

Medium resolution infrared curtain model

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Introduction

This project was proposed by the module supervisor David Heys for the EL3990 module.

The objective was to design and build a infrared curtain capable of detect objects bigger than 25 mm.



Figure 1. Object bigger used to test the project.

The project uses a Microchip PIC16F1829 to control system, it is a mid range microcontroller powerful enough to run six barriers with 32 beams each.

Materials

The PIC16F1829 was programed using MPLAB X, the IDE for PIC from Microchip and the XC8 C compiler for PIC. It is placed in a custom PCB designed by me and produced by the personnel in Stores.

The model is made of a main wooden piece and two smaller planks to add stability.

Development

During the first stage of the project different topologies were studied to position the IRLEDs and the IRphotodiodes. The final design is a column of IRLEDs on one side being powered in a circular sequence.

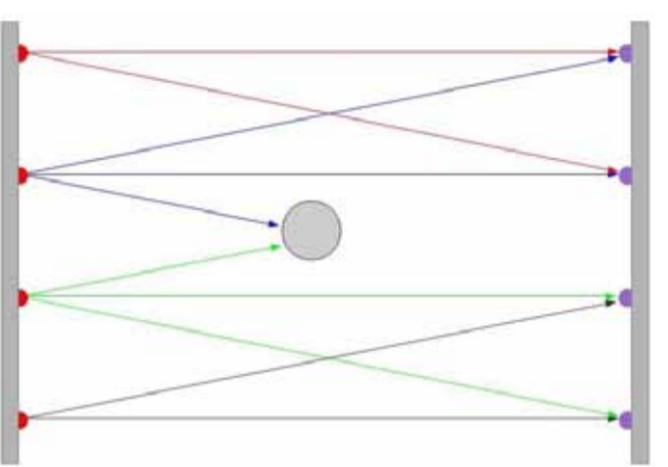


Figure 2. Schematic of the final design structure.

To control this cycle the PIC was loaded with a program based on the next flowchart.

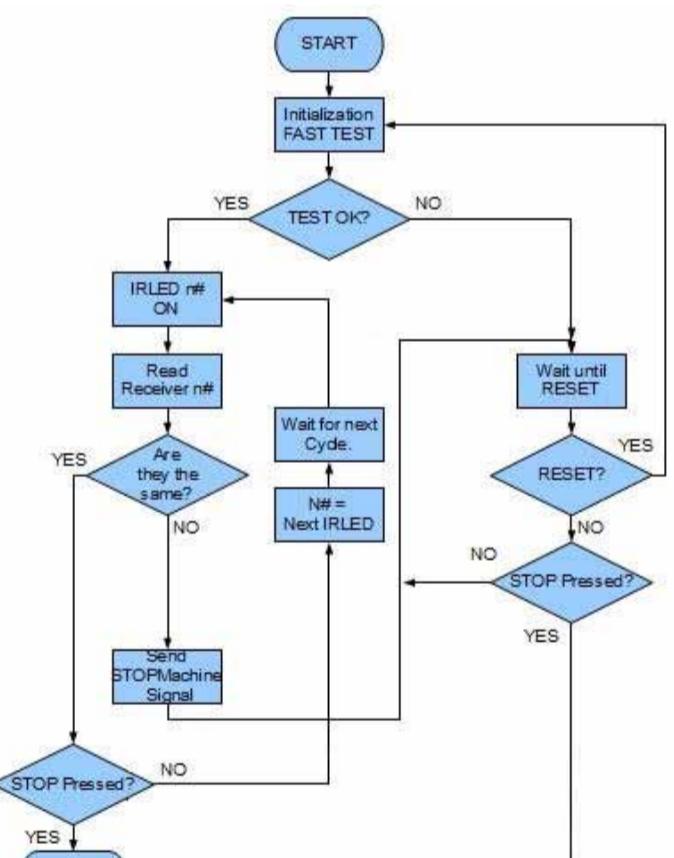


Figure 3. PIC's program flowchart.

Acknowledgments

To UCLan and EINA for letting me make this project here, and all the staff in both universities.

To my family and friends for the support given all this year in special at the final stage.

To Tim Berners-Lee for inventing Internet and Colin Purrington for the poster design guide.

Results and future work

The model was built completing the objective of the project. It was also tested, but the outcomes were not as good as expected, because it did not work on every test performed.

Some possible causes can be:

- Faulty soldered connection, even it looks OK sometimes there can be problems (Checked)
- Different light level during the test. Visible light has a infrared spectrum zone that can disturb the model's correct operation.
- Small misalignment or a small angle deviation can be significant after one meter, causing the photodiodes not detecting properly the Infrared light emitted on the other side of the barrier.

Future work will have to focus on solving all these problems and any other one that can be derived from this new solutions. Fixing the components stands to a frame will likely solve two of the problems, and a photodiode with a better quality daylight filter will reduce the probability of the other main problem.

Once the previous issues are solved the future work can head for better performance and resolution of the curtain or adding more curtains to the same microcontroller.

Conclusions

This project's main outcome was the infrared curtain model but it also has given other not material results.

One of them is the knowledge on how to make a project from the beginning: the planning, the design, the written report and this poster. This will help me in any future project.

Other important new things can be described in the following proverbs:

- "If you want something done, do it yourself."
- "Measure twice and cut once."
- "K-I-S-S (Keep It Simple Stupid.)"

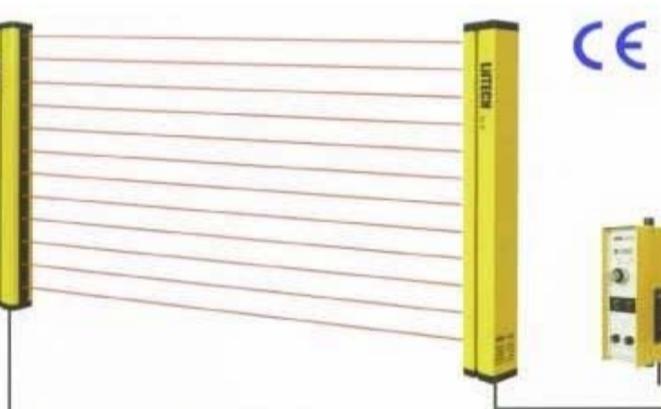


Figure 4. Commercial light barrier.



Figure 5. Finished project model.