Electronic Diary Integrated Project 2

The project is about making a laser navigation system, first we defined what we wanted to do and how, for that we talked with our teachers, and we proposed a shopping list that included the materials for this project.

So, to introduce the electronic part we need to introduce a bit the entire project, the project is going to work by making a base rotate with a motor, this base will have a mirror in the top with an angle of 45 degrees, so the laser can be on, and the beam of light can be projected in a straight line to the other mirrors that are 90 degrees from the floor. Then it must receive the light back and produce a signal the time it receives the light back, so then the position of the robot can be calculated.

Now that a bit of the idea is given, all the electronics can be explained. For the first step we need a laser, that must always be turned on, we need a phototransistor for receiving the light back when its reflected, we need a motor, to rotate the basis, a 5V Voltage regulator, a hall sensor for measuring the speed of the motor and an ESP32 to control all of this and a driver for the motor to control the power and sense of rotation.

This shopping list is the first one, we still must do some tests and verify if everything works correctly or check if we need materials, in order to make the electronic part.

First Shopping list focused on the electronic part:

ESP32(9.99): <https://www.amazon.es/AZDelivery-NodeMCU-ESP-WROOM-32-Tablero-Desarrollo/dp/B071P98VTG/ref=asc_df_B071P98VTG/?tag=&linkCode=df0&hvadid=420332609952&hvpos=&hvnetw=g&hvrand=14602736816684025879&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=1005469&hvtargid=pla-367709801435&ref=&adgrpid=98816269809&th=1>

Laser module (16.88): <https://www.digikey.es/es/products/detail/quarton-inc/VLM-650-03-LPT/1010454>

2x Fototransistor (1.08): <https://www.digikey.es/es/products/detail/vishay-semiconductor-opto-division/BPW85C/4071266>

Motor 12V (13.99): <https://www.amazon.es/ANGEEK-12V-36V-3500-9000-Electronic-Component/dp/B08NVSQ8N4/ref=sr_1_2_sspa?__mk_es_ES=%C3%85M%C3%85%C5%BD%C3%95%C3%91&crid=HK8NUN2RFOIE&keywords=motor+dc&qid=1644505687&sprefix=motor+dc%2Caps%2C227&sr=8-2-spons&psc=1&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUExRVZTQUhGQVEwNTRPJmVuY3J5cHRlZElkPUEwMDU2NzM0Mk5VVUVXMEZaQkFMUCZlbmNyeXB0ZWRBZElkPUEwNzQ1MjE1MUM5R1dIWFUxUTRFQyZ3aWRnZXROYW1lPXNwX2F0ZiZhY3Rpb249Y2xpY2tSZWRpcmVjdCZkb05vdExvZ0NsaWNrPXRydWU=>

Driver for the motor (5.9): <https://www.amazon.es/Movilideas-Puente-Bridge-Stepper-Controlador/dp/B089DPPKQ1/ref=pd_sbs_3/260-4747883-9252714?pd_rd_w=MXWDf&pf_rd_p=bead054f-de1a-4d92-98b9-04253f60cdcd&pf_rd_r=Y75NW6Y8MG54B7Z2EYJD&pd_rd_r=7184554b-d43a-498d-812e-3e36fdf0c227&pd_rd_wg=NEjnU&pd_rd_i=B089DPPKQ1&th=1>

2x Hall sensor (0.94): <https://www.digikey.es/es/products/detail/diodes-incorporated/AH3582-P-B/9649755>

The reason why we decided to go for this motor and this laser module is because we were told that the motor must have a speed of 5Hz and it has a strong torque, and the laser module must have a maximum power of 1mW because of security.

After this, we had to calculate the power that all these pieces were going to use so we can figure out a way to give this the enough power to do it:

Table

Description automatically generated

In order to get these values, we investigated the datasheet of every component so we could find the numbers that the manufacturer is giving to us.

Then we started to design in Fritzing, the reason why we chose this program is because it has a lot of options and has a big community, so you can find pieces that are not there by default and import them into the program, so this is what we did.

We looked for the files of the pieces in the community page, then we imported in into the program. Now that we have the pieces, we must check how are these components connected so we don’t make any mistakes in the electronic design.

Talking about the hall sensor in the datasheet we found two images that are the important ones:

Diagram

Description automatically generated Table

Description automatically generated with medium confidence

After knowing this the design in fritzing begin:

We select the components, and we start wiring, in this window that is called breadboard, but we need to wire everything correctly, because there’s something more important after that is the schematics.

A picture containing diagram

Description automatically generated

This is the design with the images, but again in here we only need to wire this. Something that makes the design easy is that all the pins have the appropriate name, so they are easy to identify.

Then we go to the schematics, we select the autoroute option so what this does is that based in the last thing we did in the breadboard window it shows us the electronical schematics design wiring it in an appropriate way.

Diagram, schematic

Description automatically generated

This is the full design.