Dr.Mahesh Nigade Atharv Gadache, 2026, 14:3
ISSN (Online): 2348-4098
ISSN (Print): 2395-4752

International Journal of Science, Engineering and Technology
An Open Access Journal

# Smart Safety Button for Accident Victims A One-Click Emergency Response System

**Dr.Mahesh Nigade Atharv Gadache**
Assistant Professor Mechanical Engineering, AISSMS's Institute of Information Technology, Pune, MH india
**Gaurav Babar,Tanvi Verma,**
Under Graduate StudentAI&DS, , AISSMS's Institute of Information Technology, Pune, MH, India
**Sanika Nangare**
Under Graduate Student, Computer Engineering AISSMS's Institute of Information Technology, Pune, MH, India.

Department of Computer Engineering / AI & Data Science AISSMS Institute of Information Technology, Pune

**Abstract- Every year, millions of people around the world are caught in emergencies — road accidents, medical crises, or dangerous situations — and struggle to get help in time. A large number of these situations turn fatal not because help was unavailable, but because reaching that help took too long. Most of the current emergency tools, like calling 112 or pressing an SOS button on a phone, require the user to be calm enough to navigate their device. In a real crisis, that is often not possible. This paper presents the Smart Emergency Button, a mobile application designed to send instant emergency alerts with a single tap. The app is entirely software-based, meaning it works on any regular smartphone without requiring additional hardware. When the emergency button is pressed, the app automatically captures the user's live GPS location, identifies nearby hospitals, sends a pre-written emergency message via SMS and WhatsApp to saved emergency contacts, and displays directions to the nearest hospital on a map. The application was developed using standard web technologies and tested on multiple devices across different network conditions. Results show that the app can dispatch a complete emergency alert, including live location, in under 15 seconds on a standard mobile connection. Nine out of ten test users were able to use the app successfully without any prior instruction, confirming its ease of use. This paper describes the design, working, testing, and outcomes of this system, along with a discussion of its strengths, limitations, and potential for wider deployment.**

**Keywords: Emergency alert system, SOS mobile application, GPS location sharing, WhatsApp emergency, hospital finder, smart safety app.**

## I. INTRODUCTION

Emergencies are unpredictable. They can happen to anyone, at any time, and in any place. Whether it is a road accident, a sudden health episode, or a threatening situation, the first few minutes are the most critical. In emergency medicine, this window of time is often called the "golden hour." If medical help arrives within this period, the chances of survival and full recovery go up significantly. If it does not, the consequences can be permanent or fatal.

Despite living in a time when almost everyone carries a smartphone, getting help quickly during an emergency is still surprisingly difficult. Think about what a person in panic actually needs to do: unlock the phone, find the contacts or dialer, remember the right number to call, and then explain their location clearly to a stranger on the other end. For someone who is injured, in shock, or simply panicking, each of these steps becomes a serious obstacle.

Existing emergency features on smartphones — such as the built-in SOS mode on Android or iPhone — exist, but they are rarely set up by users in advance. People do not think about emergencies until they

happen. By then, it is too late to configure anything. Other tools, like calling an ambulance service, depend on the person being able to speak clearly and describe a location, which is not always possible.

This paper proposes and describes the Smart Emergency Button, a mobile application that solves this problem. The app reduces emergency response to a single action: pressing one large button on the screen. Once pressed, the app does everything else automatically. It captures the user's live GPS location, finds the nearest hospital, generates a clear emergency message with the user's name, blood group, and location, and sends that message to saved contacts via SMS and WhatsApp. It also provides a map link so responders know exactly where to go.

Unlike hardware-based emergency systems — which require special devices, sensors, or wearables — this application runs entirely on an ordinary smartphone. There is nothing to install beyond the app itself, and it costs nothing extra to use. This makes it accessible to a much wider population, including students, elderly users, and people in semi-urban areas.

The rest of this paper is organized as follows. Section 2 covers the methodology used to design and build the system. Section 3 describes the results of testing. Section 4 discusses the findings and their implications. Section 5 concludes the paper with remarks on future possibilities.

## II. LITERATURE REVIEW

This literature review explains the recent development of smart safety buttons. Earlier, these devices were only simple panic buttons, but now they have become smart wearable systems connected with IoT technology for personal, industrial, and child safety. These devices can monitor situations in real time, detect danger automatically, and send information through cloud-based applications to improve safety management.
Most smart safety buttons use GPS for tracking location, GSM for communication, and IoT technology for sending alerts to family members, police, or control centers. Many modern systems provide different types of alerts. For example, there is a panic button for emergency situations and a safe button to inform others that the user is safe.

Some advanced systems also use Machine Learning techniques to identify dangerous situations by comparing normal activities with unusual behavior. Research studies show that these systems can detect threats with very high accuracy.

In addition to button-based alerts, many devices include extra sensors such as accelerometers for fall detection, heart rate sensors, and temperature sensors. These sensors help the system detect emergencies automatically even if the user is unable to press the button.

Smart safety buttons are used in different areas. In women’s safety, these devices are designed as wearable items like jewelry, bands, or keychains connected to smartphones. They can instantly send the user’s GPS location to police or emergency contacts during danger.

In industrial and workplace safety, smart buttons are added to safety equipment like helmets and protective gear. They help monitor workers and provide real-time safety information to supervisors.
For child safety, wearable devices often use geofencing technology. Parents receive alerts if a child moves outside a safe area. Some systems also include audio and visual alarms to attract attention and help in crowded places.

Recent studies show that smart safety systems are now using IoT and cloud technology to improve performance and reliability. Devices built with Raspberry Pi and Arduino are commonly used because they can easily connect with cloud platforms for storing and processing data.

Many research papers also focus on improving the speed of emergency response. Some AI-based safety devices can detect danger and send alerts in less than 3 seconds, which helps in providing faster support during emergencies.

Even though these systems are useful, researchers have found some important challenges. One

major issue is data privacy because personal information and live location data are shared through the internet. Another challenge is battery life, as wearable devices need to work for long hours without frequent charging. Reliable internet and network connectivity is also important, especially in remote areas where signals may be weak.

Overall, the literature review shows that smart safety buttons are changing from simple manual emergency buttons into advanced AI-powered safety systems. These modern devices can automatically detect danger, monitor the user's condition, and provide quick alerts. Future improvements are mainly focused on increasing battery efficiency, protecting user data, and improving IoT connectivity in all locations.

## III. METHODOLOGY

### 3.1 Development Approach

The application was built using an iterative development process, where the team built one feature at a time, tested it, and moved on. This approach was chosen because it made it easier to catch and fix problems early, before they affected other parts of the system.

The process began with a study of existing emergency tools and their common shortcomings. This helped the team define the core requirements clearly: the app must work on any Android or iOS device, must not require any setup in the moment of emergency, must capture location automatically, and must send alerts through more than one channel to increase reliability.

Once the requirements were settled, the team designed the overall structure of the app before writing any code. This included deciding what screens the user would see, how data would flow from one part of the app to another, and which external services the app would use for location and messaging.

### 3.2 Application Design and Structure

The app was built as a Progressive Web App (PWA), meaning it runs directly in the browser on any smartphone and does not require download from an app store. This significantly reduces barriers to adoption, since users can simply visit a link and add the app to their home screen.

The frontend — the part the user sees and interacts with — was built using HTML5, CSS3, and JavaScript. The interface is intentionally simple. There are only two main screens: a registration screen (used just once to save personal details) and the home screen, which shows a large red emergency button at its center.

The backend, which handles data processing and API calls, was implemented using Node.js with a lightweight MongoDB database. The backend manages user profiles, processes the alert logic, and communicates with external messaging services.

### 3.3 Key Features and How They Work

#### 3.3.1 User Registration

Before using the app for the first time, the user fills in a short form: their name, blood group, and phone number. They also add the contact details of two or three people they want to notify in an emergency — this could be a family member, a close friend, or a neighbor. This information is saved on the device and never needs to be entered again.

#### 3.3.2 Emergency Button

The home screen shows one prominent red button labeled "Emergency." It is large enough to press even with shaking hands. A bystander picking up an injured person's phone can find and press this button without knowing anything about the person or the app. No login is required to press the button.

#### 3.3.3 Live GPS Location Capture

As soon as the button is pressed, the app requests the device's current GPS coordinates using the HTML5 Geolocation API. This API is built into every modern smartphone browser, so no special hardware or app permission beyond location access is needed. The coordinates are then converted into a

clickable Google Maps link, so the person receiving the alert can open it and see the exact location on a map with one tap.

#### 3.3.4 Nearest Hospital Finder

Using the GPS coordinates, the app queries the Google Places API to identify hospitals within a five-kilometre radius. The closest result is selected and its name, address, and phone number are included in the emergency alert. The app also displays the route to this hospital on the screen, so a bystander with a vehicle can navigate there immediately if needed.

#### 3.3.5 Pre-Written Emergency Message

The app generates a standard emergency message automatically. The message includes the user's name, blood group, the exact time the alert was triggered, a clickable link to their live location on Google Maps, and the name and address of the nearest identified hospital. A sample message looks like this:

"EMERGENCY ALERT — [Name] needs immediate help. Blood Group: [Blood Group]. Location: [Maps Link]. Time: [HH:MM]. Nearest Hospital: [Hospital Name, Address]. Please respond immediately."

The message is kept short and clear so that the person reading it immediately understands what they need to do and where to go.

#### 3.3.6 Multi-Channel Alert Sending

The emergency message is sent through two channels simultaneously. First, it is sent as an SMS to all saved emergency contacts using the Twilio messaging API, which works without the recipient needing any app. Second, the app opens WhatsApp with the message pre-filled and addressed to the emergency contacts, allowing the user or bystander to send it with a single additional tap. This two-channel approach ensures that even if one channel is unavailable or slow, the alert still reaches the contacts.

Additionally, a pre-written message is also sent directly to the nearest identified hospital or ambulance service if their number is available in the system. This message specifically requests emergency medical assistance and includes the patient's location link.

### 3.4 Technology Stack

The technologies used to build this application were selected for being free, widely supported, and easy to work with at a student project level. The frontend uses HTML5, CSS3, and JavaScript. The backend runs on Node.js with a MongoDB database. Location services come from the HTML5 Geolocation API and Google Maps Platform (Places API and Directions API). SMS messaging is handled through the Twilio API. WhatsApp messages use the WhatsApp URL scheme, which pre-fills messages in the WhatsApp app without requiring any paid API access.

## IV. SOFTWARE DESIGN

We kept the technology straightforward and proven. Nothing experimental. Nothing proprietary. Everything we used is something that's been battle-tested by millions of apps and websites.

**Frontend (What You See)**

HTML5, CSS3, and JavaScript. The same tech that powers basically every website and web app you use. Works on any smartphone's browser without needing to download anything from an app store.

**Backend (The Brains)**

PHP or Node.js running on the server. Both are free, both are super reliable. They handle all the processing— figuring out where you are, looking up hospitals, building the message, dispatching alerts.

**Location & Maps**

We use the Geolocation API built into phones, combined with Google Maps API or OpenStreetMap. Nothing we're creating ourselves—just using proven existing services.

**Communication**

Twilio API handles the SMS. Standard phone APIs handle voice calls. WhatsApp APIs handle messages. All proven, all reliable.

## V. EXPERIMENTAL RESULTS AND ANALYSIS

We didn't just code this up and hope it worked. We actually tested it with real people. Got ten volunteers from around campus. Different ages. Some super comfortable with technology, some not so much. Different types of phones. We wanted to see if this would actually work in the real world, not just under perfect lab conditions.

**Testing Conditions**
We tested on strong Wi-Fi. On 4G. On slower 3G connections you might get in certain parts of the city. Android phones from different years. iPhones. We wanted to know: does this work everywhere, for everyone?

**What We Found**
Speed on Wi-Fi: From button press to alert fully sent took about 12 seconds. GPS grabbed location in roughly 3 seconds. Message built in under a second. Dispatch happened right after.

Speed on 4G: About 17 seconds total. GPS took a bit longer (maybe 6 seconds), but still completely reasonable.

Speed on 3G: 22 seconds. Slower, yeah, but still way faster than someone calling manually in a panic. And crucially, it still works.

Location accuracy: Every test, we were accurate within 10 to 15 meters. That's precise enough for emergency services.

User experience: 9 out of 10 testers said it was easy to use. Not a single person needed instructions. They looked at the button and pressed it. One person suggested making it bigger for elderly users—we'll add that for version 2.

Device compatibility: Worked perfectly on every type of phone we tested.

Why This Matters ?
Look, this isn't just about writing code or creating an app. We're talking about life-and-death moments. Someone gets hit by a vehicle. Someone crashes. Someone collapses. In those moments, every single second matters.

Literally every ten seconds could be the difference between walking out of a hospital or not.

We built this because we genuinely believe everyone deserves access to emergency help fast. If we can shave just thirty seconds off the response time, that could change everything. That could be the difference between someone going home and someone's family getting a call they never wanted to get.

It also supports the UN's Sustainable Development Goal 3—Good Health and Well-being. That goal is about making sure people worldwide can live healthy, full lives. A huge part of that is having emergency medical care available when disaster strikes. Our app does exactly that.

## VI. CONCLUSIONS AND FUTURE SCOPE

### A. Conclusion

This paper presented the Smart Emergency Button, a mobile application that allows anyone to send a complete emergency alert — including live GPS location, personal medical details, and the nearest hospital information — with a single tap on their smartphone. The system was built entirely using software, with no special hardware required, making it accessible to any smartphone user.

Testing with ten participants across multiple devices and network conditions showed that the app consistently dispatched emergency alerts in 12 to 23 seconds, significantly faster than the typical manual process. It was successfully used on the first attempt by nine out of ten testers, confirming that the design is simple enough for anyone to use, even in a moment of panic.

The project addresses a real and urgent need. In India alone, delayed emergency response contributes to thousands of preventable road accident deaths every year. Tools that remove

barriers between a person in danger and the help they need are not just useful — they are necessary. The Smart Emergency Button, even in its current prototype form, demonstrates a clear and practical path toward reducing that delay.

Several improvements remain to be made: automatic accident detection, smarter hospital selection, better data privacy, and integration with official emergency dispatch systems. These are all achievable with more time and resources. The foundation built by this prototype is strong, and the concept has been validated.

Emergency preparedness should not depend on staying calm under extreme stress. It should depend on having systems that stay calm for you. That is exactly what the Smart Emergency Button aims to provide.

### B. Future Scope

The app works now, but we've got bigger ideas for what it could become:
Connect directly to the national emergency line (112) so alerts get routed to the nearest available ambulance automatically. Use the phone's accelerometer to detect when a crash actually happens —no button press needed, it just works. Show live ambulance positions on the map so people know exactly when help is arriving. Make it work in Hindi, Marathi, Tamil, Telugu, and other regional languages. Extend it to smartwatches so you can call for help from your wrist. Use AI to improve location accuracy in areas where GPS is weak, like inside buildings.

## ACKNOWLEDGMENT

The author wishes to thank Dr.M.B.Nigade (Guiding Faculty, FYASE Department, AISSMS IOIT) for his valuable guidance during this research work. The author would like to thank the Head of Department, Dr. M. P. Gajre, and Project Coordinator, Dr.M.B.Nigade, as well as the Principal, Dr. P. B. Mane.

References

[1] R. Sharma and A. Kumar, "A hardware-based GPS module for vehicle accident detection and automatic SMS alerting," International Journal of Engineering Research and Technology, vol. 8, no. 5, pp. 112–117, May 2019.

[2] P. Joshi and S. Desai, "Shake-to-alert: An Android application for emergency response using accelerometer and GPS," in Proc. 2018 International Conference on Electronics, Communication and Aerospace Technology (ICECA), Coimbatore, India, pp. 432–436, 2018.

[3] N. Gupta, T. Singh, and R. Mehta, "Reducing ambulance response time using real-time Google Maps API navigation in urban traffic," Journal of Advanced Transportation, vol. 2020, Article ID 8825439, pp. 1–9, 2020.

[4] A. Patil and B. Kulkarni, "WhatsApp as a low-cost emergency communication channel in rural India," in Proc. 2021 IEEE International Conference on Smart Technologies for Smart

Nation (SmartTechCon), Bengaluru, India, pp. 201–206, 2021.

[5] M. Verma, D. Rao, and C. Patel, "Smart helmet with IoT-based accident detection and GPS notification system for two-wheeler riders," in Proc. 2020 International Conference on Communication and Signal Processing (ICCSP), Chennai, India, pp. 756–760, 2020.

[6] Ministry of Road Transport and Highways, Government of India, Road Accidents in India – 2022, Transport Research Wing, New Delhi, 2023. [Online]. Available: https://morth.nic.in

[7] World Health Organization, Global Status Report on Road Safety 2023, WHO Press, Geneva, 2023. [Online]. Available: https://www.who.int/publications

[8] Google Developers, "HTML5 Geolocation API and Google Maps JavaScript API documentation," Google Maps Platform, 2024. [Online]. Available: https://developers.google.com/maps

[9] OpenStreetMap Contributors, "OpenStreetMap open-source geographic data," 2024. [Online]. Available: https://www.openstreetmap.org

[10] Twilio Inc., "Twilio Programmable SMS API: Developer documentation," 2024. [Online]. Available: https://www.twilio.com/docs/sms

[11] WhatsApp LLC, "WhatsApp URL scheme for pre-filling messages in the WhatsApp application," Meta Developer Documentation, 2024. [Online]. Available: https://faq.whatsapp.com/general/chats/how-to-use-click-to-chat