“POCKET COMM “

EMERGENCY MESSAGE TRANSMITTER FOR SIGNAL BLACKOUT ZONES

A DESIGN THINKING APPROACH TO CRISIS COMMUNICATION

Institution: SRM IST Ramapuram

Subject: Design Thinking and Methodology

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PROBLEM STATEMENT

- Reliable communication is often the first casualty during emergencies. During Disasters, mobile networks collapse due to tower damage, power failures, or network congestion. Similarly, people in signal blackout zones—such as trekking trails in hilly regions, rural villages, or fishermen at sea—struggle to stay connected when they need it most.

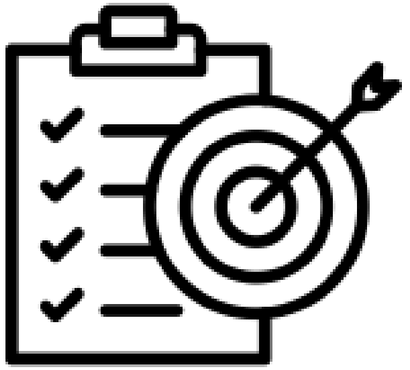
- To address this critical gap, we propose Pocket Comm, a portable emergency communication device that enables message transfer without mobile towers or internet.

- Pocket Comm ensures that people can still send and receive emergency messages over a 2–10 km range, even in complete network failure.

WHY THIS PROJECT?

- Places in India like, Tamil Nadu often faces cyclones, floods, and heavy rains.
- Hilly and rural areas like Nilgiris, Yercaud, Kolli Hills have poor network coverage.
- People get cut off from families and rescue teams during emergencies.
- So there is a Need for a low-cost, portable, and tower-independent device.
- Pocket Comm enables emergency text communication in blackout zones.

OBJECTIVES

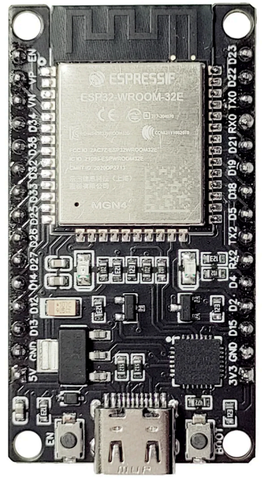


- The main objective of Pocket Comm is to design a portable communication system capable of transmitting messages over long distances without relying on mobile towers.

- The device will allow users to send and receive short text messages through their phones using Bluetooth, which are then transmitted via LoRa technology to another device within a range of 2–10 km.

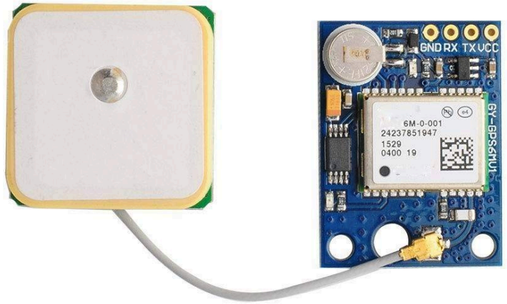
- Additional goals include ensuring low cost, simplicity of use, and optional features like GPS-based location sharing for improved emergency response.

COMPONENTS USED :



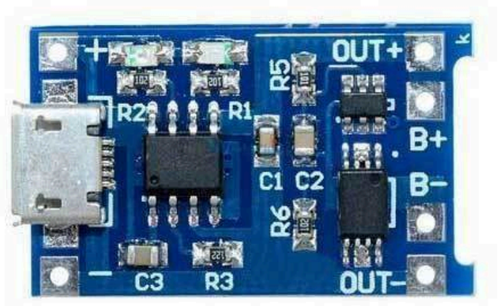
ESP32 DEV BOARD – MICROCONTROLLER WITH WI-FI & BLUETOOTH

LORA SX1278 MODULE (433 MHZ) – LONG-RANGE COMMUNICATION



NEO-6M GPS MODULE – LOCATION TAGGING

433 MHZ ANTENNAS – FOR BETTER SIGNAL TRANSMISSION



TP4056 CHARGING MODULES – SAFE BATTERY CHARGING

18650 LI-ION BATTERIES – RECHARGEABLE POWER SOURCE

WORKING PRINCIPLE

- Pocket Comm enables phone-to-phone communication without mobile networks. A user types a message in a Bluetooth terminal app on their phone.
- The message is passed to the ESP32 microcontroller, which transmits it using the LoRa module.
- The paired LoRa receiver captures the signal and forwards it to another ESP32, which then displays the message on the receiving phone.
- This process ensures that communication is maintained even in complete blackout zones.

Flow of Connectivity:

Phone A → (Bluetooth) → ESP32 A → LoRa TX → LoRa RX → ESP32 B → (Bluetooth) → Phone B

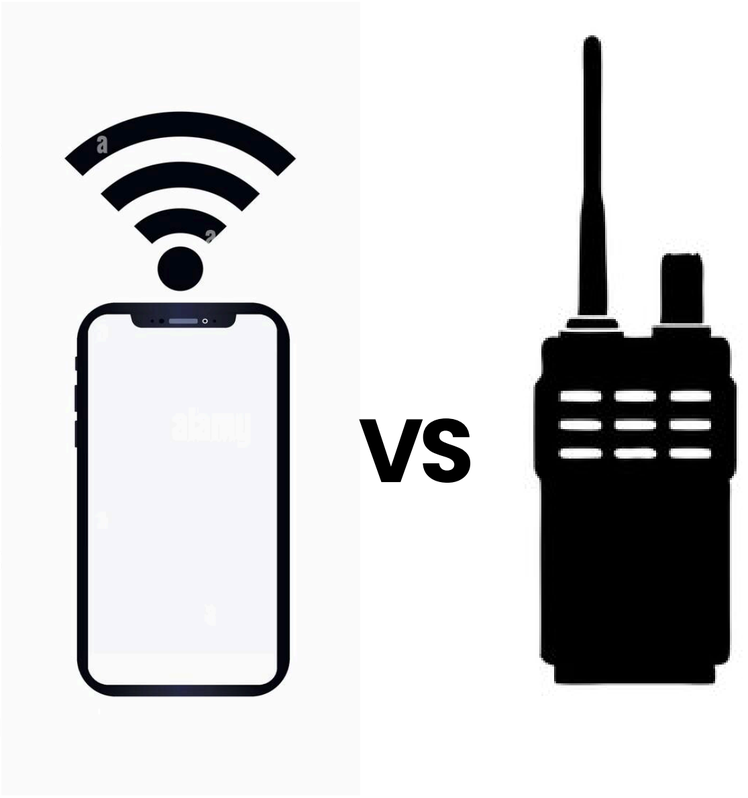
USE CASES

- **Disaster relief**: When floods, cyclones, or earthquakes disrupt mobile networks
- **Remote villages & rural areas**: Where mobile coverage is weak or absent
- **Trekking & adventure**: Groups can stay connected in no-signal zones
- **Coastal communities & offshore workers**: Communication in areas far from cell towers
- **Emergency preparedness in cities**: Backup communication during power/network failures

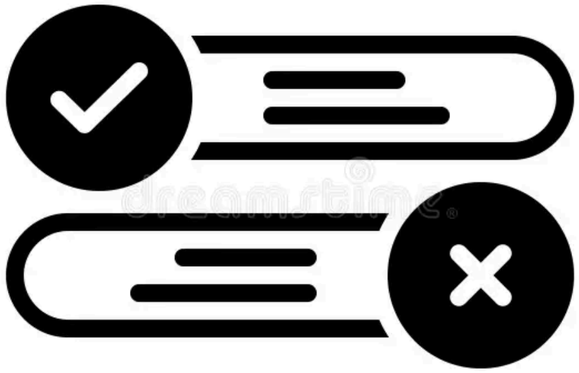
POCKET COMM VS WALKIE-TALKIE

WHY POCKET COMM IS BETTER?

- **Lower Cost** : Prototype costs only ₹2,500–₹3,000, compared to ₹4,000–₹6,000 for a good walkie-talkie set.
- **Longer Range Potential** : Walkie-talkies cover ~1–5 km, while Pocket Comm supports 2–10 km, extendable up to 40 km with upgrades.
- **Smartphone Integration** : Works with any phone via Bluetooth; no need to carry a separate bulky device.
- **Energy Efficient** : Text-based LoRa communication consumes very little power compared to continuous voice transmission.
- **Customizable & Scalable** : Can be improved with GPS, mesh networking, and solar power features which are not available in basic walkie-talkies.



ADVANTAGES & LIMITATIONS



Advantages of Pocket Comm :

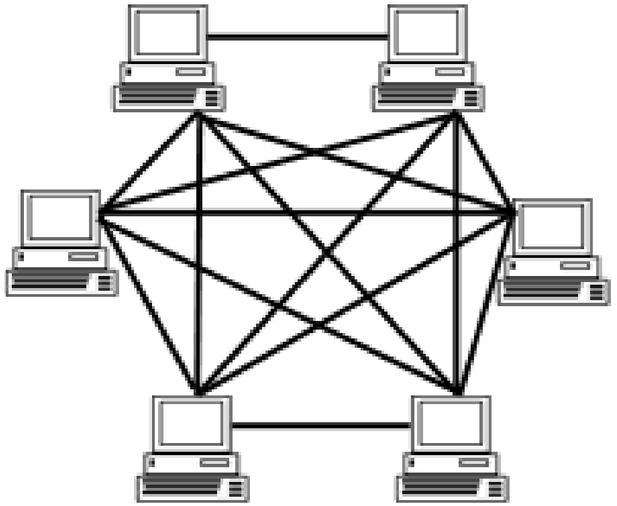
- Works without mobile networks – enables communication in complete signal blackout zones.
- Low-cost and portable – affordable prototype (~₹2.5k–₹3k) that can be easily carried.
- Long-range connectivity – effective communication up to 2–10 km in open areas.
- Simple and user-friendly – messages can be sent directly from a phone via Bluetooth.
- Energy-efficient – uses rechargeable batteries with low power consumption.

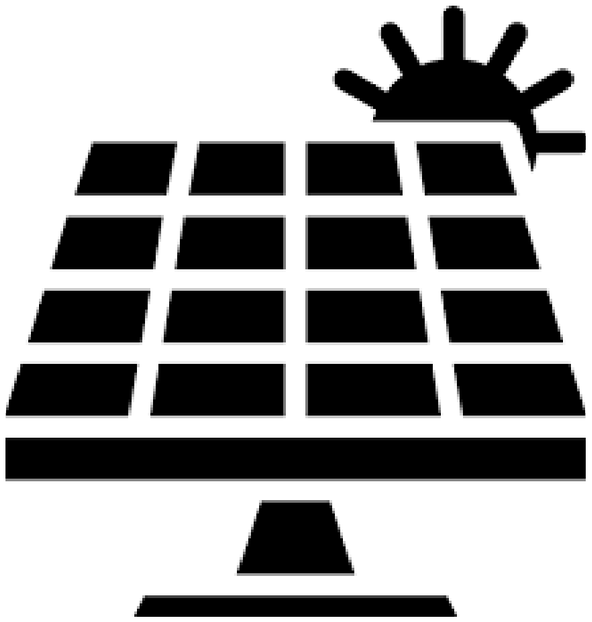
Limitations of Pocket Comm :

- Supports only text messages – no voice or multimedia communication.
- Range depends on terrain – buildings, hills, or dense forests may reduce distance.
- At least two devices are required – both sender and receiver must have Pocket Comm.
- Limited data speed – LoRa is designed for small packets, not continuous communication.
- Prototype durability – may require a proper enclosure for rugged outdoor use.

FUTURE SCOPE

- **Extended Range** : Upgrade to high-gain LoRa modules and antennas to achieve 25–40 km coverage or even more than that.
- **Mesh Networking** : Create a network of multiple Pocket Comm units so that messages can hop across devices for wider reach.
- **Solar Charging** : Add solar panels to make the device self-sustainable during long-term emergencies.
- **Compact Design** : Develop a rugged and waterproof enclosure for outdoor and disaster conditions.
- **Enhanced Features** : Integration with small OLED screens or buzzers for direct alerts without a phone





CONCLUSION

- Pocket Comm provides a simple yet effective solution for emergency communication in network blackout zones.

- It demonstrates how low-cost technology can be used to address real-world challenges such as disaster management and rural connectivity.

- While the current prototype focuses on text communication within 2–10 km, future developments could extend the range up to 40 km, integrate mesh networking, and add solar charging for enhanced usability.

THANK YOU !

- Thank you for your attention and support during our presentation.
- Before concluding, we'd like to make it interactive.
- Imagine a situation where mobile networks fail – during a flood, on a trek, or in a remote village.... How would you try to communicate in such a scenario?
- We welcome your questions, feedback, and suggestions to improve Pocket Comm!