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Vehicle Theft Detection System

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Abstract: Vehicle theft has increased significantly in several nations as a result of the growth of vehicles. The safety of the car may thus depend heavily on a vehicle theft monitoring equipment. Theft of vehicles has been a major issue in recent years, and it needs to be tracked, recognized, and regulated. Safety and defense of the vehicle are essential. The GSM is the component that connects the DC motor. Using a GPS app and the wireless module, it was possible to locate a vehicle. As a satellite-based navigation system, a GPS system can precisely locate a car in any weather. A GPS device provides the position's latitude and longitude. With the aid of a GSM module that is connected to the vehicle, the owner may now manage the ignition of the vehicle and start or stop it with the simple click of a message.

Keywords: GSM Technology, Vehicle Tracking, GPS, Internet of things (IoT), SMS, Motor, GSM modem, Ignition key.

I. INTRODUCTION

Car crimes lead to vehicle theft and trafficking, which have an impact on owners, organisations in charge of insurance and public safety in every nation, and linkages to significant organized criminal networks. Modern systems based on cutting-edge technologies must be put in place to help law enforcement agencies and vehicle owner's track, regulate, retrieve, and apprehend thieves in order to prevent car theft. With the technology that is being demonstrated, pursuing vehicles may be monitored and controlled using a GSM modem and a microcontroller. The entire system is mounted to the vehicle, and the microcontroller has been programmed with the approved user numbers. Every time the vehicle is started, the module will send an SMS. You can be certain that there is an unauthorized individual in your car if you receive a text message while not behind the wheel. In response to the module's SMS, the approved person gives or sends an SMS to control the movement of the vehicle and disable the ignition control. We can use GPS to locate the vehicle's location. The owner of a car can track the sensor data graphically utilising this data from anywhere in the world.

II. LITERATURE SURVEY

As technology has advanced in recent years, various methods and inventions used in a variety of industries. The primary focus of vehicle theft detection is on the various lock systems or monitoring and managing a vehicle from a distance. These kinds of gadgets can't be practically inferred since the logic has to be updated and there are a number of flaws.

"Development of an Anti-Theft Vehicle Security System using GPS and GSM Technology with Biometric Authentication" journal paper published by AKINWOLE BUKOLA in 2020. It talks about the GPS and GSM modules which were utilized to prevent theft and to determine the exact location of vehicle and a fingerprint reader module to identify authorized persons and thus start the engines. One of the biggest issues is if the vehicle is theft during when it's on then there is no way to control it. [7]

"Real time anti-theft vehicle tracking system using GSM and GPS" journal paper published by M. SIDDHARTH in 2020. It talks about how module is combining GPS, GSM for conveying data and Arduino-UNO R3 microcontroller and how Information is displayed by Google Maps after storing it in the server. This made use of web and mobile applications for tracking and retrieving information. One of the main disadvantages is that it can only track the vehicle and does not have any methods to control the movements of the vehicle. [11]

"Smart Transportation Tracking Systems Based on the Internet of Things Vision" journal paper published by W.FERNADO, RUWANI.M, SAMARAKKODY in 2020. It talks about the security administration could monitor by remotely tracking their RFID sensor tags or any IoT sensor embedded in the tracking unit. This also reviews and provides relevant information for road traffic officers and related experts, correspondence technologists, and technological innovation researchers on the IoT-based smart vehicle tracking frameworks. [8]

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Journal paper titled "Web based Vehicle Tracking, Monitoring, and Security System" was released in 2021 by JAAFAR A, A.LNOOR, and A.MUSTAFA. An electronic device installed in a vehicle that allows the owner or a third party to follow its whereabouts is referred to as a vehicle tracking system. The position of the vehicles (Coordinates) is sent using a GSM modem from a remote location. One of the biggest drawbacks is that it can only track a car during a burglary; it has no control over it. [9]

"Smart Asset Tracking" journal paper published by SUSHMA T in 2021. It talks about the tracking device is designed implementing GPS and GSM Technology which is controlled by STM32 Microcontroller. GPS module used is Quectel L76 and GSM modem is SIM800C.Mainl used for embedded system. [10]

III. PROPOSED SYSTEM

The proposed system is designed in such a way that it must overcome both the shortcomings of the current systems and the extra features that are missing from them. The foundation for IoT-based vehicle theft detection is described. The suggested solution eliminates the majority of shortcomings in the systems and methods now in use because there have been various processes employed to locate a stolen car up to this point. A SMS with the current location and an alarm message is sent to the authorized user as soon as the dc motor starts, signaling that the car has been stolen. The authorized user may then send an SMS to stop the vehicle.

10 IOT Design Methodology Step

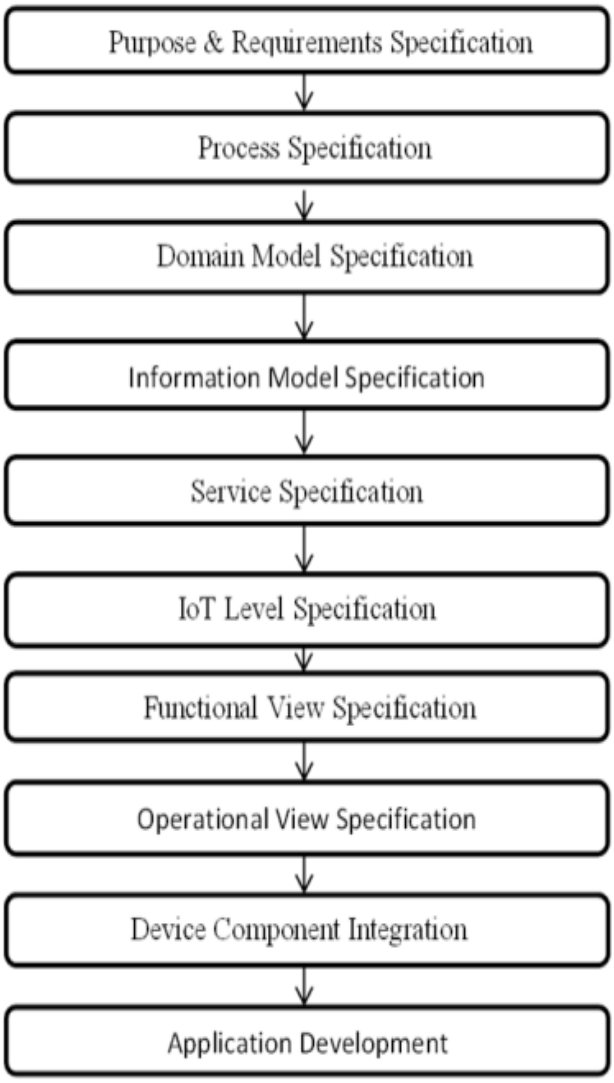

Figure 1: IOT Methodologies

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1) The system's goals are to locate stolen vehicles, identify them, and use mobile applications to remotely operate their engines. The hardware specifications call for a 5 volt DC power supply, a microcontroller, an LCD, serial communication, a GSM modem, and switches.
Software prerequisites: Embedded C, IDLE KEIL C, and a programming language.

2) The second phase after establishing the goal and requirements is to specify the use cases. Based on or derived from the purpose and requirement specifications. There are two main process one is to control the ignition and the other is used for sending location. If the ignition key is on it sends sms and if the request is sent to off the vehicle then after turning off the vehicle it will send the sms. If the location request is raised then the system gathers the longitude and latitude value's and sends it.

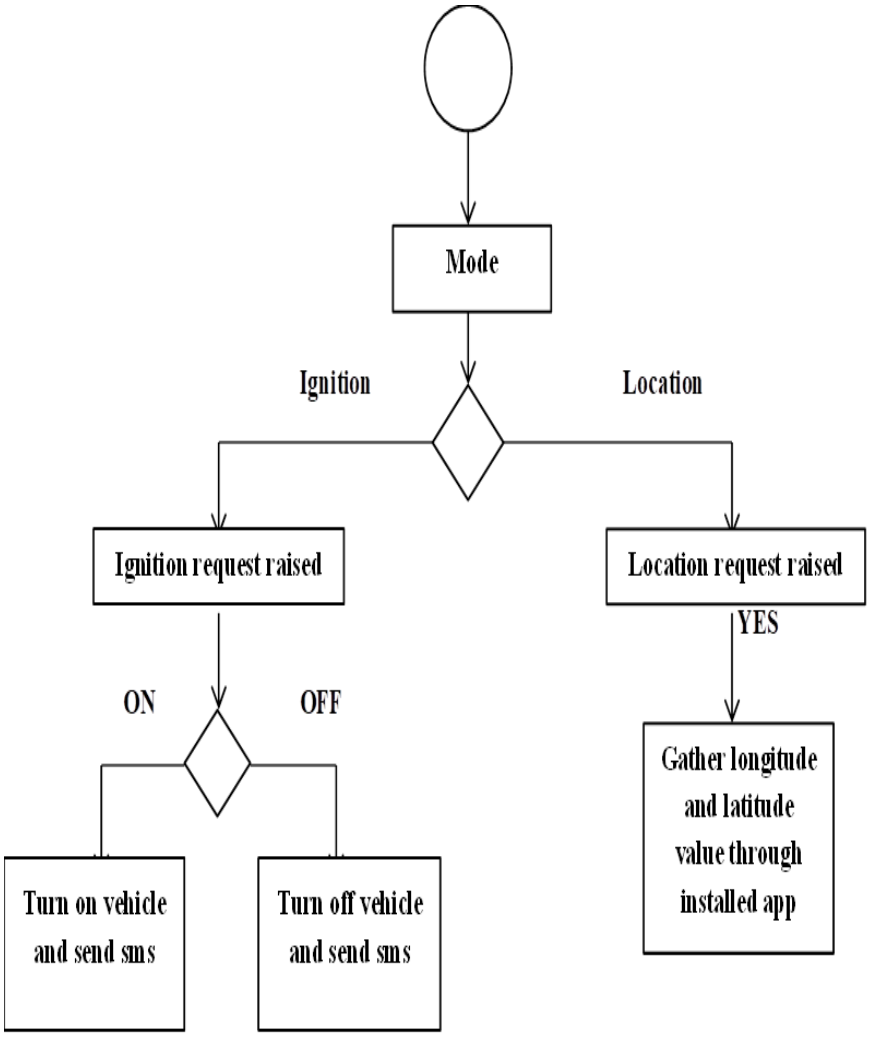

Figure 2: Process Specification

3) The third step is to describe the key ideas, entities, and objects in the IoT system domain. Domain model defines the attributes of the objects and relationships between objects. IoT system designers can get an understanding of the IoT domain for which the system is to be designed.

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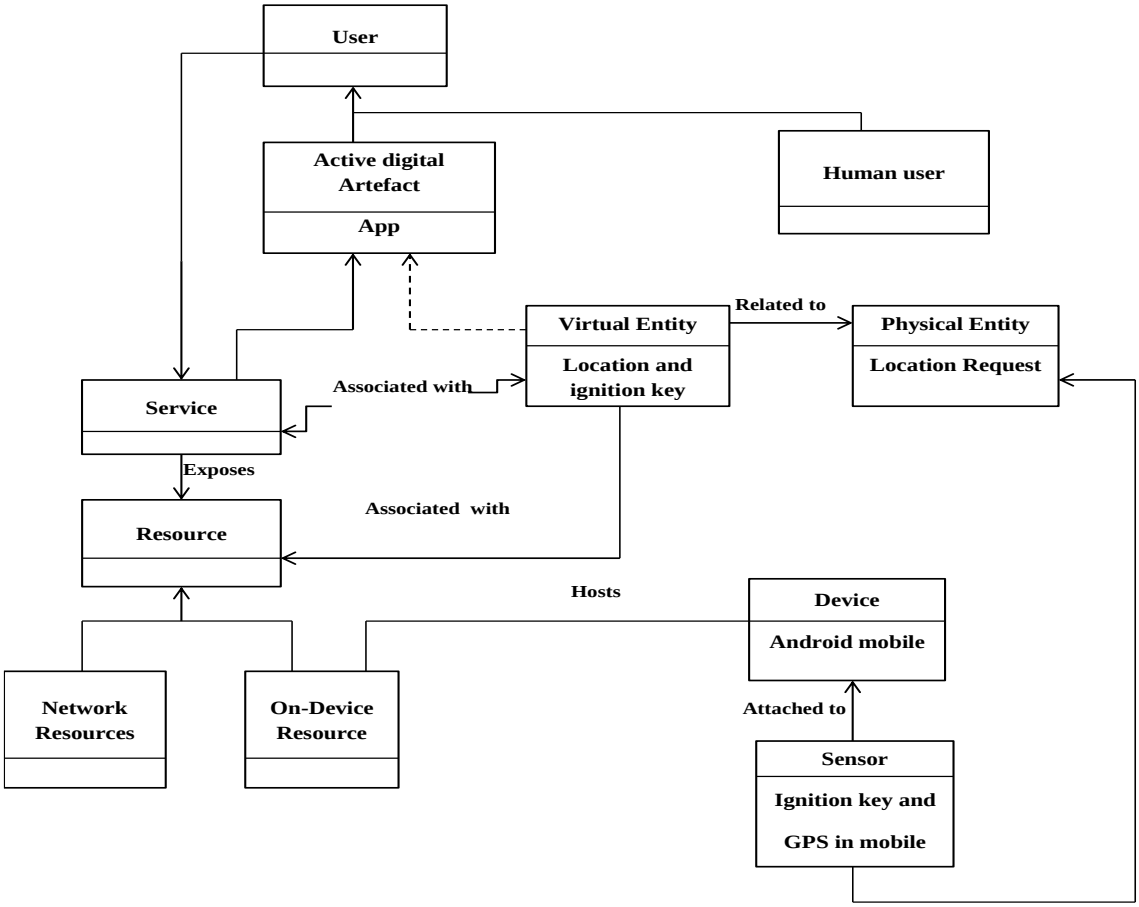

Figure 3: Domain Model Specification

4) The fourth step is to specify the structure of all the information, such as virtual entities, attributes relations, etc. IOT level 4 this level consists of multiple sensors, data collection and analysis and control & monitoring app. The data analysis is performed on the cloud and based on which control action is triggered using mobile app. System has multiple nodes that perform local analysis. The application is cloud based.

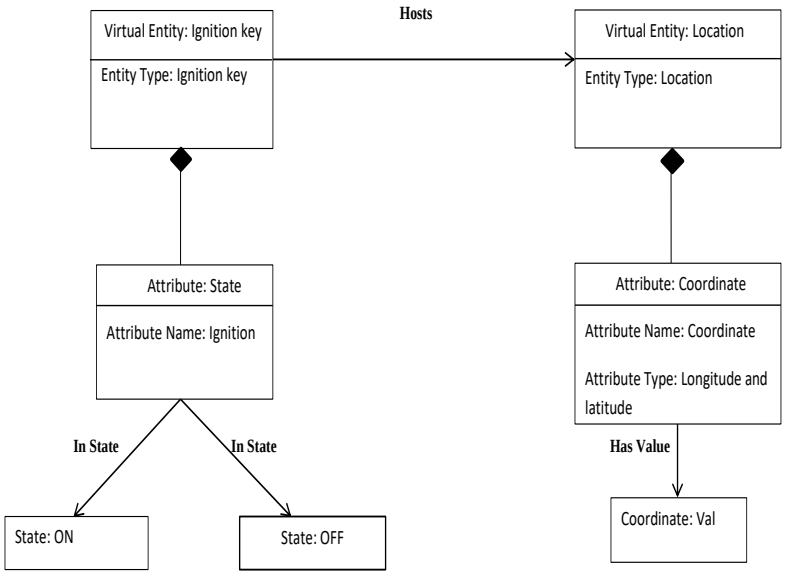

Figure 4: Information Model Specification

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5) The fifth step in the IoT design methodology is the Service Specifications. Service specifications define the services in the IoT system. Service types, service inputs/output, service endpoints, service schedules, service preconditions and service effects.

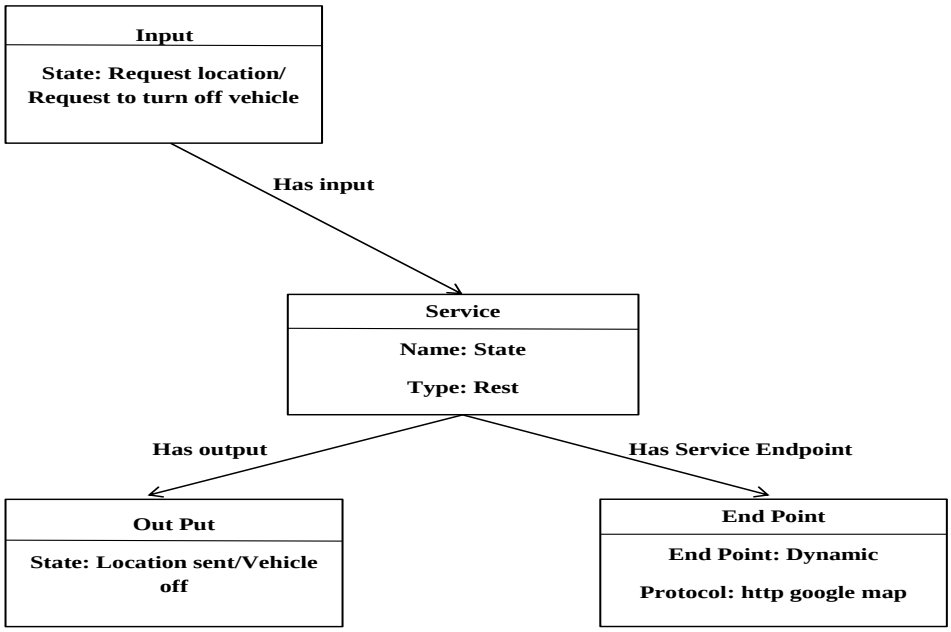

Figure 5: Service Specification

6) The sixth step in the IOT design methodology is to define the IOT level for the system. In this step we define the node types and devices, database, web services, storage types etc.

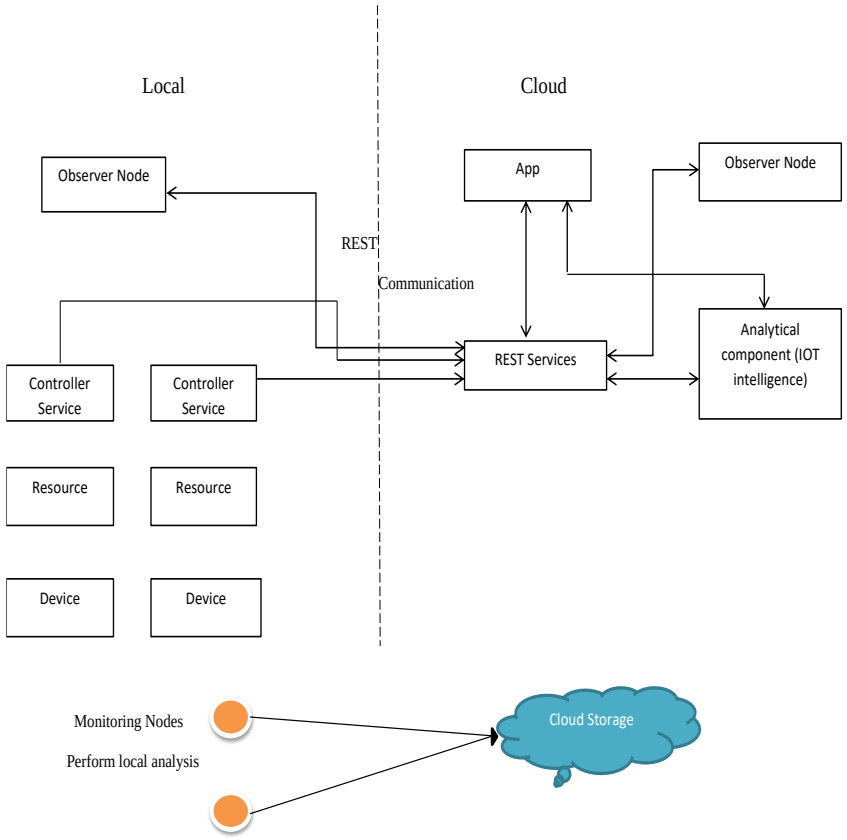

Figure 6: IOT Level Specification

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7) The seventh stage entails It outlines the IOT systems' functions, which are divided up into numerous Functional Groups. Certain functionalities are offered by each functional group. In order to communicate with instances of ideas specified in the domain model.

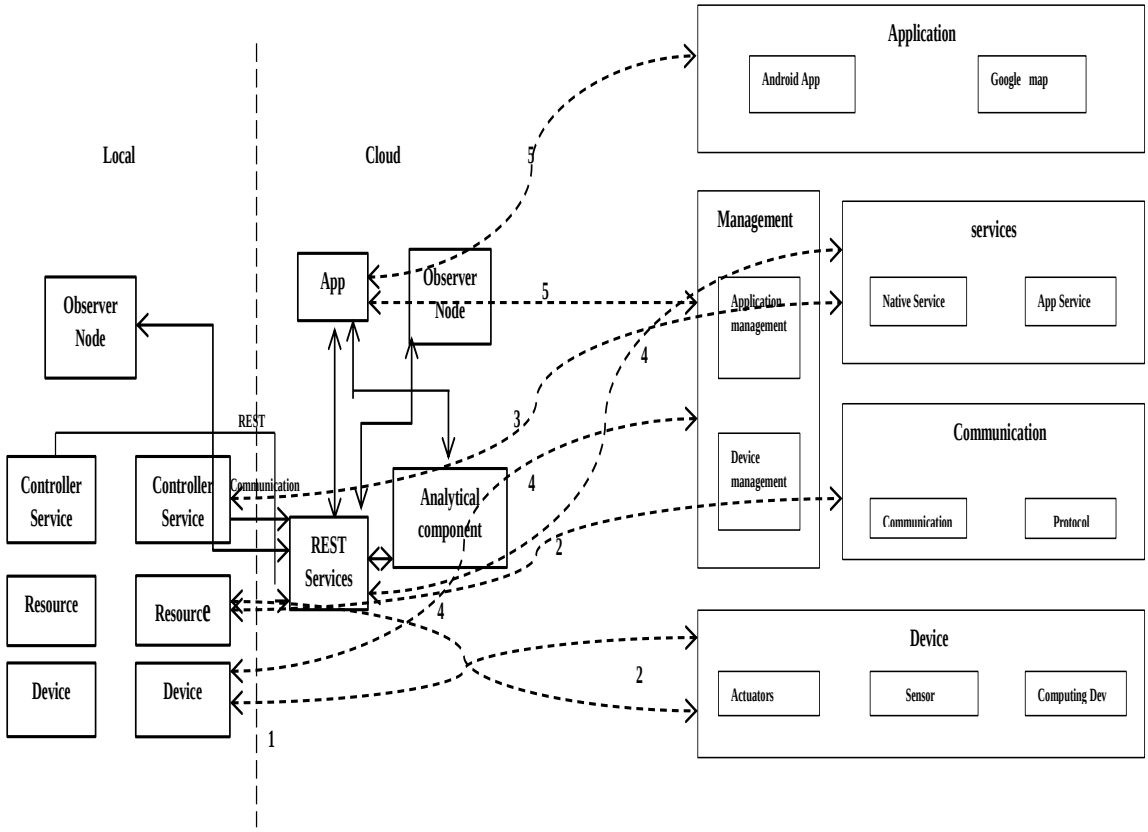

Figure 7: Functional View Specification

8) The eighth phase is to describe different options related to the deployment and operation of the IoT system. Options for hosting services, storage, devices, and applications are just a few examples.

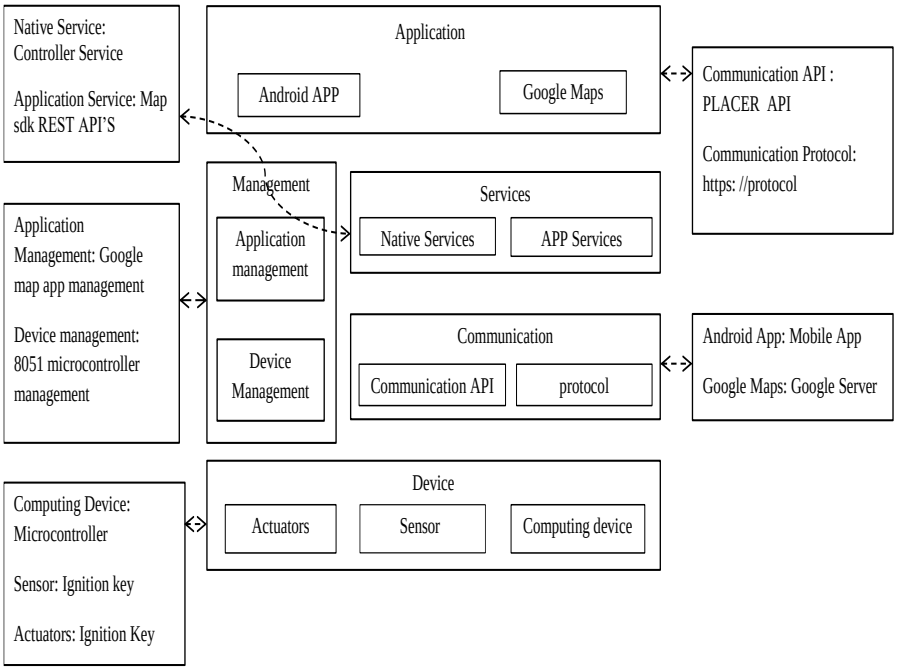

Figure 8: Functional View Specification

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9) The ninth step in the IoT design methodology is the integration of the devices and components.

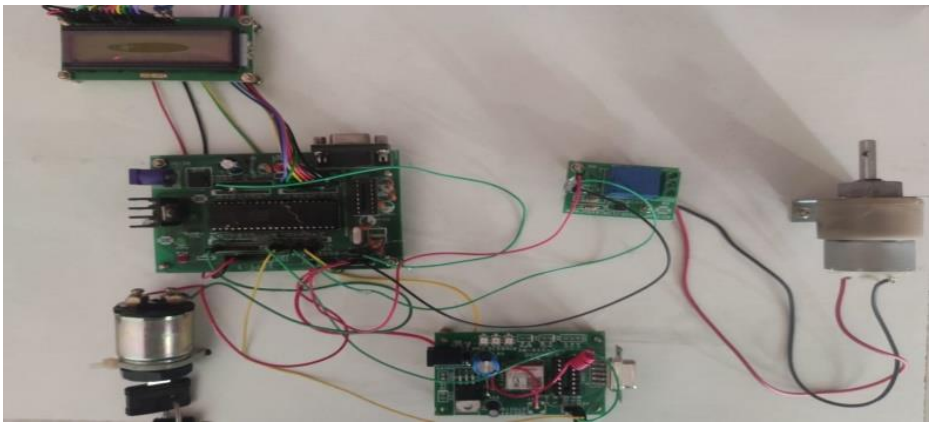

Figure 9: Device and Component Integration

10) The final step in the IoT design methodology is to develop the IoT application.

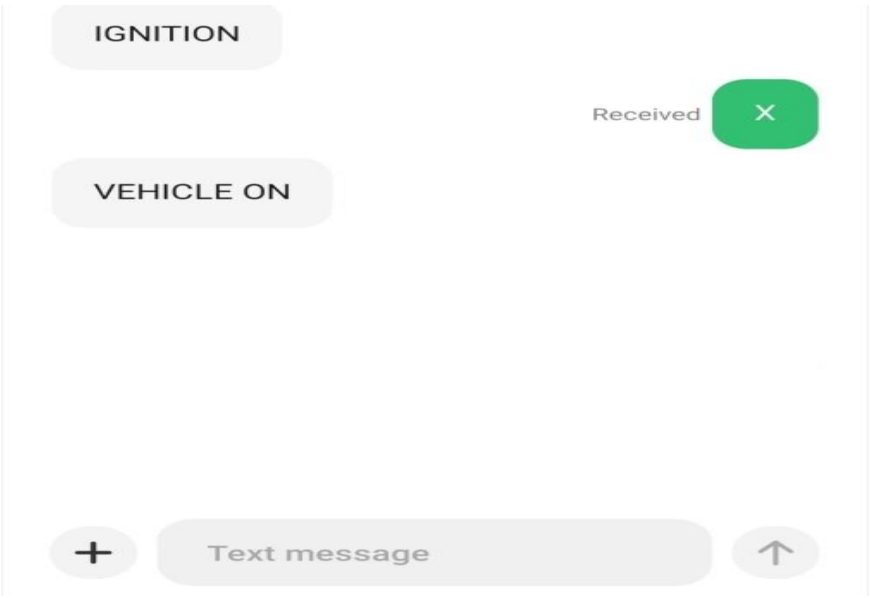

Figure 10: Application Development

IV.EXPERIMENTAL RESULT

The planned project is put to the test by kicking the engine of the car as if it were stolen. The outcomes met the goals set forth in the project design. Within 15 to 20 seconds of the car starting, the owner receives the SMS. There might be a short delay, if any, because of the mobile network. In response to this message, the owner can now send an SMS to disable the ignition control of the car, which stops the engine and sends the owner an SMS letting them know where their car is right now. Utilizing an IOT application in the Google app, as demonstrated in the figures below.

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Figure 11: user controlling the vehicle moment

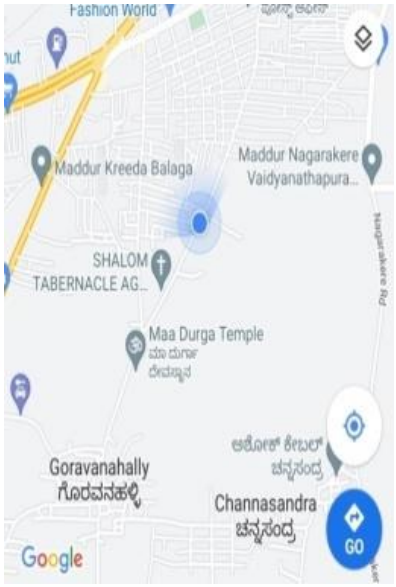

Figure 12: Tracking the exact location of your vehicle

VI. CONCLUSION

A low-cost, user-friendly tracking and anti-theft system is presented in the proposed proposal. The system consists of a tracking module with an embedded system and a single GPS-GSM module to track vehicles, report thefts, and get real-time car whereabouts. The tracking server obtains the information sent by SMS, analyses it, and displays the location of the vehicle on a Google map. Sending a simple SMS text is all that is needed to stop or start the car.

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