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**SUMMARY**

The ICESI University has a library that contributes to the active formation of the students through a wide portfolio of services that integrates several sources of scientific, academic and cultural information (Syri DS, s.f.).

The library does not have a system that allows reaching in a quick way the location of the books. Since the existing system, OLIB WebView, with a key word, title, author subject or subject ovides the availability of the material, the floor in the one that is located and a code for his search more not the specific location in the library, which makes that the process of search is longer than should. It is for it that arises the need to make a robot follower of line who finds the books of an automatic way through a database with the spatial location and a route divided by colors in each of the racks.

Key words: Location, search, route, database.

**OBJECTIVE**

**General objective**

To develop a system of control that simplifies the search of bibliographical physical material to final user of the University Icesi.

**Specific objective**

* To develop an algorithm that allows the robot to follow, and at the same time to guide a user for a specific route, on there having been deposited a request of search of bibliographical material.
* To design routes of search that agree with the physical space of the library, the location is necessary rack and the sections, and to store them in a database, together with the numbers of bar codes of every book.
* To realize tests(proofs) in physical spaces of simulation that facilitate the validation of functionalities, as well as corrections and improvements of the algorithm, routes of search and design of the system.

Carry this project the work was divided in the following items:

* Elaboration of the text of follow-up:
* Functionality and design
* Programming
* Assembles
* Simulation of programming

**PROBLEM OF INVESTIGATION AND JUSTIFICATION**

When a student of the university community wants to search a book in the library, a need is observed, since the page of the digital library, OLIB WebView, indicates the location of the book by a code that must be looked by bookshelf until the desired book is found. The problem is that people invest a lot of time searching it, because they do not know the logic of the code. Therefore, the project will be done with the purpose of reducing time and facilitating finding of a book.

In addition, in the long term this mechanism is intended to be applied to industrial projects where it is necessary to find a product that is in inventory. The robot would be able to go to the place where the product is to take it and to go to the space where it was requested.

**USED METHODOLOGY**

The development of this work presents the following items:

**1. Programming:**

The main program must read the location of the book written by the user and be able of choosing the exact route to find that book.

The logical steps to achieve the task are the following:

1. Ask the user to enter the codebook to search it.
2. Read the information entered by the user.
3. Compare with the database the information entered by the user.
4. If the comparison is successful, choose the route to continuing, the color of route to continuing and the location.
5. By not being this way, it send a message to the user to that people returns to depositing the information.
6. Send the order to the robot in order that it follows the indicated route.
7. The robot follows the indicated route.
8. The robot changes to the route specified by the color.
9. The robot comes to the location, but only with regard to the axes X and located in a Cartesian digital plane of the soil.
10. On having come to the designated location, one shows to the user the location Z of the book by means of the help of a laser.
11. The laser is activated and raises the point laser up to the location of the book.
12. After 10 seconds, the laser is extinguished and returns to his initial position.
13. The robot returns to his location, on having invested the previous route.
14. The information of search is cleaned.
15. The system is ready for a new search.

The robot must be capable of following a route limited in the floor and of correcting his course automatically if it was managing to get lost of the same one.

All that thanks to the action of three sensors, two actuators, a controller (PLC) and finally the algorithm of programming, which is the principal base of this milestone.

The logic of programming to follow the route is going to be the following one:

The program starts and evaluates the information of the track sensor, when the sensor is on the route, the sensor sends a digital equal sign to one, which does that the engines synchronize and the robot advances on line straight line. The sensor is evaluated constantly and if the sign is equal to one, the process of synchronization keeps going, of not being like that, the engines are stopped and it begins the process of rectification of route (PRR), which also is connected in the initial evaluation of the sensor.

1. The PRR has two options of take-off:It is given if in the first evaluation the sensor sends an equal sign to zero.
2. If after the synchronization of the engines the sensor sends an equal sign to zero.

when PRR initiates makes turn the first engine towards the right, while the sign got for the sensor is evaluated, of being one, the engines synchronize again. Of not being like that, the first engine is stopped, and the second engine is started towards the left side, the same thing happens if the sign of the sensor is one. This execution realizes a sweep of the track to identify again the route and to correct the course. Finally, of being a zero the sign, the second engine is stopped and the PRR repeats itself.

**2. Assemble**

The robot was assembled taking the guide as a base of fischertechnik: ROBOTICS-TxT Discovery Set.

However, in the course of the project parts have been modified for to replace the needs of the same one.

**3. Simulation**

To check that the robot goes in a correct way in the realized system, simulations will create that the persons contain the majority of the components as the space, the time, etc.

A space will be reserve to adapt it specifically to the simulation and this way, to be able to verify that the sensors work following a route, in several sheets of cardboard. This route will be marked by black tape from the place where it is supposed that the persons are going to use the robot even you them would be of the books, which also will be simulated.

The robot will identify for what book it is going to look to go to the place and then it will indicate with a laser where the exact position of the book is.

If the mechanism expires with the requirements at the time it would remove to the practice in the library to observe what other factors can affect the simulation.

After obtaining the results of the established simulations, it will pass to test the robot in the second floor of the library, in order to verify of that the made algorithms work adequately.

There is going to be designed the route of the library, of the following form:

* Measuring the distance of the library
* Distance between the computer and the corridor
* To do a plane to scale of the library
* Designing the route of the robot
* Establishing colors for shelves

**RESULTS FORESEEN**

To expire with the specific aim, the following milestones will be fulfilled:

Milestone 1: In the week 10, it is necessary to be done with the following points:

* To finish constructing the robot
* To programme detector of route (black color)

Milestone 2: In the week 11, the following points are had:

* To correct failings of the previous milestone if it appears.
* To programme detector of route in a curve (black color)

Milestone 3: In the week 12, it wants to be fulfilled with:

* To correct failings of the previous milestone if it appears.
* To obtain the codes of every book of the library.
* Designs the routes of the library.
* To programme change of route of colors.

Milestone 4: For the week 13, it owes:

* To correct failings of the previous milestone if it appears.
* The programming route simulates library black color.
* To measure shelves the library.
* The programming Simulates route of colors.
* The database keeps and realize with the codes of the obtained books.
* To realize route of library.

Milestone 5: In the week 14

* To correct failings of the previous milestone if it appears.
* To simulate search of the guarded information
* Simulation of the programming of all racks

Milestone 6: In the week 15

* To correct failings of the previous milestone if it appears.
* To join the database to the programming of the route.
* To prove the software and the system in the library.

Milestone 7: In the week 16,

* To correct the mistakes of programming and other failings of the system in total.

**BIBLIOGRAPHY**

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