, given more parts (i.e. photoresistors and blocks) and time, the solar-tracker would be able to support tracking light in multiple planes. As a result, it would be able to capture the most amount of light possible as the tracker would be able to move its photoresistors precisely towards the most intense light. Another feature would be to increase efficiency of the solar-tracker by using a voltage controller to control the motor speed. The current build uses a large worm gear, which causes energy to be wasted, whereas the voltage reduction would allow for less energy to be consumed. Additionally, to improve the amount of light captured, the current photoresistors would be replaced with ones that have more electrodes. This would also allow for a more accurate reading of the energy being captured. Photoresistors are used to read voltages, but are not used to actually convert light energy to electricity. Hence, a change would be to replace the photoresistors with photocells as it allows for a much broader spectrum for applications using the solar-tracker. Also, to improve an on-site troubleshooter's experience using the solar-tracker, an on-site display would be implemented to allow the troubleshooter to see what the current voltage reading is along with the current digital voltage meter.

Conclusion

Overall, this project was a fun way to explore the different applications of technology using the myDAQ system and LabVIEW. I learned how to work with LabVIEW's block programming architecture and was able to create my own solar-tracker through previous experience and from online resources. In conclusion, this was a great challenge and way to learn about myDAQ and LabVIEW and will help me with future projects as well.