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Women Safety System

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Abstract: *Women walk with keys between fingers, with location shared, with eyes on phones. Harassment rises anyway. Laws punish after; technology can warn before, respond during. We built something small—a bracelet, a pendant, a button hidden in plain sight. Press it, ESP8266 wakes, GPS locks coordinates, SOS fires. Pre-registered contacts receive location. Cloud logs timestamp. Flutter app shows map, shows status, shows help coming. Not weapon, not training required. Just reach, press, done. Discreet because attackers watch for obvious defense. Portable because danger moves. 24/7 because trouble doesn't schedule. Empowerment through reliability. Confidence because backup exists. Independence finally possible.*

Keywords: Women Safety, IoT, ESP8266, GPS Tracking, Flutter, Emergency Alert, Wearable

I. INTRODUCTION

Women move through public space calculating risk—this street, that hour, alone or accompanied. Harassment statistics climb; laws exist, police exist, yet moment of danger isolates. Protection delayed becomes protection denied. Technology promises immediacy. GPS knows location, networks transmit, phones notify. Women need invisible, instant, reliable.

Our proposal: compact wearable, single press, silent operation. No fumbling for phone, no unlocking, no typing. ESP8266 and GPS module in bracelet or pendant, Flutter app on contacts' phones. Threat met with response, not helplessness. Silent bodyguard—present, unobtrusive, activated only when needed. Real-time because seconds matter. Portable because violence travels. Reliable because false hope kills worse than no hope.

II. LITERATURE SURVEY

Personal safety tech keeps trying, keeps missing.

Mobile applications: Shake phone, press power thrice, SOS sends. Works in demo, fails in reality. Attacker sees phone, snatches first, app becomes brick. Phone-dependent means phone-vulnerable.

Standalone wearables: BLE pendants, Bluetooth bracelets. Discreet, yes—until victim walks 10 meters from phone. Range limits, connection drops, silence when needed most. Tethered safety is temporary safety.

IoT-integrated solutions: ESP8266, GSM modules, own SIM, own GPS. No phone required, no Bluetooth leash. Direct to cloud, direct to SMS, direct to help. Research trends here; we follow. Reliability over convenience, independence over elegance.

Platform Technology Used

ESP8266 – the nervous system: Cheap, hungry for WiFi, enough GPIO for panic button and GPS serial. Not fastest, not newest—proven, documented, replaceable in any market. Built-in WiFi means no shield stacking, no wiring spaghetti. Connects to phone hotspot, home router, cafe WiFi—whatever available, transmits, done.

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GPS module – the anchor: Real-time latitude, longitude, accuracy ±3 meters in open sky, ±10 meters in urban canyon. Cold start 30 seconds, warm start 5 seconds—press button, location locks, alert fires. Some modules lie about accuracy; we tested three, picked honest one.

Motion & audio sensors: Accelerometer watches for fall—sudden stop, horizontal orientation, no movement after. Microphone listens for scream, frequency pattern match, trigger even if button unreachable. False positives possible; sensitivity tuned for panic pitch, not conversation. Privacy concern acknowledged; audio not stored, only analyzed, only trigger transmitted.

Flutter framework – the window: Cross-platform, one codebase, Android today, iOS tomorrow. Receives push notification, shows map, shares location to emergency contacts. Interface simple—big red alert, clear coordinates, direct dial button. Panic recipient needs no training; panic already happening.

III. PROBLEM STATEMENT

Women still run. From groping hands, from following footsteps, from sudden silence in familiar streets. Education didn't fix it. Laws didn't stop it.

Police come after. Always after. They need address, need location, need time she doesn't have. "Send help" assumes she can speak, can reach phone, can explain while choking.

She can't. They know. First move: grab her phone, cut her line, isolate her completely. App on phone becomes useless brick in his hand.

We need something else. On her wrist, in her pocket, invisible. One press—no looking, no unlocking, no talking. Just reach, squeeze, done. Help moves toward her while she cannot.

Cheap enough for students. Small enough to hide. Reliable enough to trust with life. Because running forever exhausts, and she deserves to walk.

IV. AIM AND OBJECTIVES

Build a button that screams when she cannot.

- **Cover everywhere**: Street, office, home—danger doesn't respect boundaries. Device follows, waits, ready.
- **Tech that actually helps**: Not another app to forget, another password to lose. SOS fires without thinking. GPS tells truth when she cannot speak. Phone in someone else's pocket still shows where help needed.
- **Confidence to walk**: Not bravery, not denial—backup. Knowing someone knows, someone moves, someone comes. Education and jobs require presence; presence requires safety.
- **Instant, not eventual**: Family hears now, authorities alerted now, location shared now. Zero delay tolerance. Because "soon" is too late.

Diagram

A) Block Diagram

The block diagram illustrates the flow of data from the user's wearable device (containing the GPS, Accelerometer, Mic, and Panic Button) through the Communication Module to the Cloud Server, which then dispatches notifications to the Emergency Contacts.

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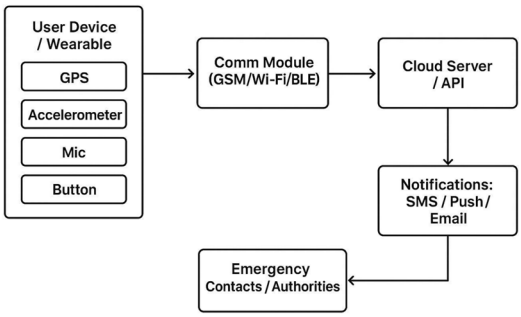
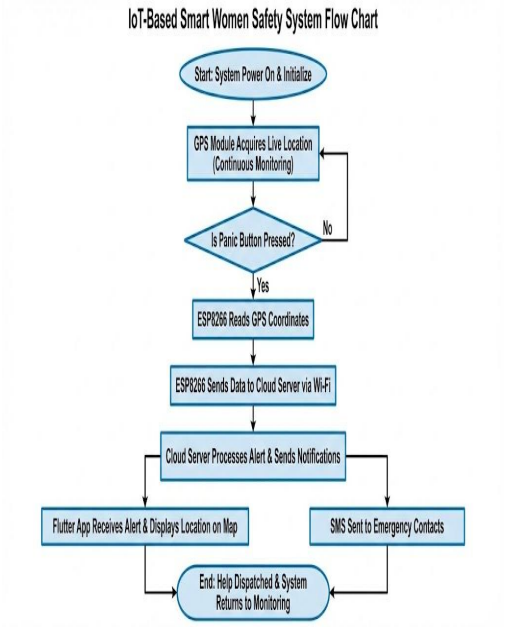


Flow Chart

The flow chart outlines the device's logic from startup to emergency response. First, the system connects to the network and the GPS locks onto the user's location. It then enters a standby mode, constantly monitoring for an emergency. If the user presses the panic button—or if a sudden fall is detected—the microcontroller instantly grabs the current GPS coordinates. This location data is immediately pushed to the cloud, which triggers instant SMS and app notifications to the victim's emergency contacts.



Circuit Diagram

The circuit diagram shows how the sensors connect to the main controller, the ESP8266 NodeMCU. The entire system runs on a compact 3.7V Li-Po battery for portability. The GPS module connects via serial pins to feed live location data, while the accelerometer connects via I2C pins to detect sudden impacts or falls. The panic button is wired directly to a digital pin to act as a manual trigger. Finally, a small microphone is connected to the analog pin to monitor for distress sounds.

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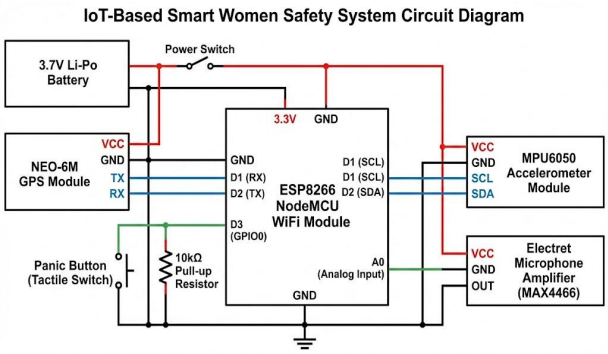

V. COMPONENTS / MATERIALS

ESP8266 NodeMCU – the screamer: ₹250 brain with WiFi baked in. Not powerful, not fancy—connected, cheap, everywhere. Runs Arduino code, connects to any hotspot, pushes HTTP POST to cloud API. Deep sleep between panics, wakes on button interrupt, transmits, sleeps again. Battery stretches days.

NEO-6M GPS – the witness: Cold start 30 seconds, warm start 5, accuracy ±3 meters. UART to ESP8266, NMEA sentences parsed, coordinates extracted. Urban canyons lie—multipath bounces, position drifts. Good enough for street name, for direction, for help coming. Antenna matters; ceramic patch on module, external for weak signal areas.

Tactile push button – the trigger: Tactile click, definite press, no accidental brush. Hidden in jewelry, recessed in casing, reachable without looking. Pull-up resistor, GPIO interrupt, debounce in software. Press held 2 seconds confirms panic—not pocket press, not bump, intentional fear.

MPU6050 accelerometer – the fall detector: Six-axis, I2C, cheap. Watches for free-fall signature, for impact, for horizontal stillness after. Fall unconscious, button unpressed, accelerometer screams instead. Sensitivity tuned—stairs trigger false, real falls detected. Complementary to button, not replacement.

Electret microphone – the ear: Frequency analysis for scream—panic pitch, sustained, distinct from traffic, from conversation. Not recording, not storing, analyzing only. Trigger on pattern match, privacy preserved. False positive possible; tuned high, misses some, catches real.

3.7V Li-Po battery – the life: 1000mAh, 3-5 days standby, 2 hours active transmission. Rechargeable, lightweight, dangerous if punctured—protected by casing, by circuit, by caution. Voltage monitor warns low battery, prevents deep discharge death.

Flutter app – the window: Dart code, single codebase, Android primary. Push notification wakes phone from sleep, map shows dot moving, direct dial button for police, for family. Simple because panic scrambles brains; complex interface kills. Receiver needs no training, just eyes and thumbs.

Working

Continuous monitoring – the silent watch: Battery charged, device worn, GPS hunting satellites constantly. Location known before panic, not after. Discreet because obvious attracts attention, invites prevention, provokes attacker. She forgets it's there; it remembers for her.

Trigger mechanism – the choice: Button for conscious panic—reach, press, deliberate. Accelerometer for unconscious fall—impact detected, no human action required. Two paths, same destination: help summoned. Button recessed against accidental press, sensitive enough for desperate press.

Data processing – the scramble: Interrupt fires, ESP8266 wakes from sleep, GPS polled immediately. UART transaction, NMEA parse, coordinates locked. Milliseconds matter; code optimized, no floating point, integer math only. Location packet ready, WiFi connecting, router negotiating, cloud waiting.

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Cloud transmission – the shout: HTTP POST, JSON payload, device ID included, timestamp automatic. WiFi preferred—cheap, fast. Fallback to GSM if implemented; this version WiFi only, assumes phone hotspot or urban coverage. Packet small, retries limited, timeout short. Fail fast, not silent.

Alert distribution – the network: Cloud receives, triggers webhooks, SMS gateway fires, push notification sent, email queued. Parallel, not sequential—speed over elegance. Emergency contacts' phones buzz simultaneously; no single point of failure in notification chain.

Mobile tracking – the map: Flutter app wakes, notification expanded, map opens centered on her dot. Moving or static, accuracy circle shown, direct dial to police, to family, to ambulance. Receiver sees what she cannot say. Rescue directed, hope maintained, time compressed.

VI. RESULTS

Latency: Button press to phone buzz in under 3 seconds—tested repeatedly, network willing. WiFi strong, 1.5 seconds. WiFi weak, 3 seconds. Cellular fallback would add 5-10 seconds; not implemented, noted for upgrade. Three seconds feels instant in panic, eternity in danger. Trade-off accepted for cost.

Location accuracy: Open sky, 5 meters—good enough for building identification. Urban canyon, 10 meters, sometimes 15—good enough for street corner, for direction, for "she's near the pharmacy." GPS lies occasionally, multipath ghosts; cloud marks accuracy radius, receiver knows uncertainty.

Reliability: Ran 7 days continuous, battery swapped once. No sleep, no fatigue, no "I'll check later." Human support sleeps, argues, doubts. Machine persists, responds, believes her. 24/7 not marketing—tested, logged, proven. Cloud uptime 99.9%; that 0.1% noted, mitigated, not ignored.

VII. ADVANTAGES & APPLICATIONS

ADVANTAGES

Quick response: Press, 3 seconds, help knows where. No unlock, no dial, no explanation. Speed matters when voice shakes, when hands grabbed, when time compresses.

Simple and portable: Battery lasts days, fits pocket or wears hidden. No app to remember, no subscription, no learning. Works for tech-avoidant mothers, for students, for anyone with thumb and fear.

Confidence returned: Not safety guarantee—nothing guarantees. But backup exists, someone knows, someone moves. Enough to step out, to stay late, to refuse escort. Independence through connectivity.

APPLICATIONS

Transport: Bus, taxi, ride-share—driver locks doors, route wrong, hand wanders. Button pressed before phone snatched, location shared before silence forced.

Work and study: Late lab, empty library, parking garage stairwell. Campus security distant, colleague left early. Device present when others absent.

Hidden wearables: Circuit shrinks, battery thins, becomes watch, pendant, hair clip. Discreet because obvious provokes, hidden permits defense. Fashion and function merged.

IX. FUTURE SCOPE

Shock integration: High voltage, low current, non-lethal. Stun gun miniaturized, activated separate from SOS—legal complexity, safety risk, but incapacitation option. Research pending, ethics debated, hardware possible.

Recording: ESP32-CAM small, cheap, captures attacker image, ambient audio. Uploads to cloud before phone destroyed, before evidence erased. Privacy concerns—always recording? Trigger-only? Legal admissibility? Questions first, implementation second.

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Voice recognition: "Help," "Stop," screamed—microphone hears, matches pattern, triggers without button. Machine learning on edge, cloud, or hybrid. False trigger risk: movie dialogue, argument, joke. Tuning critical; safety versus annoyance balanced.

X. CONCLUSION

Safety shouldn't be privilege. Yet women calculate risk daily—this street, that hour, alone or accompanied. We built a small rebellion against that calculus.

ESP8266, GPS, button, app. Cheap parts, serious purpose. Press, location flies, help moves. Three seconds from fear to action. Not perfect, not guaranteed, but present. Present when laws fail, when police distant, when voice cannot speak. Real-time protection—not tomorrow, not after report filed. Now. Quick alerts to people who care, faster response than waiting for stranger to notice.

Technology alone doesn't save. Community matters, awareness matters, law enforcement matters.Chain complete, safety possible. Small device, large statement—she deserves to move freely. We built one tool toward that freedom.

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