PERSONAL SAFETY THROUGH SMART ID

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Abstract:*The projct involves building a personal safety device that can send emergency notifications to predefined contacts upon pressing a button. The device uses a Node MCU development board, a push button switch, and an HTTP client library to communicate with a predefined API endpoint. When the push button switch is pressed, the Node MCU sends an HTTP request to the API endpoint, which triggers the notification to be sent to the predefined emergency contacts. The notification can be sent in the form of an SMS, email, or push notification, depending on the capabilities of the API endpoint. The API endpoint should be authenticated and encrypted to ensure that the device is secure and reliable. The project can be useful for personal safety in situations where pepper spray may need to be used and emergency assistance is required. The device can also be used in other emergency situations, such as medical emergencies or accidents, where quick notification to emergency contacts can be critical. Overall, this project demonstrates the use of Node MCU development board and HTTP client library to build a simple yet effective personal safety device.*

Keywords:Pushbutton,NodeMCUboard,EmergencyContactsDataBase,Wifi,NotificationService

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I. INTRODUCTION

This project utilizes the NodeMCU development board, a push-button switch, and an HTTP client library to create a personal safety device. The NodeMCU, built on the ESP8266 Wi-Fi chip, offers an affordable microcontroller solution with built-in Wi-Fi connectivity, making it both secure and reliable—an essential feature for safety applications. It is programmed using the Arduino IDE, ensuring ease of development.

The push-button switch serves as a trigger mechanism, activating an emergency alert when pressed. To facilitate communication, the HTTP client library interacts with a predefined API endpoint, which is responsible for sending emergency notifications to designated contacts. These alerts can be delivered via SMS, email, or push notifications, depending on the API's configuration.

By integrating these technologies, the project aims to develop a straightforward yet highly effective personal safety solution, ensuring rapid communication in critical situations. The device is particularly useful in scenarios where immediate notification to emergency contacts is crucial. This initiative demonstrates how simple hardware and software components can be leveraged to enhance personal safety through efficient emergency communication.

II. WORKINGOFAPROJECT

This project focuses on developing a women's safety system that utilizes a GPS module to track and share the real-time location of individuals in distress. The device continuously monitors the victim's location and updates it in the Blynk app, ensuring that emergency contacts or authorities can take immediate action.

The system establishes communication between the device and the user's smartphone through specially designed software, which acts as an interface between the two. As depicted in the block diagram, the device connects to a smartphone, and the location data is transmitted from the cloud to the intended recipient, enabling swift response by law enforcement and relevant authorities.

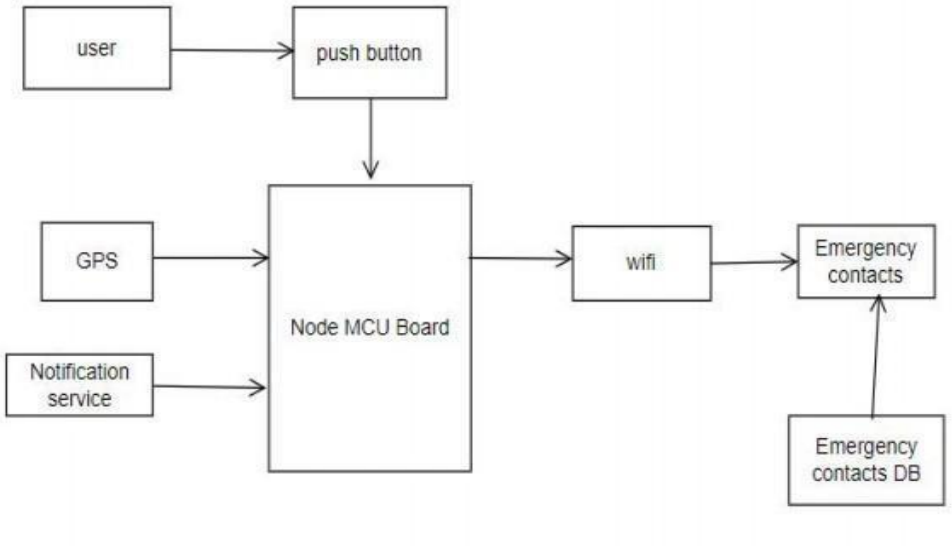

Fig1: Block diagram of node MCU

III. HARDWAREDEVICE

The NodeMCU development board is an affordable, open-source microcontroller based on the ESP8266 Wi-Fi chip. It supports the Arduino programming environment and features built-in Wi-Fi connectivity, enabling seamless internet access and the ability to send HTTP requests.A push-button switch serves as a trigger for emergency notifications. When pressed, it completes an electrical circuit, signaling the NodeMCU to send an HTTP request to a predefined API endpoint.To function properly, the device requires a power source, such as a battery or a direct power connection. The choice of power supply depends on the specific design and operational needs of the system.Overall, the project utilizes minimal hardware components, making it both cost-effective and easy to construct.

Fig2. Implementation

IV. SOFTWAREENVIRONMENT

The NodeMCU development board is programmed using the Arduino IDE, an open-source integrated development environment designed for microcontrollers. The HTTP client library required for this project can be installed as a library within the Arduino IDE, enabling seamless communication with web services.To ensure secure access to the API endpoint, authentication and encryption methods such as HTTPS and token-based authentication can be implemented. The HTTPS protocol establishes a secure communication channel over the internet, while token-based authentication relies on a unique token or secret key for access control.Notifications can be sent through various APIs, including Twilio, Nexmo, and Firebase Cloud Messaging, based on the project's specific needs. These APIs provide user-friendly interfaces for delivering alerts via SMS, email, or push notifications, ensuring efficient and reliable communication.

V. APIENDPOINT

The API endpoint must be structured to receive HTTP requests from the personal safety device and initiate emergency notifications to designated contacts. To maintain security, authentication methods such as an API key or OAuth token should be implemented. Additionally, encryption protocols like SSL or TLS should be used to safeguard transmitted data and prevent unauthorized access.

VI. RESULTS&OUTPUT

The findings of this project demonstrate that a personal safety device can be effectively developed using a NodeMCU development board, a push-button switch, and an HTTP client library. The device successfully transmits emergency notifications via SMS, email, or push notifications, depending on the capabilities of the API endpoint.By incorporating authentication and encryption methods, such as API keys and SSL/TLS encryption, the system ensures secure and reliable communication. Testing confirms that the device functions as expected, immediately notifying predefined emergency contacts when the push button switch is activated.This project is particularly beneficial for individuals who may require a personal safety device, including those who work alone, travel frequently, or have medical conditions necessitating urgent assistance. Additionally, it can be used in various emergency situations where rapid communication with emergency contacts is crucial.The web application includes a homepage featuring the project title, along with a button directing users to the registration page. This page allows users to enter necessary details and complete the registration process for accessing the platform.

LOGINPAGE

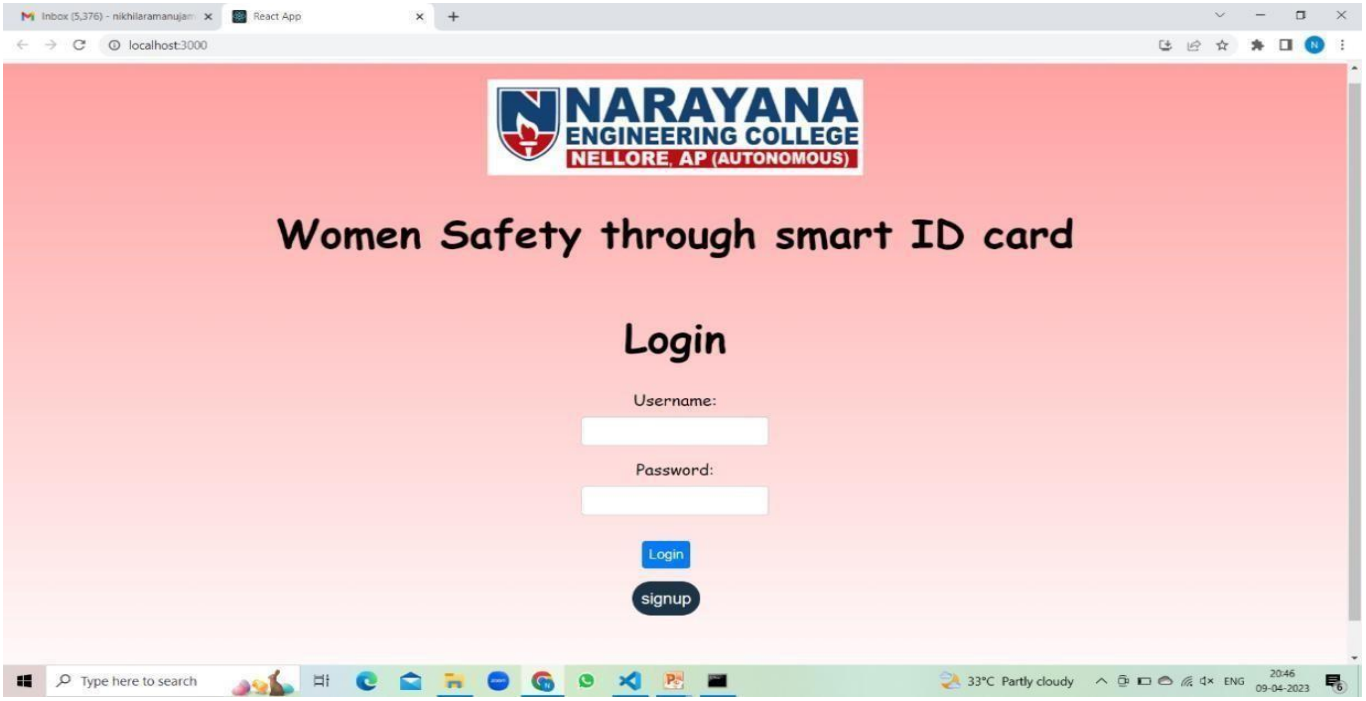

Fig 3. Login PAGE

This login page is designed for the website "Women Safety Through Smart ID" and includes built-in validation features. Users must enter a username of up to 50 characters and a password of up to 8 characters, which must contain at least one uppercase letter and one special character. If the entered credentials are valid, the system redirects the user to the home page. Otherwise, a pop-up message appears, notifying them of an incorrect username or password.

EMERGENCYCONTACTSPAGE

Fig 4: Emergency page

The Emergency Contacts page allows users to add and manage emergency contacts, with all details stored under a unique user ID. Users can enter essential information such as phone number, relationship, and name, and upon clicking the Submit button, the details are securely saved.Additionally, this page includes a Clear Contacts feature, enabling users to modify or remove saved contacts as needed, ensuring efficient contact management.

DETAILSOFTHEALERT

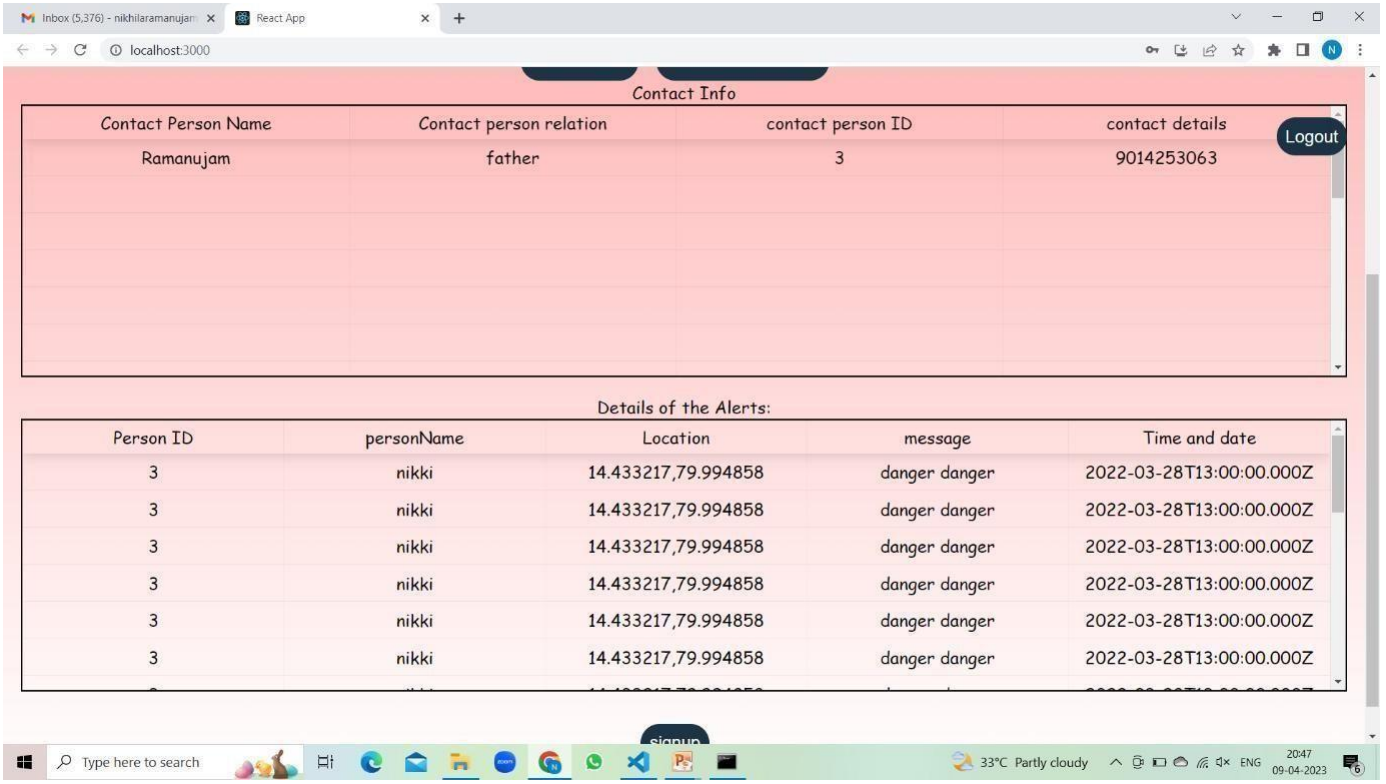

Fig 5. Details of alert

This page allows users to review alert details on the website. It displays key information, including the person ID, name, location, message, time, and date of the alert. Users can cross-check these details for verification.Additionally, the system tracks and displays the number of times the emergency button has been pressed and provides real-time location updates, ensuring accurate monitoring of alerts.

ALERTNOTIFICATIONS/SMS

The emergency notification is sent to the designated recipient whose details have been stored on the server by the user. The SMS includes the user's location, a custom message, and a timestamp to provide precise details of the emergency.Additionally, the

message contains a link to Google Maps, allowing recipients to quickly access the victim's exact location, making it easier for them to respond promptly.

Fig6. Link page

GPSLOCATIONONMAP

The emergency message includes a **link to Google Maps**, which provides the **exact location** of the victim. This feature ensures that **relatives, friends, or emergency responders** can quickly locate the individual in distress.The map displays the **precise location** where the emergency button was pressed, enhancing the accuracy and effectiveness of the safety system.

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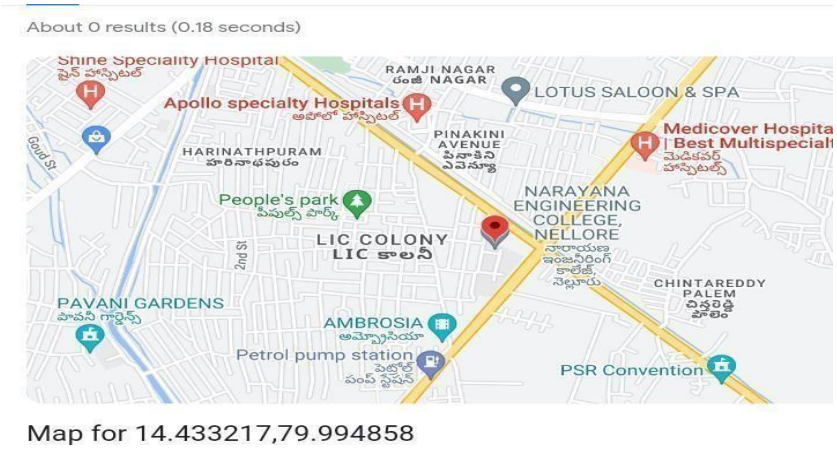

Fig7. Location

VII. FUTUREENHANCEMENT

Integration of Pepper Spray:A potential upgrade includes attaching a pepper spray mechanism to the NodeMCU development board. This would provide an added layer of protection during emergency situations where immediate self-defense is required.

Incorporation of Voice Control: Implementing voice command functionality would allow the device to operate hands-free. This enhancement would be especially valuable for individuals with physical limitations or in moments when manually operating the device is not possible.

Panic Button Addition: Besides the emergency alert feature, an additional panic button can be introduced. When pressed, this button could trigger a loud alarm, drawing attention and possibly deterring attackers.

User Interface Enhancements: To improve usability, the user interface can be refined for better accessibility and ease of use. For instance, adding an LCD display to show real-time system status, battery level, and other relevant information would greatly benefit the user.

Advanced Security Features: The device's data security can be strengthened by introducing two-factor authentication, data encryption, and secure user data storage mechanisms to ensure higher protection levels.

VIII. CONCLUSION

The personal safety device, developed using a NodeMCU development board and an HTTP client library, offers a simple yet effective solution for sending emergency notifications to predefined contacts. It is designed for various emergency situations, including personal safety threats, medical emergencies, and accidents, where immediate alerts are crucial. By integrating an authenticated and encrypted API endpoint, the device ensures secure and reliable communication. Depending on the API's capabilities, notifications can be sent via SMS, email, or push notifications, ensuring quick and efficient response in critical situations.

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