**ICESI XPLORER**

by

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**Abstract**

As time passes, Industrial Engineers have searched the ways to optimize every process that is relevant to the field, the purpose of this Project is to merge programming and optimization disciplines in an efficient manner, because nowadays, efficient use of resources is key to human development. Initially, the project is aimed at educational purposes. The project consists of a robot that has the capabilities to be autonomous in almost every way. The robot must traverse Icesi’s campus unsupervised, and without interaction with human controllers. This is an ambitious project with multiple applications in a variety of fields. For instance, the information gathered by the robot can be used to map the easily accessible paths of Icesi´s campus, this information can then be used to generate welfare to the handicapped population of the university, by building or improving existing roads so they can be traversed by anyone, including handicapped people. The project can also be used to provide services for the university, services like internal post, that currently is performed by human carriers. All this can be achieved with the use of multiple technologies, including GPS systems, distance sensors, path finding algorithms and many more.

**Key words**

Autonomous, Paths, Robot, Vehicle, GPS, Mobility, Programing, Fischertechnik,

**Investigation problem**

How to build and designs and autonomous vehicle capable of traversing Icesi’s campus, identifying all accessible paths for itself, based on its locomotive system, all this keeping its material integrity (the vehicle should be able to avoid harm for itself).

**Justification**

The construction of the robot is necessary to show in a definitive way, which are the less accessible paths in Icesi University´s campus. This information is relevant because it can be used for multiple purposes, with integration with other technologies, it could be used to generate a human traffic map at various times of the day inside the university’s facilities, also, Icesi’s staff could use it to perform transportation labors that can be easily automated. This project could offer multiple integration with other VIP projects.

**Objectives**

General Objective:

Design and build a prototype of an autonomous vehicle using Fishchertechnik framework, that is to transit unsupervised around Icesi’s campus, avoiding danger to itself and others.

Specific Objectives:

* Build a model capable of accomplishing the project requirements.
* Program an algorithm that is capable of travelling autonomously and avoid dangers.
* Integrate all software and hardware components in a single prototype that is functional and capable of operating without human interaction.

**Methodology**

* Conceive the idea and define the Project scope: The scope of the Project should be clearly defined, along with the prototype’s functionality.
* Design and construction of the physical structure: The design for the physical structure will be conceived considering the basic functions that it should have. The, the model will be constructed using a Fischertechnik model.
* Development of the movement algorithm: The autonomous movement algorithm will be designed and implemented. This algorithm should be in capacity of guiding the robot through an open space with obstacles.

**Expected results**

* As a minimal result, the expected vehicle prototype should be able to navigate itself, avoiding obstacles that it finds in its path by correcting its course in real time. The prototype should have minimal movement capabilities in a closed space.