SmartSOS

AWS-BASED LOCATION-AWARE EMERGENCY ASSISTANCE SYSTEM

A SECURE AND SCALABLE CLOUD SOLUTION FOR MODERN EMERGENCY RESPONSE

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THE PROBLEM

- **Communication Gaps:** Traditional systems rely on voice descriptions, which are often inaccurate during high-stress situations.
- **Location Inaccuracy:** Victims often struggle to provide precise GPS coordinates in unfamiliar or dense urban environments.
- **Knowledge Gap:** Bystanders frequently lack immediate procedural knowledge for first-aid or safety while waiting for rescuers.
- **Data Scarcity:** Voice calls lack structured metadata and visual evidence for post-incident analysis.

Proposed Solution

- **One-Tap Emergency Alerts:** Precise GPS capture via browser APIs.
- **Multimedia Evidence:** Direct photographic upload to provide situational awareness to responders.
- **AI-Style Guidance:** Rule-based module providing structured first-aid and safety instructions.
- **Incident Management:** Cloud-backed workflow (NEW, ACKNOWLEDGED, RESOLVED) for tracking

System Architecture (The Three-Tier Model)

A presentation is a formal or informal communication method that involves conveying information, ideas, or a message to an audience. It often employs visual aids such as slides, charts, graphs, or multimedia elements to support and enhance the spoken content.Presentation Tier: Responsive React Single Page Application (SPA).

- **Application Tier:** Node.js/Express backend hosted on Amazon EC2 instances.
- **Data Tier:** Amazon RDS for relational metadata and Amazon S3 for secure multimedia storage.
- **Networking:** Deployed within an Amazon VPC with public/private subnets and IAM security roles

Key Features & Actors

- **Citizens:** Register, trigger SOS alerts, upload evidence, and receive first-aid guidance.
- **First Responders/Nurses:** Receive real-time SNS notifications and update incident statuses.
- **Administrators:** Manage global incident feeds and monitor system health via CloudWatch.
- **Notification Engine:** Real-time email/SMS alerts powered by Amazon SNS.

Visual Interface (Frontend)

- **Clean UI:** Role-appropriate views for civilians and admins.
- **SOS Interaction:** A prominent, one-tap trigger for immediate dispatch.
- **Guidance Chat:** Integrated interface for rule-based safety recommendations.
- **Incident History:** Dashboard for users to track their reported emergencies.

Technical Implementation (AWS Integration)

- **Security:** IAM roles, security groups, and encryption at rest for S3 buckets.
- **Scalability:** Auto Scaling Groups and Application Load Balancers (ALB) to handle concurrent requests.
- **Observability:** Amazon CloudWatch for logging application events and monitoring CPU/error metrics.
- **High Availability:** RDS Multi-AZ configuration to ensure database durability.

Testing & Evaluation

- **Functional Testing:** Verified incident creation, S3 evidence uploads, and SNS notification delivery.
- **Guidance Accuracy:** Confirmed appropriate first-aid responses for scenarios like "severe bleeding" or "fire".
- **Security Assessment:** Tested SQL injection prevention and authentication protocols.
- **Performance:** Monitored response times and cross-device usability.

Conclusion & Future Work

- **Conclusion:** SmartSOS successfully leverages cloud infrastructure to modernize emergency reporting and bystander support.
- **Mobile Integration:** Future plans include push notifications via Firebase Cloud Messaging.
- **Advanced Analytics:** Machine-learning-based incident prioritization and severity analysis.
- **Official Integration:** Connecting with government dispatch systems and emergency service APIs

Thank You