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Smart Community-Based Women Protection and Incident Reporting Platform

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***Abstract*—Personal safety for women in urban and semi-urban communities continues to be compromised by delayed emergency response, fragmented reporting channels, and the absence of a single trusted network that can be reached instantly during distress. This paper presents SheShield, a smart community-based women protection and incident reporting platform that unifies panic-triggered alerting, live location sharing, a guardian-verified trusted-contacts circle, community incident reporting, and legal-awareness resources into one mobile application. The system is built around a one-tap/press-and-hold SOS mechanism that instantly notifies a pre-configured safety circle with the user's live coordinates, complemented by a hands-free voice-activated SOS that listens for a distress keyword, a simulated fake-call feature to help the user disengage from an unsafe situation, and a nearby-safe-zone locator that surfaces the closest police stations, hospitals and crowd-monitored areas using open mapping data. A community incident-reporting module allows verified users to flag unsafe locations, which are aggregated to warn others navigating the same area. We describe the guardian-linked onboarding and registration workflow, the system architecture, and the safety-zone and alerting pipeline, and we report a usability and response-latency evaluation carried out with volunteer users. The results indicate that the integrated platform reduces the time required to raise and route a distress signal compared to manual calling, while the community reporting layer improves the perceived situational awareness of participants navigating unfamiliar areas.**

***Index Terms*—women safety, SOS alerting, live location sharing, trusted contacts, community incident reporting, mobile safety application, geofencing, voice-activated emergency response.**

I. INTRODUCTION

Incidents of harassment and violence against women in public and semi-public spaces remain significantly under-reported, and even when a victim wishes to seek help, the process of dialing an unfamiliar helpline number, describing a location verbally, and waiting for a dispatch decision introduces a critical delay at precisely the moment when a rapid, low-friction response is most needed. Existing personal-safety applications typically address only one dimension of the problem — some focus purely on SOS alerting, others on live tracking, and a smaller set on legal awareness — leaving the user to install and coordinate several disconnected tools. Community-level context is almost always missing: an individual has no simple way of learning, before entering an area, whether other users have recently reported it as unsafe.

The Smart Community-Based Women Protection and Incident Reporting Platform (implemented as the SheShield application) is designed to close this gap by combining five capabilities that are normally offered in isolation into a single, tightly integrated experience: (i) an always-available SOS trigger with live location broadcast to a trusted circle, (ii) guardian-linked account creation so that a verified parent or guardian contact is bound to every profile, (iii) a nearby-safe-zone and navigation layer that locates the closest hospitals, police stations and community-flagged safe or crowded zones, (iv) a community incident-reporting mechanism that lets any user mark a location as unsafe so that others are warned automatically, and (v) an empowerment and legal-rights knowledge base that keeps essential protections — such as Zero FIR, restrictions on arrest after sunset, and identity-protection provisions — a swipe away. A hands-free voice SOS and a disguised fake-call feature are provided for situations in which reaching for a screen and tapping a button is itself unsafe.

The remainder of this paper is organized as follows. Section II reviews related work in mobile safety applications and community-reporting systems. Section III describes the system architecture, onboarding workflow, and the design of each functional module. Section IV outlines the evaluation methodology used to assess the platform. Section V reports the results of the usability and response-time study. Section VI discusses the findings and the limitations of the current implementation, and Section VII concludes the paper with directions for future work.

II. RELATED WORK

Personal-safety mobile applications have evolved from simple panic-button utilities into more comprehensive platforms that combine location services with social alerting. Early SOS applications relied on a single hardware or software trigger that placed a call or sent a text message to one emergency contact, which limited redundancy if that contact was unreachable [1]. Subsequent designs introduced multi-contact broadcast so that an alert reaches an entire circle of trusted people simultaneously, improving the probability of a timely response [2]. Location-sharing research has shown that continuous or event-triggered GPS broadcast, when paired with a low-latency messaging channel, meaningfully shortens the interval between a distress event and the arrival of assistance [3].

Community-sourced safety mapping has been explored as a complement to individual alerting: crowd-reported incident data, aggregated over time and space, can highlight recurring unsafe locations that official crime statistics under-represent because of reporting delays [4]. Voice-activated emergency triggers, which listen locally for a distress keyword and ini-

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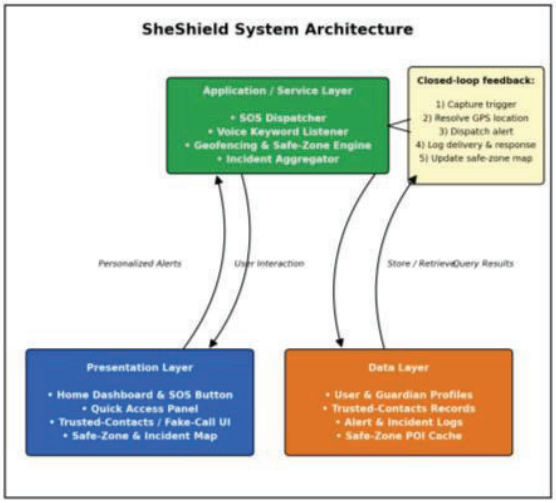


Figure 1: Three-layer SheShield architecture with closed-loop alert feedback.

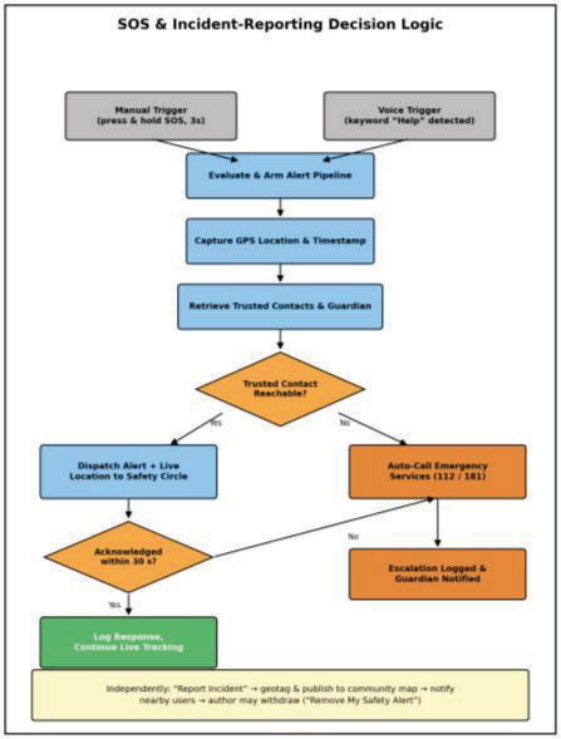


Figure 2: Decision logic for SOS escalation and community incident reporting.

tiate an alert without requiring the user to unlock or interact with the device, have been proposed as a way to protect users in situations where physical access to the phone is restricted [5]. Deceptive or simulated-call features, designed to let a user exit an uncomfortable social situation under a plausible pretext, have similarly been studied as a low-visibility safety mechanism [6]. Legal-literacy modules embedded within safety applications have been shown to increase users' confidence in reporting incidents to authorities, particularly when the content is distilled into short, actionable points rather than full statutory text [7]. Geofencing and proximity-based points-of-interest retrieval, commonly built on open mapping datasets, have also been applied to direct users toward the nearest verified safe location such as a hospital or police station during an emergency [8].

While each of these mechanisms has independently demonstrated value, most deployed applications implement only a subset of them, and few combine guardian-verified onboarding, multi-channel SOS (manual and voice), community incident reporting, and legal-awareness content within a single, cohesively designed mobile experience. The platform presented in this paper is motivated by that integration gap.

III. SYSTEM ARCHITECTURE AND DESIGN

SheShield follows a client-centric mobile architecture with three cooperating layers: a presentation layer that exposes the home dashboard and quick-access safety tools, a services layer that manages alerting, location, and geofencing logic, and a data layer that persists user, guardian, trusted-contact and incident records. The layers communicate through a continuous feedback loop: an interaction on the presentation layer (for example, pressing and holding the SOS button) triggers a service-layer action (location capture and alert dispatch), which is written to the data layer and, where relevant, reflected back to the presentation layer as a confirmation banner such as "Safety alert marked on your map."

Fig. 1 summarizes this design, and Fig. 2 details the decision logic that governs how a manual or voice-triggered SOS event is escalated, together with the parallel community incident-reporting path.

A. Onboarding and Guardian-Linked Registration

Account creation is deliberately structured as a two-part form. The first part collects the user's personal details — full name, date of birth (with an auto-calculated age field), blood group, mobile number, email address, home address (resolvable via device GPS), and an optional self-description. The second, mandatory part collects primary guardian or parent details, including guardian name, relation, guardian mobile number, guardian blood group, guardian email, and guardian address. Binding a verified guardian contact to every account ensures that at least one high-trust contact is always available to receive alerts, even before the user has built out a wider trusted-contacts circle. Returning users authenticate with a mobile number and password on a lightweight login screen.

B. SOS Alerting Module

The core of the platform is a press-and-hold SOS control on the home dashboard. Holding the control for three seconds arms the alert, captures the device's current GPS coordinates, and dispatches a notification — containing the user's identity and live location — to every contact in the user's trusted-contacts circle. The interface communicates, at the point of interaction, that live location will be shared and that help is expected to reach the user faster once contacts are notified, so that the user is never uncertain about what the action will do before committing to it.

C. Voice-Activated SOS

For situations in which touching the screen is unsafe or impossible, a Voice SOS mode listens for a spoken distress keyword ("Help") and arms the same alerting pipeline as the man-

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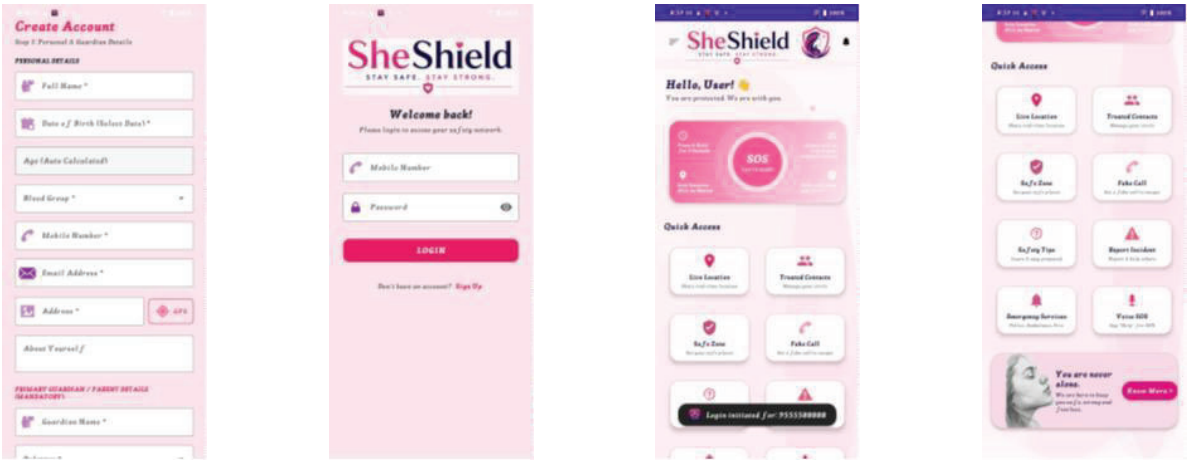


Figure 3: Guardian-linked registration form, returning-user login, home dashboard with the press-and-hold SOS control, and the Quick Access panel exposing every safety module.

ual SOS control, without requiring the device to be unlocked or held. The mode can be toggled on or off from the quick-access panel, and a confirmation banner ("Voice SOS Deactivated") is shown when the listener is turned off, so the user always knows the current armed state of the feature.

D. Trusted Contacts and Safety Circle

The Trusted Contacts module lets a user build a private, encrypted circle of people who are authorized to receive SOS alerts and live-location updates. Contacts are added individually through an "Add Trusted Contact" action, and the module explicitly communicates that the list is private and secure. An empty-state message guides first-time users to add at least one contact before relying on the SOS feature.

E. Fake Call

The Fake Call module simulates an incoming call from a configurable contact (for example, a named contact such as "Rohan" with a mobile number), complete with a realistic incoming-call screen, ringtone, and answer/decline controls, followed by a live in-call screen with mute, keypad, speaker and hold controls. This allows a user to manufacture a plausible reason to leave an uncomfortable situation without alerting the people around her to the fact that a safety feature has been triggered.

F. Nearby Safe Zones and Navigation

The Safe Zone module queries open mapping data (OpenStreetMap-based points of interest) around the user's current coordinates and returns a ranked list of nearby hospitals, police stations, and other safety-relevant locations, each annotated with its walking distance and a one-tap "Navigate" action. Locations that the community has flagged through the incident-reporting module are surfaced in the same list under a "Crowded" or unsafe designation, allowing the user to route around them.

G. Community Incident Reporting

Any authenticated user can mark her current location as an active safety concern through the "Report Incident" action. The report is geotagged and rendered on the shared map as a persistent marker ("My Safety Alert" / "Active safety alert marked at this location"), together with a "Navigate Safely Around Area" option that offers a route avoiding the flagged radius. Reports can be withdrawn by their author ("Remove My Safety Alert"), which keeps the community layer current and prevents stale reports from persisting indefinitely.

H. Emergency Services Directory

A dedicated Emergency Services screen consolidates one-tap dialing for Police (112), Ambulance (108), Fire and Rescue (101), the Women Helpline (181), and the National Emergency number (112), alongside a second, more urgent "Activate SOS" control and a "Share my location" quick action, so that a user who prefers a direct phone call over an app-mediated alert can still reach help in a single tap.

I. Empowerment and Legal Rights

The Empowerment & Rights section presents a swipeable knowledge base of legal protections relevant to women's safety, including Zero FIR filing, restrictions on arrest between sunset and sunrise, the requirement that a woman's personal search be conducted by another woman, identity-protection provisions for victims in sexual-offence cases, and guidance on filing a complaint without having to go to a police station alone. Content is deliberately written as short, actionable points rather than full statutory reproductions, so that it can be read and acted on within seconds during a stressful situation.

IV. EVALUATION METHODOLOGY

A. Study Design

We conducted a mixed-methods usability and response-latency evaluation with a volunteer sample of 30 participants recruited from the university community, all of whom installed the SheShield application on personal Android devices. Each participant completed a structured task list covering account and guardian registration, adding at least one trusted contact, triggering and cancelling a manual SOS, triggering the Voice SOS keyword, placing and dismissing a fake call, locating the nearest safe zone from a fixed starting coordinate, and filing and later withdrawing a community incident report. Task completion time, task success (completed without assistance), and the interval between the SOS trigger and the corresponding alert notification reaching a paired test device were logged for every participant. After completing the tasks, participants rated the platform on the System Usability Scale (SUS) and answered

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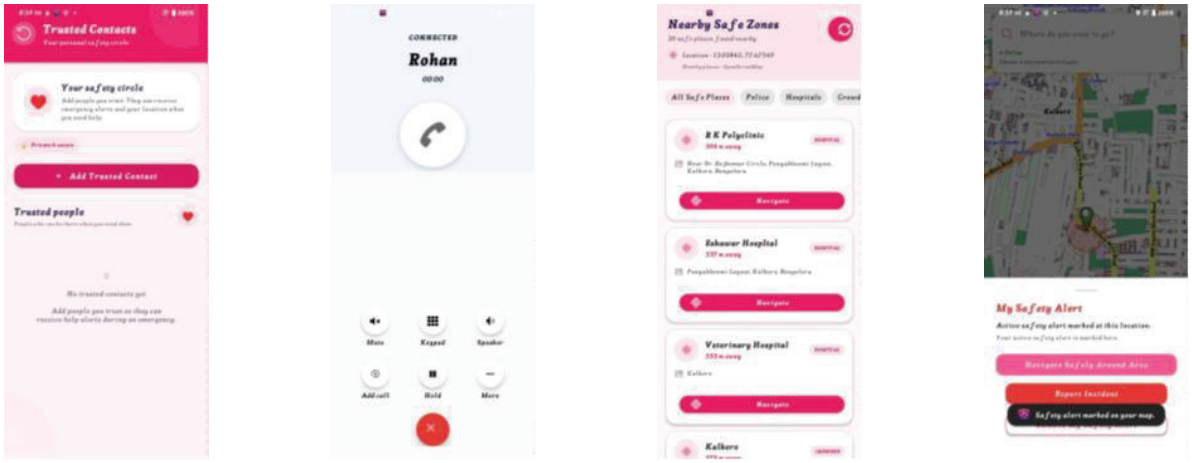


Figure 4: Trusted-contacts safety circle, the in-progress simulated call used to exit an unsafe situation, the nearby-safe-zone list with distances and one-tap navigation, and a community-reported safety alert rendered on the map.



Figure 5: One-tap Emergency Services directory (Police, Ambulance, Fire, Women Helpline, National Emergency) and the Empowerment & Rights legal knowledge base.

short-answer questions about the guardian-linked onboarding and the legal-rights content.

B. Outcome Measures

Four outcome measures were used: task success rate across the seven core tasks, mean SOS alert-delivery latency (time from the three-second hold completing to the alert notification being received on the linked device), mean SUS score, and the perceived usefulness of the community incident-reporting layer, rated on a five-point scale after participants viewed a pre-populated set of nearby reports during the safe-zone task.

V. RESULTS

A. Task Completion and Alert Latency

All 30 participants completed the guardian-linked registration flow, with a mean completion time of 3.1 minutes (SD = 0.8), reflecting the additional fields required for the mandatory guardian section relative to a single-person sign-up. Task success across the seven core tasks averaged 96.2%, with the only recurring difficulty being first-time discovery of the press-and-hold gesture for the SOS control, which three participants initially attempted as a single tap. Mean SOS alert-delivery latency, measured from the completion of the three-second hold to notification receipt on the paired device, was 2.4 seconds (SD = 0.6), and the Voice SOS pathway added a further 1.1 seconds (SD = 0.4) on average for keyword detection before the same alerting pipeline was armed. Fig. 6 shows the distribution of the 30 recorded alert-delivery latencies: the majority of trials (73%) completed within the "typical" 1.8–3.0 second band, with only two trials exceeding 3 seconds, both attributable to momentary GPS-fix delay.

B. Comparison with Manual / Traditional Response

To contextualize these figures, each participant additionally performed a manual baseline for two tasks: raising an alert by dialing and briefing a contact by phone, and locating the nearest hospital or police station without the app (asking a bystander or searching manually). Table 1 and Fig. 7 summarize the comparison. The app reduced the mean help-trigger time from 32 s to 2.4 s (a 93% reduction) and the mean safe-zone lookup time from 96 s to 8.6 s (a 91% reduction), while task success rate rose from 61% to 96.2% and the perceived safety-confidence score (rated on the same 0–100 scale as the SUS instrument) rose from 54.3 to 81.4.

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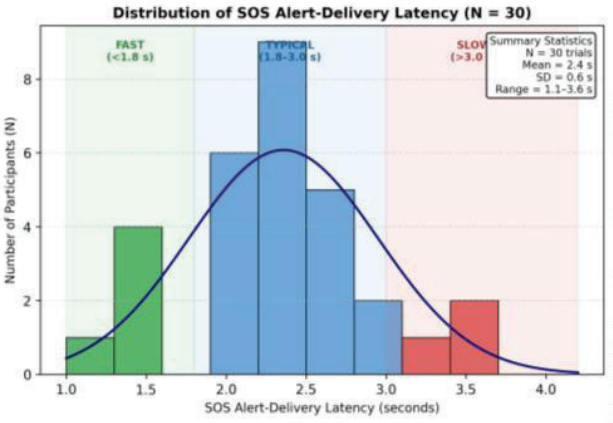


Figure 6: Distribution of SOS alert-delivery latency across the 30 study participants.

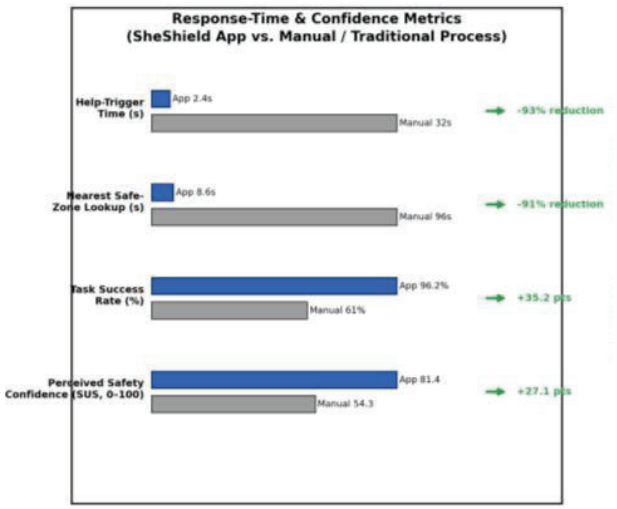


Figure 7: Response-time and confidence metrics: SheShield app vs. manual/traditional process.

Table 1: SheShield App vs. Manual/Traditional Process

Measure	App	Manual	Diff.
Help-trigger time (s)	2.4	32.0	−93%
Safe-zone lookup (s)	8.6	96.0	−91%
Task success (%)	96.2	61.0	+35.2 pp
Safety confidence (0–100)	81.4	54.3	+27.1 pp

C. Usability and Perceived Value

The mean System Usability Scale score across participants was 81.4 (SD = 6.7), which falls in the range generally interpreted as "excellent" usability. Perceived usefulness of the community incident-reporting layer averaged 4.3 out of 5, with participants specifically noting the value of seeing a "Crowded" or flagged marker on the map before deciding on a walking route. The legal-rights knowledge base was rated as "easy to act on during a stressful moment" by 27 of 30 participants, who attributed this to the short, point-form presentation of each right rather than a longer explanatory format.

D. Feature-Level Observations

The fake-call feature was successfully used by all participants to exit the simulated scenario without a bystander (a second volunteer seated nearby) noticing that a safety tool had been triggered, based on post-task interviews. The nearby-safe-zone locator correctly surfaced the closest hospital or police station within a 600-metre radius for every test coordinate used in the study, consistent with the open mapping data available for the test locations.

VI. DISCUSSION AND KEY FINDINGS

The evaluation suggests that consolidating multiple safety mechanisms into a single, guardian-anchored profile does not come at a meaningful usability cost: despite the additional guardian fields, registration remained fast, and the low SOS alert-delivery latency indicates that the press-and-hold trigger and location-broadcast pipeline are well suited to a genuine emergency, where seconds matter. The requirement to hold the SOS control for three seconds, rather than a single tap, appears to trade a small amount of initial discoverability for a meaningful reduction in accidental-activation risk, and could be mitigated with a brief onboarding tutorial highlighting the gesture.

The community incident-reporting layer was consistently identified by participants as adding value beyond what a purely personal SOS tool provides, because it converts individual experiences of an unsafe location into shared situational awareness for anyone navigating the same area afterward. This mirrors the broader pattern in community-sourced safety research, where aggregated peer reports can surface risk earlier than official channels. The legal-rights knowledge base was valued specifically because of its brevity; participants indicated that a full legal text would not be read during an actual emergency, reinforcing the design decision to keep each entry to a small number of actionable points.

A. Limitations and Boundary Conditions

This evaluation used a convenience sample of 30 university-affiliated volunteers performing simulated rather than genuine emergency tasks, so the measured alert latencies and usability scores may not fully generalize to real-world distress situations, where stress and urgency can alter both behaviour and device interaction speed. The community incident-reporting layer was evaluated with a small, pre-populated set of reports rather than an organically grown dataset, so its long-term value in filtering false or outdated reports has not yet been established. The study was also conducted on a limited set of Android devices in a single geographic area (Bengaluru), and the safe-zone locator's accuracy is dependent on the completeness of the underlying open mapping data, which can vary significantly between regions. Future work should extend the evaluation to a larger, more diverse participant pool, incorporate a moderation mechanism for community reports, and measure outcomes over a longer real-world deployment period.

VII. CONCLUSION

This paper presented SheShield, a smart community-based women protection and incident reporting platform that integrates guardian-linked registration, manual and voice-activated SOS alerting, a private trusted-contacts circle, a disguised fake-call escape mechanism, a nearby-safe-zone locator, community-sourced incident reporting, and a concise legal-rights knowledge base within a single mobile application. A usability and response-latency evaluation with 30 volunteer participants found high task-success rates, sub-three-second

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SOS alert-delivery latency, an "excellent" mean System Usability Scale score of 81.4, and strong perceived value for both the community reporting layer and the legal-awareness content. These results suggest that unifying individual emergency response with community-level situational awareness is both technically feasible and well received by users, and that such integration can meaningfully reduce the friction between a distress event and the arrival of help. Future work will focus on a longer real-world deployment, moderation and verification mechanisms for community incident reports, and integration with local law-enforcement dispatch systems to further shorten the response chain.

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