Problem Statement ID : Theme-3 (Open Innovation)

Team Name : TechTornado

TEAM ID : HK-038

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HACK KRMU 5.0

Problem & SOLUTION

Despite the availability of mobile safety applications, women still face serious risks due to communication barriers during emergencies.

Lack of Reliable Network Access

In many rural and remote areas, mobile network coverage is weak or unavailable, causing internet-based safety apps to fail during emergencies.

Delay in Emergency Communication

Even a few seconds of delay in sending a distress message can increase risk and reduce the chances of timely help.

We developed-

LoRaMesh is a compact, network-free women safety communication device designed to provide emergency connectivity without mobile network or internet.

- **Portable & Wearable Design –** Can be carried or used as a wearable safety unit.
- **Direct OTG Connection –** Connects to Android phone via OTG and operates through a dedicated app.
- **Works Without SIM/Internet –** Uses LoRa technology for long-range offline communication.
- **One-Touch SOS –** Instantly sends emergency alert during danger.
- **Long-Range Coverage –** Communicates up to 10–15 km without telecom infrastructure.

Flow of Solution

User Connects Device

User connects the LoRaMesh device to an Android phone via OTG.

App Interface Activation

The dedicated mobile app activates the WhatsApp-like chat interface.

Normal Offline Communication

Users send and receive real-time text messages through LoRa.

Emergency SOS Trigger

User presses the One-Touch SOS button from the app.

Long-Range LoRa Transmission

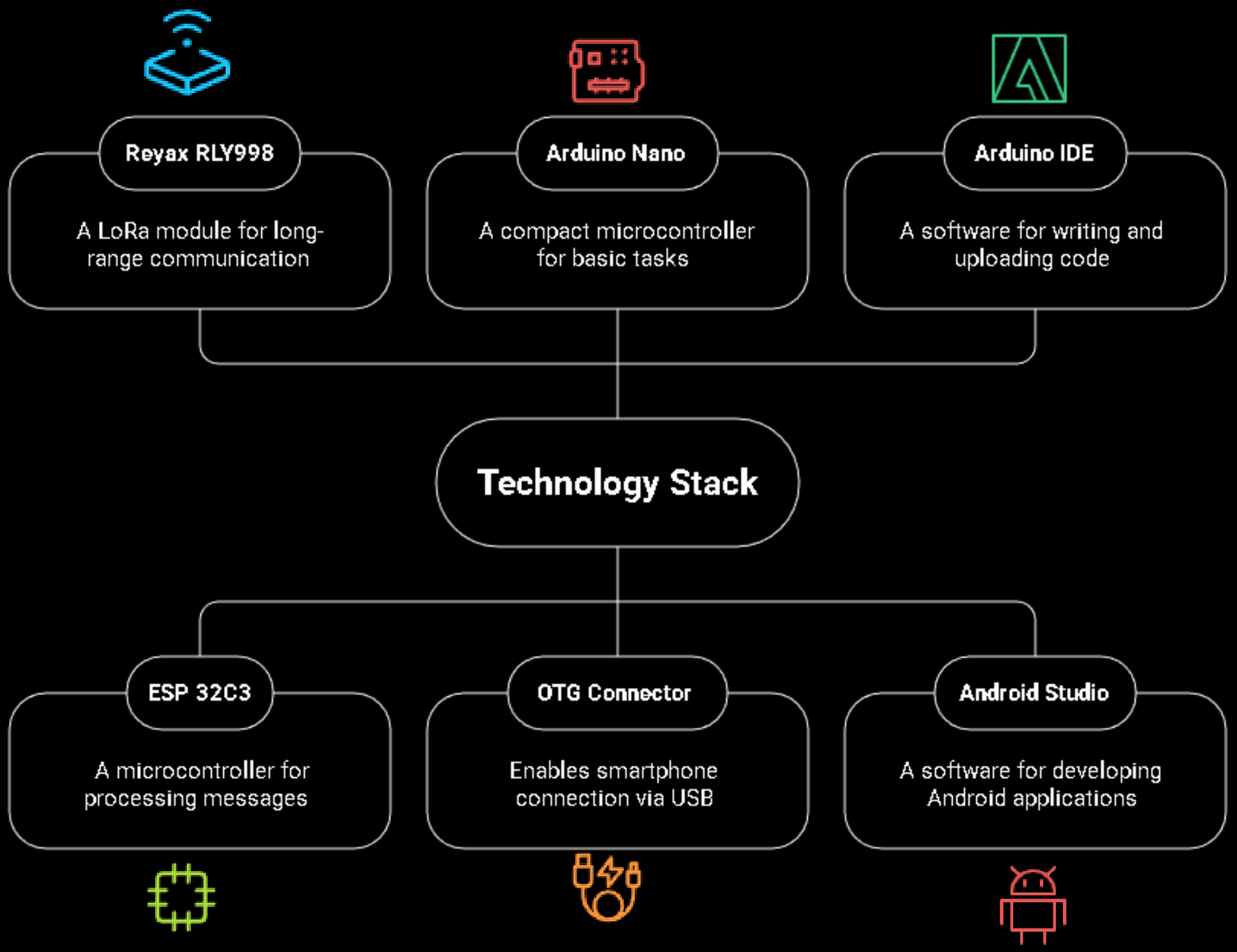
The device transmits the distress signal up to 10–15 km.

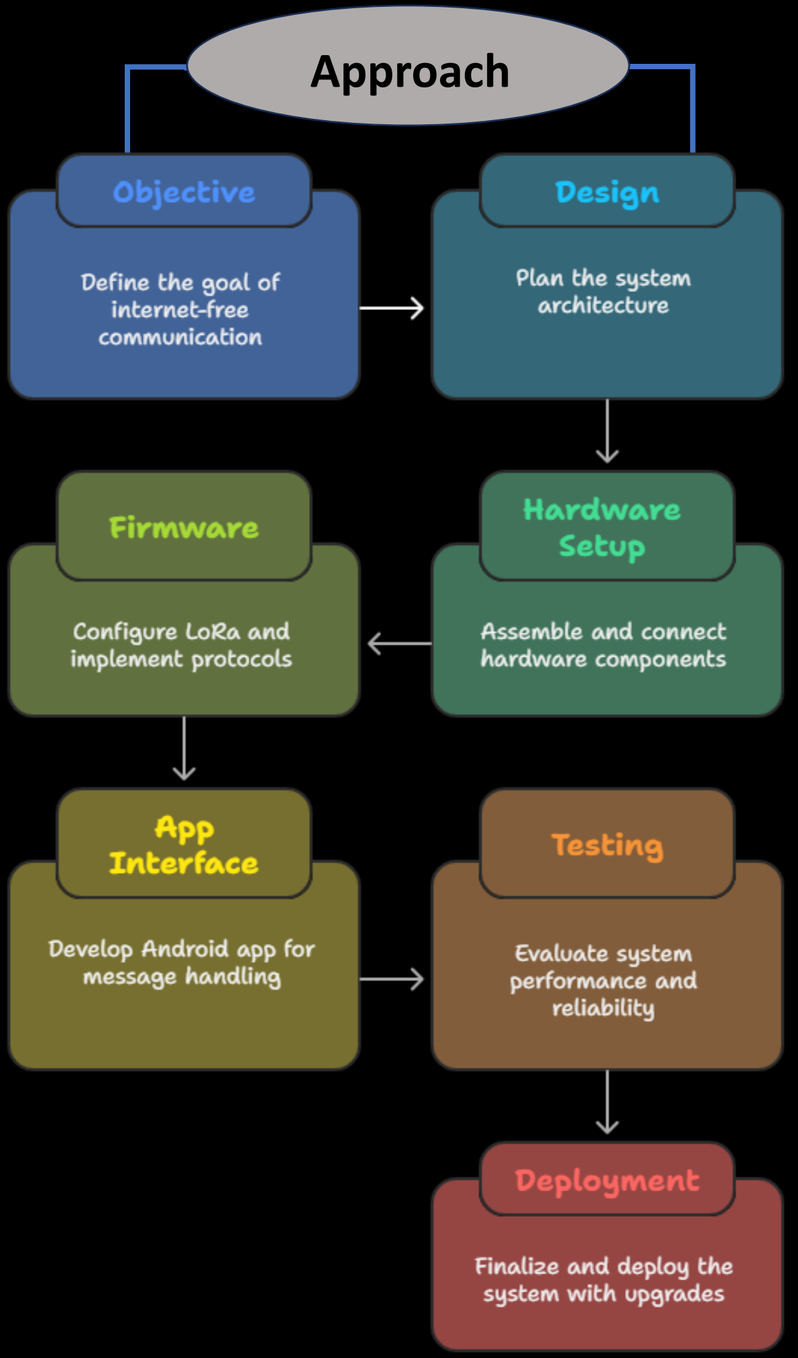
Alert Reception & Action

Nearby devices receive the alert, and guardians or responders are notified.

Wearable Device → OTG Connection → Offline Chat → Messaging/SOS → LoRa Transmission → Device Receives Alert → Help Initiated

TECH STACK & APPROACH





UNIQUENESS & INNOVATION FACTOR

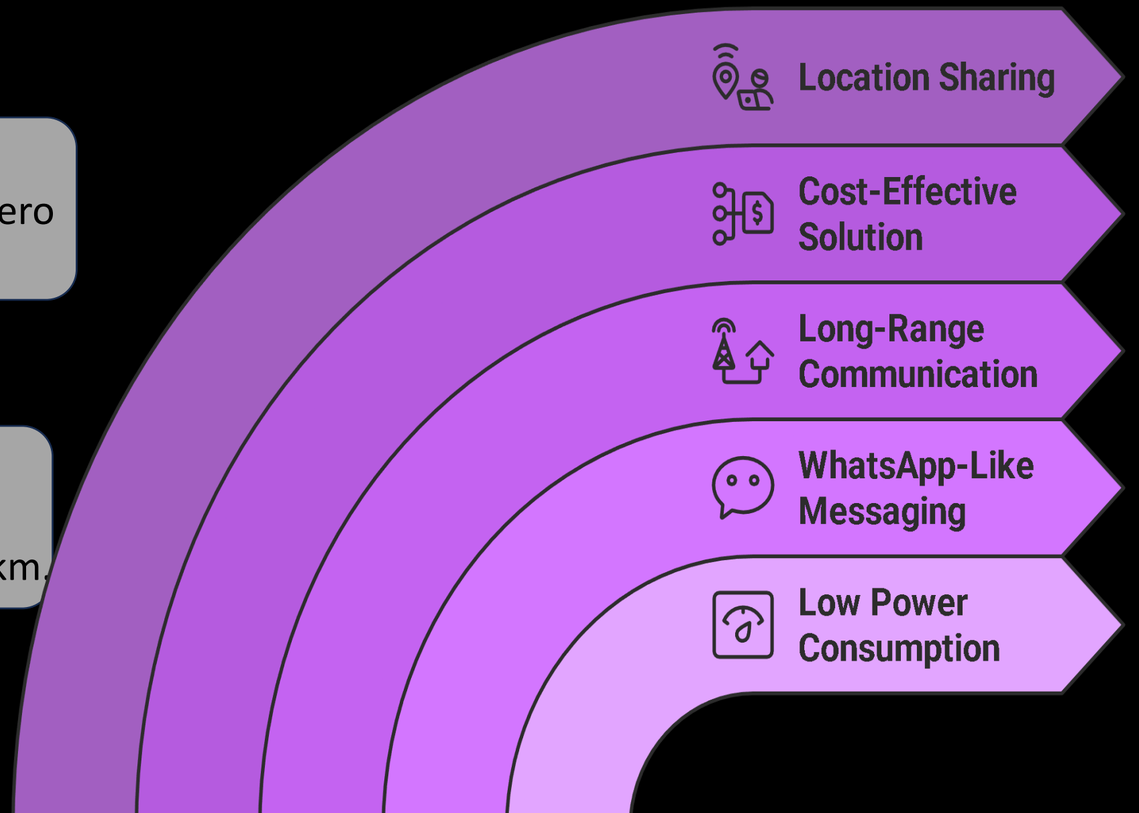
USP

Network-Free Communication
Works completely without SIM, WiFi, or Internet using LoRa technology.

Long-Range Safety Connectivity
Enables communication up to 10–15 km, even in low or zero network areas.

Official WhatsApp Chat
Enabling Official WhatsApp messaging feature without internet and supports long-range communication up to 10km.

Innovative Features



Location Sharing	Enables faster response by sharing user location
Cost-Effective Solution	Affordable hardware for widespread accessibility
Long-Range Communication	LoRa technology for communication up to 15 km
WhatsApp-Like Messaging	Familiar interface for easy offline communication
Low Power Consumption	Ensures functionality during extended power outages

FEASIBILITY & CHALLENGES

FEASIBILITY

- ✓ **Works Without Internet:** Completely independent of cellular networks, ensuring communication during disasters and network failure.
- ✓ **Reliable Long-Range Communication:** LoRa technology ensures stable communication over several kilometers.
- ✓ **Low Power Consumption:** Optimized for minimal energy usage, making it suitable for long-duration emergency scenarios.
- ✓ **Proven Technologies:** Built with reliable, widely used tools for smooth development and deployment.
- ✓ **Affordable Hardware:** Uses low-cost, easily available components like LoRa Reyax RLY 998 and ESP32.
- ✓ **Scalable & Practical:** A cost-effective, scalable, and real-world-ready emergency communication solution.

Challenges

Secure Communication

End-to-end encryption implemented

- End-to-end encryption

Limited Range

Dense areas pose a challenge

- Limited Range in Dense Areas

Wider Reach

Integration with institutions

- Device Adoption & Distribution

Hardware Dependence

Initial reliance on hardware

- Initial Hardware Dependence

RESEARCH & REFERENCE

Research Sources

- LoRa Technology for Emergency Communication– IEEE explore
- NCRB (National Crime Records Bureau), Crime in India Report 2023
- Low-Power Wide area network in emergencies scenarios- Article
- Existing Women Safety Applications & Emergency Systems

Tech Foundations 🔗

- LoRa – Reyax RYLR998 Module – Official Datasheet & Docs
- ESP32 Microcontroller – Espressif Official Documentation
- Arduino Nano – Arduino Official Page

Supporting Tools/Platform

- GitHub- for collaborative code managements
- Canva- For UI/UX prototyping of mobile application
- LoRaWAN libraries- For integrating communication