

# Development of SMS Alert Module for Emergency Response Planing in QGIS

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**Abstract:-** This study is based on the creation of a Python-based plugin as an SMS alert module for emergency response planning in QGIS. The project involves performing GIS analysis on vector layers and generating SMS alerts. For example, when disasters and emergencies such as natural disasters, accidents, medical crises, or security threats occur, there is a need for rapid dissemination of information. It can happen to anyone, anywhere, at any time. The purpose of the risk assessment phase of an emergency response plan is to explore potential emergency scenarios. Such a facility develops and implements an emergency plan for the safety of its personnel, guests, customers, and other visitors. When emergencies occur, the SMS Alerts plugin will provide an immediate and direct way to reach individuals in real-time. Emergency alerts can be received on almost all mobile phones in the nearby emergency area. For example, if a disaster occurs, we need to send an alert message to all hospitals in the area to alert them of the situation so that necessary action can be taken immediately. We need to send a warning message to a specific area. The user will get a warning message and all the information about all the events in the specific area where the buffer is created. The user gets all the information about the event, whether it is a positive or negative one.

**Keywords:-** QGIS, SMS Alert, Plugin, GIS Analysis and Vector Data.

## I. INTRODUCTION

We are in the era of an information revolution, in which many technologies such as computers and mobile phones are emerging everywhere, making it easier to share information. SMS is one of many. It's a familiar and widespread form of communicating with anyone, making it very easy for a person to notice and act on SMS alerts during an emergency. Emergencies can come without warning at any time. Being prepared is the best way to handle these unexpected incidents and disasters. In highly populated countries like India, every day people lost their lives because of accidents and poor emergency facilities. These lives could have been Loss of property, damages, and life. So that safety precautions can be taken to avoid any mishaps. Like if medical facilities are provided at the right time. In many situations the family members or the ambulance and police authority is not informed in time. First, we need to know where the accident happened through location tracking and then send an alert message about emergency to re-coded contact number and nearby hospitals along with current gps location of vehicle.

Effectuated people save your life and provide all recue facility at the time. This paper discusses about developing the python-based plugin in form of SMS alert module for emergency response planning in QGIS. And performing GIS analysis on vector layers and generating the SMS alert.

SMS alerts can be geographically targeted, allowing users to notify specific areas or localities affected by an event while avoiding unnecessary panic in unaffected areas. SMS alerts are used effectively in various emergencies, such as natural disasters, to save lives and facilitate timely response. SMS alert system as part of our ongoing emergency management efforts. This system is available to all members. Any situation that can pose a sudden risk to humans, their lives, property, or the environment is classified as an emergency. So, this project will give an emergency response to the user.

The article is divided into four sections, the first of which discusses the problem Statement and the second of which introduces the Literature survey. Figures that aid in software development are shown in the third part, while test cases are displayed in the fourth. The final segment focuses on the ending portion.

### A. Purpose

The goal of the project is to use a GPS module to locate the crash site and deliver an emergency alarm message. Emergency rescue is required to reach the accident site. In addition, the necessary actions can be taken immediately. Or, the user receives all the information about the event. Your phone number will be used to send SMS notifications. Your personal information will not be accessible to anyone else.

### B. Literature survey

The Emergency Alert System (EAS) is a national warning system that was implemented by most of the countries now a days. However, recent years have seen the exposure of a number of drawbacks of the EAS. For example, systems that rely on the use of cellular phone [1,2] or radio broadcast [3] networks are often unable to reach individuals who are located inside of buildings. The interiors of many buildings at universities, research centers, office complexes, manufacturing plants, and other locations often have very poor radio and cellular phone reception because of interference caused by equipment located within the building, or because of a shielding effect created by the building structure itself. In addition, current emergency systems are not easily able to reach the right people, in the right location, at the right time. Although services relying on Cellular phones services, text messaging services, and e-mail services

can target specific individuals, but they will would not be effective for a location specific emergency because such these services are only able to target individuals' people selectively on an individual basis by phone number or e-mail address, regardless of their physical location. Sirens [4] can provide a quick alert, but they may not yield desired results because the sound may not reach all locations, and some individuals in some areas may ignore a siren that provides no specific information about the emergency. People relying solely on cellular telephones would be excluded from the warning. Networks like such as Ethernet and WiFi are prone to failure in times of an emergency due to because potential power outages could shutting down the network or one or more network devices, thereby causing the communication failure with an entire building or geographical area to fail. R. Repanovici, Șerban Nedelcu, Lucian Alexandru Tarbă, S. Busuioceanu [5] This paper proposes an integrated system to improve emergency situation management by using mobile alerts. Mobile alerts can be used to provide real-time information to emergency responders and the public. An integrated system combining mobile alerts and other existing technologies can be used to provide a more comprehensive emergency response.[6] Byungseok Kang, Hyunseung Choo This paper presents a deep-learning-based emergency warning system suitable for existing infrastructure. The experimental results show that it can immediately detect emergencies such as car accidents and natural disasters. The system is suitable for existing infrastructure such as closed-circuit television and other monitoring devices. [7] P. Durairaj, S. Ramamoorthy, Ashokkumar Ramalingam This paper presents a remote collateral tracking system using Google's Android mobile platform. It also acknowledges the support of various people in the completion of the project. The proposed emergency based remote collateral tracking system using Google's Android mobile platform is a viable solution for tracking and monitoring the collateral in emergency situations.

**II. OBJECTIVES**

In this project, first, we are developing plugins in Python. To create Qt software and QGIS, we need to install Python. This plugin allows users to select a vector layer and write its attributes in a CSV file. We have a vector file of points. We need to create circles with different radius around the click points using Python programming. Then extract the features of the points using Python programming. Detecting all SMS APIs and selecting good message APIs to send warning messages to the required vector points using programming.

With the increase in accidents and other emergency situations, many people lose their lives due to delayed response and first aid.

This delay is happening for many reasons, but one of the main reasons is relief. The driver does not know the location of the emergency. This study was done to develop a framework that can be successfully used in any emergency.

This study deals with two major phases of emergency management: preparedness, response, and rescue. Information about the study area (road network, hospital, landmarks) is collected and then stored in the database for future use.

*A. Product Perspective*

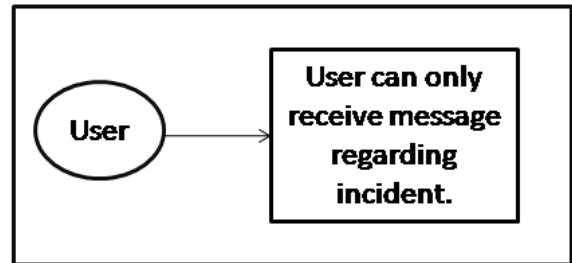


Fig 1: Product perspective

Safety of life, be it our own or that of others, is always the top concern in an emergency. Therefore, the SMS alert plugin is able to broadcast important information to people, alert them in an emergency, and give them timely information about precautions to be taken to stay safe.

*B. USE CASE DIAGRAM*

A use case diagram is a graphic depiction of the interactions among the elements of a system. A use case diagram consists of actors, use cases and their relationships.

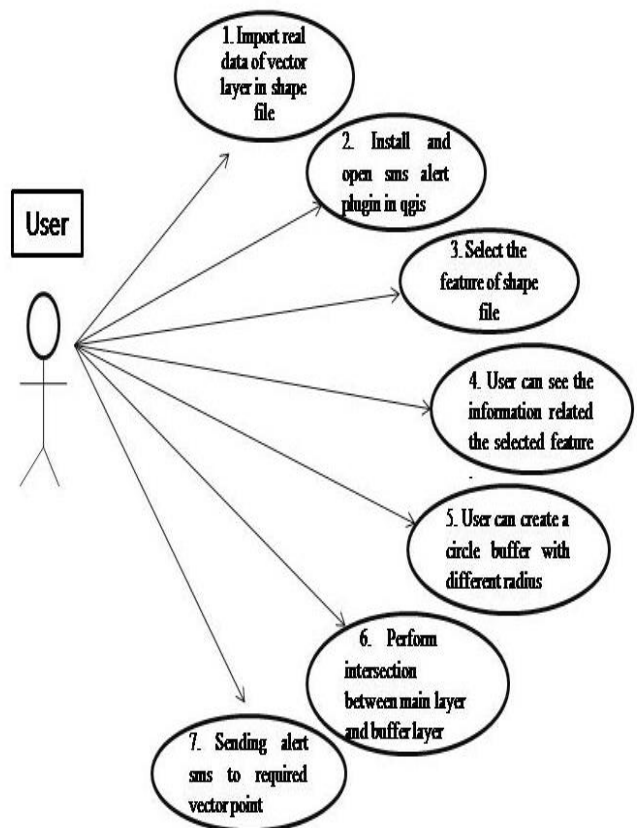


Fig 2: Use case diagram

To use the SMS Alerts plugin in QGIS, you can follow these simple steps:

- QGIS layer supports both vector layer and raster layer. Raster layers are the most obvious type. When you create a picture, paint or paste an image as a new layer. Vector layers are lines, shapes, points, and other shapes. Here we are importing a vector data into the shape file using qgis. This is going to be implemented using Python 27 in QGIS 2.18.
- First select the feature (vector point) using the SMS alert plugin and view the information related to the selected feature. We are performing the circle buffer on the selected feature with different radii. After buffering, the intersection performs the input layer (vector layer) with the buffer layer. After the intersection, send SMS about the events. And after sending the SMS, a notification will be generated to send or not send the SMS.
- The SMS alert plugin will send an alert to all the concerned authorities with a message that you are in danger with periodic updates of your current location. And all the information will appear in the table view related to the concerned authority. The Zerosome API is the SMS API. Here, it will be used to generate an SMS alert for the emergency response plan in QGIS.
- Discuss about Zerosome API: - Send a text message via Way2SMS to your friends and family in India. Enter your India mobile number and SMS text message as parameters. Your free SMS to India will be delivered instantly.

### III. IMPLEMENTATION

QGIS is a cross-platform, free, and open-source desktop Geographic Information System (GIS) application that offers a user-friendly interface and a vast repository of official and third-party open-domain plugins. It has been integrated with other open-source GIS programs like PostGIS, GRASS, SAGA, and Map Server to provide comprehensive capabilities and a better environment for all users. QGIS is written using the Qt framework, which is a software development framework used to develop applications on Windows, Mac, Linux, and various mobile operating systems.

Python is the programming language for QGIS plugins, and a good understanding of Python programming is essential.

The QGIS Plugin Builder generates a basic plugin template structure, saving time by creating necessary files and folders.

The Plugin Reloader Plugin allows for plugin reloading during development and testing.

SMS service provider: To create an SMS service provider, choose an API or gateway to send SMS messages as a program, and configure API credentials and parameters. Determine the functionality of the SMS Alerts plugin.

Plugin logic and functionality: Determine the functionality. This includes defining trigger events, recipient management, message content, and integration with the SMS service provider's API.

Configure the user interface elements for the SMS Alerts plugin, including settings for API credentials, recipient lists, and message templates. Test the plugin thoroughly to ensure proper functionality, validate integration with the SMS service provider's API, and verify accurate SMS alerts. Package the plugin for deployment, typically creating an installable package for distribution to other QGIS users.

### IV. RESULTS

**Step I :** Vector data is stored as either point, line, or polygon features. Import airports data in shape file using QGIS. After import vector data, sms alert plugin is work in QGIS.

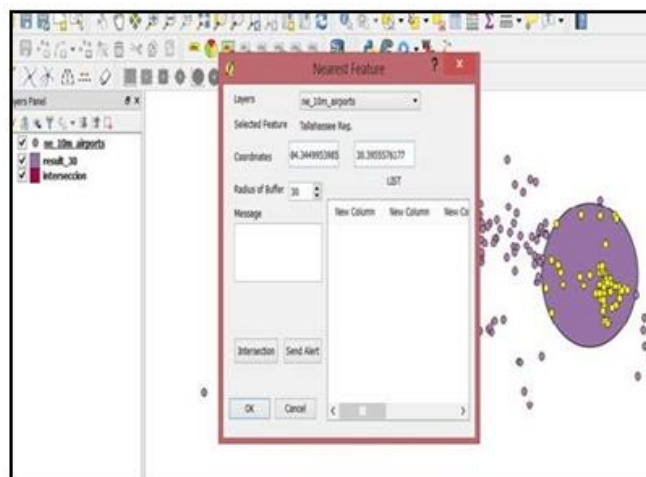


Fig 3: import Airport data

**Step II :** Open SMS alert plugin and information is not showing because feature is not select. So Plugin will facilitate to select the feature from the point vector layer loaded in QGIS.

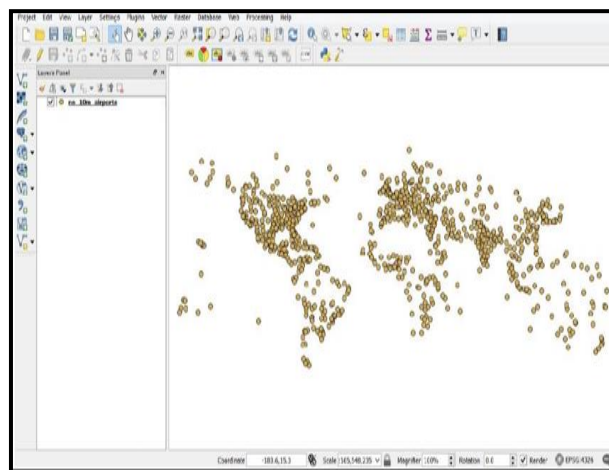


Fig 4 : open window for sms alert plugin

**Step III :** Sms alert plugin is showing the name or coordinates of selected feature in QGIS. And Circular buffer on selected feature with a different radius can be created and new buffer layer will be created.

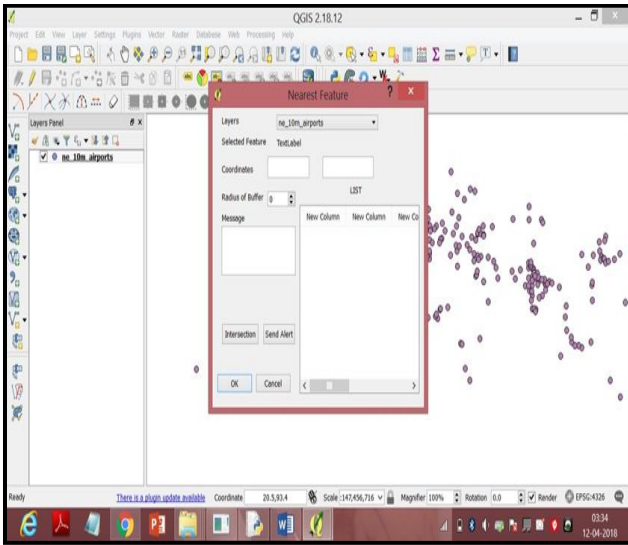


Fig 5 : Feature showing window

**Step IV :** Intersection between input vector layer and buffer will be calculated and results are added in the form of new layer.

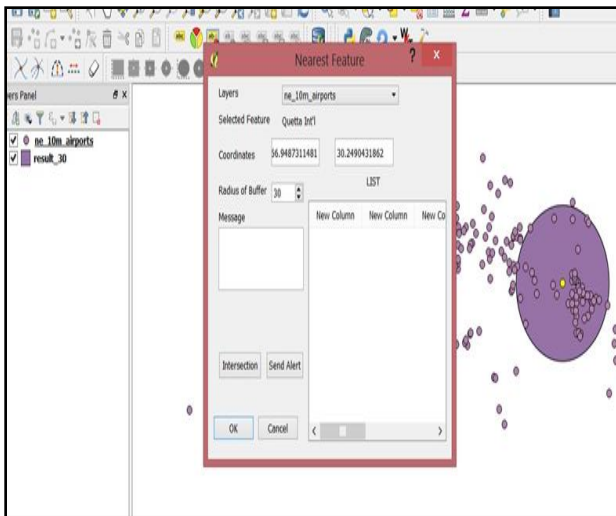


Fig 6: Calculation of input vector & buffer layer

**Step V :** Alert will be perform after intersection. Sending alert sms to all concern authority using sms API through plugin. here ,SMS has been sent

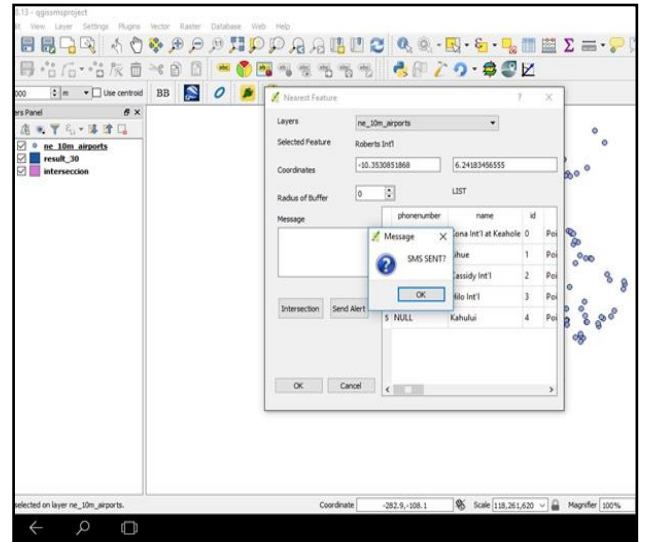


Fig 7 : API Plugin



Fig 8: Message Box

**ACKNOWLEDGEMNT**

Every project big or small is successful largely due to the effort of number of wonderful people who have always given their valuable advice or lent a helping hand. I sincerely appreciate the inspiration; support and guidance of all those people who have been instrumental in making this project a success.

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## V. CONCLUSION

This research involves developing a SMS alert module for Emergency Response Planning in QGIS. It is going to implement by using python 2.7 in QGIS 2.18. Emergencies can come without warning at any time. Being prepared is the best way to handle these unexpected incidents and disasters. Emergencies are source of risk and therefore have the probability of causing an undesired event. Emergency shelter may be needed in some situation. After a disaster occur, immediate action is taken to protect staff, visitors & collections and sending alert text messages to concern authority using sms alert plugin.

All information of all concern authority 'needs following an emergency for sending alert sms regarding incidents. Contact names and phone numbers must be listed for sending alert sms using sms alert plugin in QGIS and staff and other occupants can be moved to a safe area.

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