NEYART Journal
ISSN: 2992-7161

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DOI: https://doi.org/10.61273/neyart.v4i1.176 **Received:** 12/23/2025 | **Accepted:** 03/03/2026 | **Published:** 04/02/2026

Abstract-- The project is titled "Pinpoint Rescue - We Locate, Guide, and Rescue." It is an innovation project focused on the manufacturing, subscription sales, and installation of vehicle tracking devices, developed in the Kotlin programming language and utilizing circuit design techniques. The system enables vehicle monitoring via real-time GPS technology, specializing in theft cases, thereby enhancing security and fleet management. This project arose from the need to support the security and protection of society's assets. According to data reported by Forbes, in 2023, 61,222 insured vehicles were stolen in Mexico (Forbes Staff, 2024), representing a 2.3% increase compared to 2022, according to data published by the AMIS (Mexican Association of Insurance Institutions, 2023). In response to this problem, the project proposes a pilot technological solution in the municipality of Ahome, Sinaloa, featuring intuitive software and hardware that provides access to vital information such as dashboards and performance reports, real-time location tracking, more efficient routes, and a community section where users can receive assistance from other users and experts. The proposal also includes a subscription system, which will improve the management and recognition of active customers and enhance service quality by maintaining a customer history and generating usage statistics, which will serve as the basis for providing recommendations.

Keywords-- Automotive, Location, Community, Software, Telefónica.

Abstract-- The project is titled **"Pinpoint Rescue - We Locate, Guide, and Rescue."** It is an innovation project focused on the manufacturing, subscription sales, and installation of vehicle tracking devices, developed using the Kotlin programming language and circuit design techniques. This enables real-time vehicle monitoring through GPS technology specialized for theft recovery, enhancing security and fleet management. The project arises from the need to support public safety and the protection of property. According to Forbes, 61,222 insured vehicles were stolen in Mexico in 2023 (Forbes Staff, 2024), representing a 2.3% increase compared to 2022, based on data published by AMIS (Mexican Association of Insurance Institutions, 2023). This project is intended to be carried out as a pilot program in the municipality of Ahome, Sinaloa. The software design will be intuitive and supported by robust hardware, aligned with the electronics industry, to monitor fuel consumption.

The goal is to provide access to essential information such as performance dashboards and reports, real-time location tracking, efficient routing, and a community section where users and experts can offer assistance. As a business, a subscription system will be implemented to improve the management and recognition of active clients, enhancing service quality through customer history and usage statistics that will serve as the basis for providing recommendations.

Keywords: Automotive, Community, Location, Software, Telephony.

INTRODUCTION

According to Forbes, 61,222 insured vehicles were stolen in Mexico in 2023 (Forbes Staff, 2024), representing a 2.3% increase compared to 2022, according to data published by AMIS (Mexican Association of Insurance Institutions, 2023). Given the rise in theft of insured vehicles, a strategy is needed to protect vehicle owners. Additionally, with the high cost of fuel, our project includes a feature designed to optimize the most convenient routes, thereby reducing additional fuel costs. Therefore, we can say that this project has an impact on the automotive security sector. Another important piece of data comes from an article published in the newspaper "El Debate," which reported a total of 221,987 vehicles in Ahome (Corral, 2023). This data is of utmost importance since the project will be developed in that municipality. This vehicle tracking and monitoring device has a significant and diverse potential market, as it can be used for both business and private purposes.

DEVELOPMENT

Theoretical Foundations

Mobile programming languages**:** The programming languages used to develop the project are Kotlin and Dart. Kotlin: is an open-source language officially supported by Google for Android development; it was designed as an alternative to Java and has a number of features that make it easier to write object-oriented code (Hardik, 2020). Regarding the Dart language, a framework called Flutter is used; it is an open-source framework created by Google that allows for the development of mobile apps for iOS, Android, and the web. The Flutter framework offers an interface with widgets that adapt to different platforms, allowing the developer to create a single interface without having to

writing code for different platforms. The Dart programming language, on which the Flutter framework is based, has a simple syntax that is easy for developers to learn.

The device used as a prototype, which enables the connection between the vehicle's indicators and the mobile app, is the Arduino. The **Arduino** is a development platform based on an open-source electronic board that incorporates a reprogrammable microcontroller and a series of female pins that allow connections to be established between the microcontroller and various sensors and actuators in a very simple manner (MCI Electronics, 2024). Some of the most commonly used models include the Uno, Leonardo, Mega, Nano, and ProMini, among others. Various modules can be connected to these boards, including modules that enable GPS communication via a cellular chip. These modules support different communication protocols, allowing communication with a mobile device via Bluetooth, Wi-Fi, infrared, etc. Some of the modules on the market that can interact with the Arduino board are: Velleman VMA430 U-BLOX Neo-7M GPS Module for Arduino, NEO-6M/NEO 7M Micro USB GPS Satellite Positioning Module for Arduino, NEO-7M/NEO-6M 51 for Arduino STM32, SIM808: GSM/GPRS+GPS.

Figure 1. Velleman VMA430 U-BLOX Neo-7M GPS Module for Arduino,

Figure 2. NEO-7M/NEO-6M 51 GPS Mini Module for Arduino

Google Play Services APIs: The Geolocation API is a service that accepts an HTTPS request containing the cell towers and Wi-Fi access points that a mobile client can detect. It returns latitude and longitude coordinates and a radius indicating the accuracy of the result for each valid entry (Google for Developers, 2024). This API was used to obtain GPS location and map data**.**

METHODOLOGY

The Kotlin programming language (Hardik, 2020; Lee, 2013) and Dart with the Flutter framework were used to carry out this project, implementing the use of APIs to ensure consistency

to the data obtained via the GPS device (C.V., LSI Localización Satelital Integral S.A. de, 2016),

In conjunction with software development, we are designing a prototype of electronic circuits that will provide access to key information, such as vehicle dashboards, performance reports, real-time location, and more efficient routes.

The project designs and develops a community section [1]that enables community participation to enhance the success of vehicle tracking and where users can receive assistance from other users and experts. This module will be added to the mobile app

Once the functionality of the app and the prototype is ensured, designs will be created to produce a product with an intuitive interface that optimizes routes.

Finally, a subscription system will be implemented as a payment method, with the aim of tracking the various issues customers may encounter. The subscription system allows for better management and recognition of the company's active customers, and this tracking helps improve the experience in handling vehicle theft cases. The company is strictly committed to providing quality service in accordance with the company's core values, such as: gender equality, inclusion, respect, integrity, confidentiality, and environmental stewardship

RESULTS

This project contributes to a vehicle management solution that has a significant impact on the transportation and logistics sector. It enables real-time vehicle tracking and provides crucial information on vehicle performance and safety, improving operational efficiency and fleet security through the implementation of our device in conjunction with the software (app) for optimal functionality. In other words, the software is designed to be used on any mobile phone, which enables us to reach a broad user base—from individual vehicle owners to large corporate fleets—thus facilitating widespread adoption of safer and more eco-friendly driving practices. This accessibility and versatility can position our

[1] A "Rescue Community" is a term used to refer to a strategy that seeks to respond to the urgent needs of a community or individuals in the event of a disaster or when they are in danger

solution as a market-leading innovation, offering tangible benefits for both users and the environment.

	FlotPoint Rescue	Lojark	SG Flota	WebFleet
LOCALIZACIÓN EN TIEMPO REAL	SI	SI	SI	SI
EXCESO DE VELOCIDAD	SI	SI	SI	NO
INFORMES PERIODICOS	SI	NO	SI	SI
HISTORICO DE RECORRIDO	SI	NO	SI	SI
COBERTURA NACIONAL	SI	SI	NO	NO
COMUNIDAD	SI	NO	NO	NO

Table 1. *Note: This table shows the features the product will offer compared to the competition*

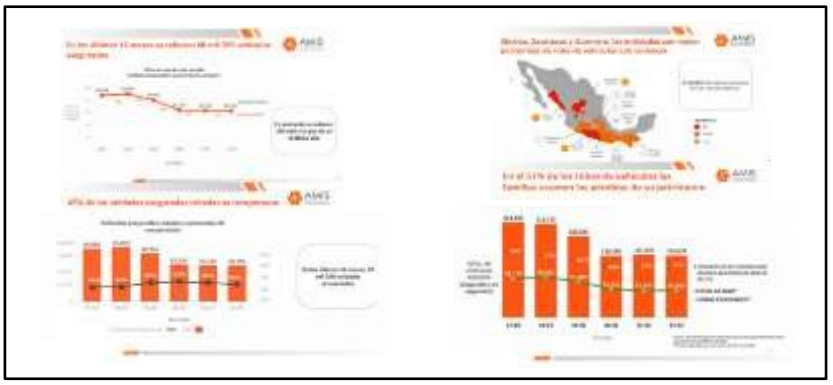

Figure 1. *Note: Vehicle theft figures in Sinaloa represent a high percentage for insurers, making the development of a mobile vehicle tracking app supported by a Rescue community feasible*
Data from the Mexican Association of Insurance Institutions (2023)

CONCLUSIONS

The main innovation of this product is that it allows users to track vehicle locations in real time, obtain relevant information on fuel consumption, and access dashboards and performance reports through driver analysis. Another feature implemented in the software is the rescue community, which allows users to receive assistance from other users and experts, all through a highly intuitive and user-friendly interface. The rescue community feature aligns with Goal 16 of the 2030 Agenda for Sustainable Development: “Peace, Justice, and Strong Institutions” (UN, Mexico, 2023), and the

performance and fuel economy analysis contributes to the achievement of Goal 11 (Sustainable Cities and Communities) (UN, Mexico, 2023).

It should also be noted that the theft rate in the state of Sinaloa—where the pilot project will be carried out—is high. This has an impact on the economic performance of businesses, for which vehicles are a key source of revenue. To a greater or lesser extent, and directly or indirectly, the impact on economic security in the business sector affects the entire community. This project helps the business sector increase the likelihood of locating a stolen vehicle and thus prevent financial loss.

Finally, we can note that security and/or the sense of security regarding our material possessions—in this particular case, vehicles—is highly valued. To achieve this goal, it is essential to correctly utilize technology and the knowledge acquired by other community members who share their experiences, as well as to seek guidance from knowledgeable individuals—an objective this project aims to achieve.

Following the implementation of the pilot project in the municipality of Ahome, Sinaloa, the following strategic lines are being considered for the evolution of Pinpoint Rescue:

Geographic Scalability and Strategic Partnerships: We plan to expand service coverage to the state and national levels by establishing direct collaboration agreements with the Secretariats of Public Safety and the AMIS to streamline protocols for recovering stolen vehicles through shared access to real-time location data.

Integration of Artificial Intelligence (AI): We plan to implement machine learning algorithms for predictive data analysis. This will enable the identification of risk patterns on specific routes and the issuance of preventive alerts to users before they enter areas with high crime rates, based on up-to-date data from platforms such as the SESNSP.

Hardware Optimization and Advanced Telemetry: Future hardware development will focus on integration with the On-Board Diagnostics (OBD-II) system to provide preventive monitoring of engine condition, collision detection with automatic notification to emergency services, and even more precise fuel management through high-sensitivity flow sensors.

Community Ecosystem Expansion: The goal is to strengthen the app's social component, transforming it into a citizen response network where safety experts and users can generate real-time traffic reports, creating a dynamic heat map of urban safety.

Sustainability and Electric Mobility: Given the growth of the electric vehicle market, work will be done to adapt devices to monitor battery health and charging efficiency, aligning the company with sustainable mobility trends.

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