SUSTAINED 2024
1st International Conference on Sustainability and Technological Advancements in Engineering Domain
13 - 14 December, 2024

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Title of Paper: AI-Integrated Community Safety Solutions for Smart Cities: A Study Towards SDG 11

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School of Engineering and Technology

Manav Rachna International Institute of Research and Studies Sec 43, Faridabad, Haryana, 121004, INDIA

Contents

Introduction

- Rapid urbanization in Chennai exposes gaps in traditional safety measures, particularly in densely populated areas.
- Study focus: Exploring AI-integrated solutions to address urban safety challenges.
- Survey of 408 residents to assess:
- Safety perceptions.
  - Experiences with theft and gas leaks.
  - Awareness of SDGs (9 and 11).
  - Feedback on AI-enabled technologies.
- Highlights:
  - Need for real-time monitoring, proactive detection, and swift emergency responses.
  - Role of AI in Enhancing Urban Resilience.

Literature Review

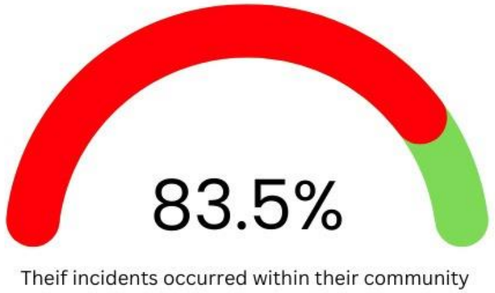
- [1] A. Sherif, S. Sherif, et al.: LoRa-driven home security systems for residential communities.
- [2] M. E. E. Alahi, et al.: IoT-enabled AI technologies for smart city advancements.
- [3] X. Li, R. Lu, et al.: Smart community applications using Internet of Things (IoT).
- Standards and compliance:
  - ISO/IEC 23894:2023: AI system safety and risk management.
  - IEEE 802.11: Wireless communication standards.
  - IEEE P2413: IoT architecture framework.
  - NFTA 72: Fire alarm systems.
  - UL268: Smoke detector standards.

Problem Formulation

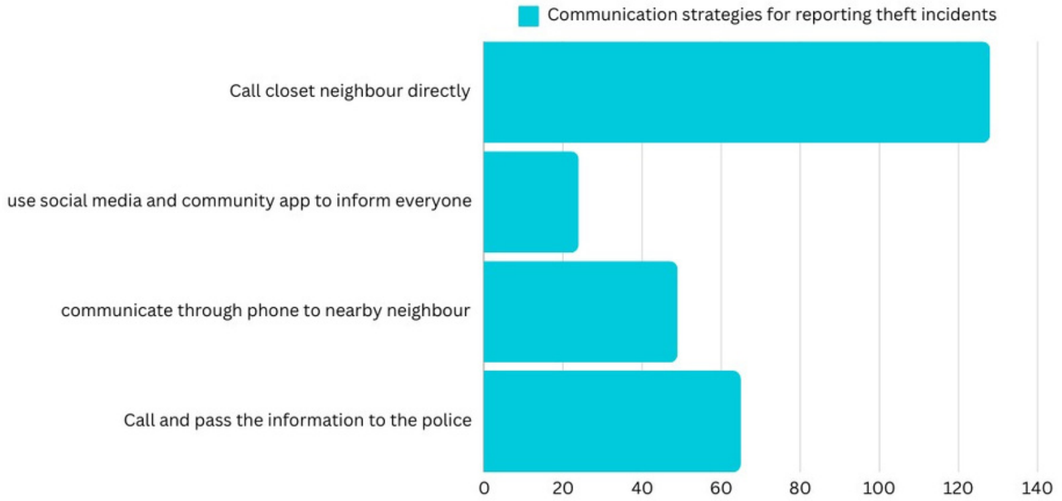
- Key Challenges:
  - Theft incidents: 65.2% reported personal or community experiences.
  - Gas leaks: 55.6% experienced leaks, with 72.8% highly concerned.
  - Low awareness of SDGs (only 14.7%).
  - Limited understanding of AI's potential for safety.
  - Delays in help response: Current safety measures often lack the speed and efficiency to provide timely assistance during emergencies.

- Need for Solutions:
  - Address gaps in traditional safety measures, including response delays.
  - Promote SDG awareness and engagement.
  - Leverage AI for proactive, real-time safety responses to mitigate delays and enhance urban resilience.

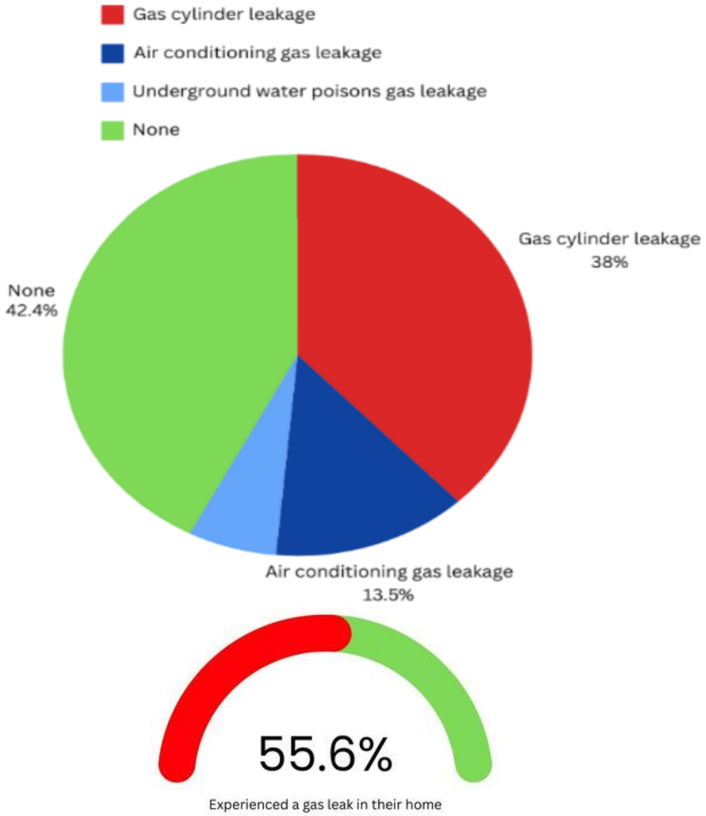
Problem Formulation



Incidence of Theft Experiences



Preferred Methods for Reporting Theif

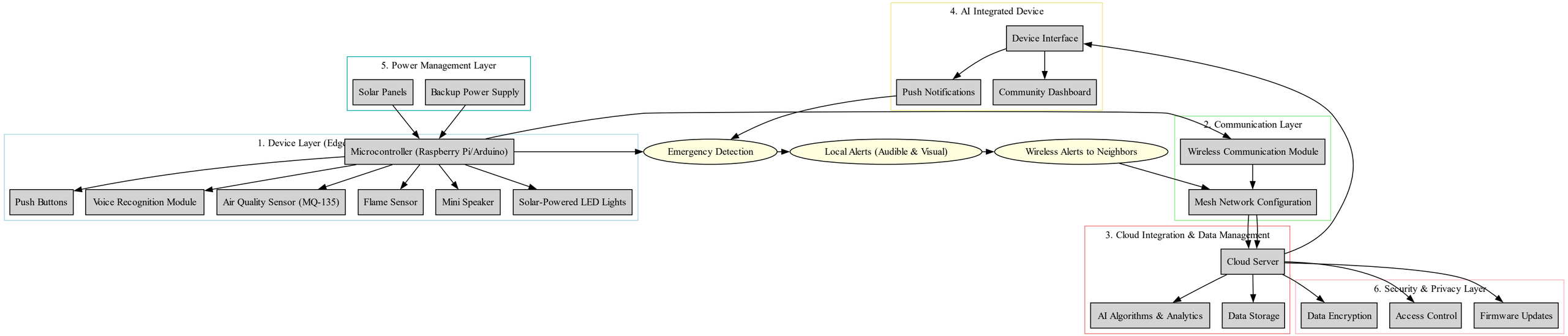


Awareness and Concerns About Gas Leaks

Methodology

- Survey Details:
  - Sample size: 408 residents across Chennai.
  - Focus: Theft experiences, gas leaks, safety concerns, SDG awareness, AI feedback.
- Proposed System:
  - AI-driven emergency detection for theft, fire, medical incidents, and air quality.
  - Features:
    - Push-button and voice-command alerts.
    - Solar-powered alarms and wireless communication.
    - Real-time monitoring and automated notifications.
  - Standards compliance: ISO/IEC 23894:2023, IEEE P2413, NFTA 72, UL268.

Methodology



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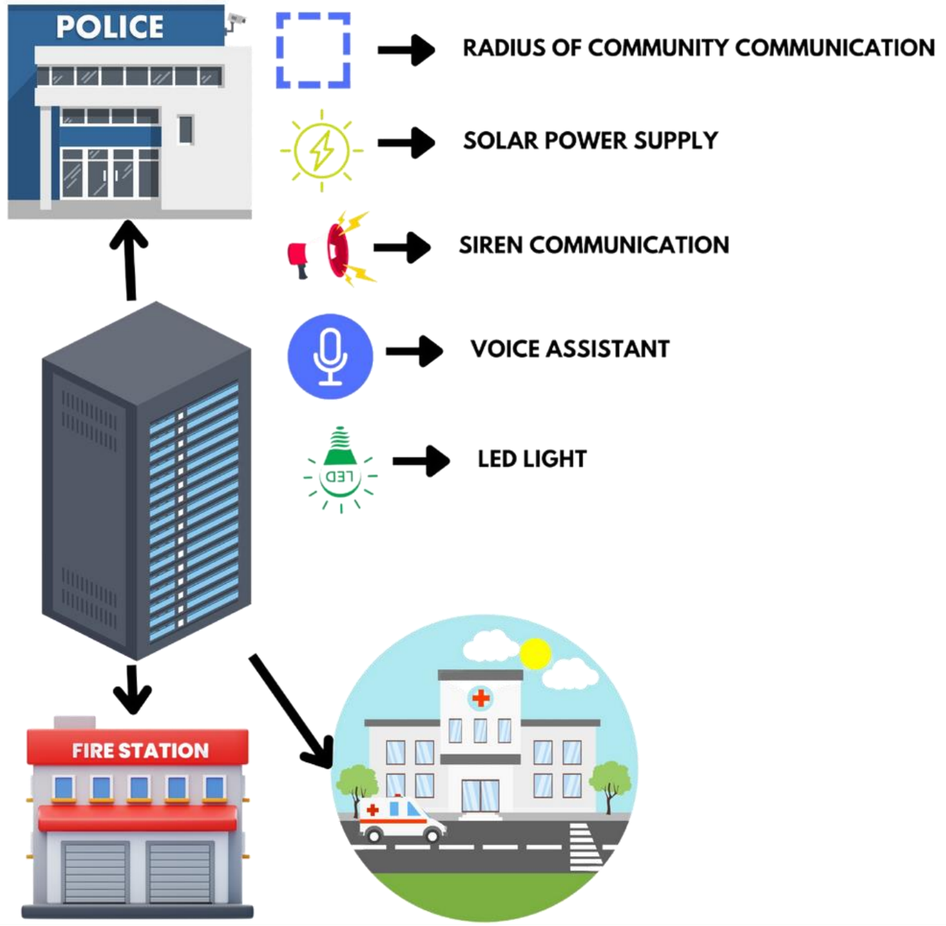
PROJECT WORKING MODEL



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Results and Discussion

- Survey Findings:
  - Theft Concerns:
    - 65.2% experienced theft; 83.5% occurred in community spaces.
    - Detection by neighbors (33.8%) or personal observation (28.2%).
  - Gas Leak Awareness:
    - Cylinder leaks (38%) most common; AC leaks (13.5%), underground leaks (6.1%).
    - Regional gas usage risks require targeted safety programs.
  - AI-Driven Safety Devices:
    - 67.4% rated highly effective; 79.7% interested in testing/feedback.
- SDG Awareness:
  - Only 14.7% aware; need to enhance understanding and community engagement.

Results and Discussion

Willingness to participate in further testing or provide additional feedback

Unaware of these UN SDG Goals

Patent Filed

Sr. No.	App. Number	Ref. No./Application No.	Amount Paid	C.B.R. No.	Form Name	Remarks
1	202441007573	TEMP/E-1/8829/2024-CHE	1600	7313	FORM 1	AI INTEGRATED COMMUNITY SAFETY GADGETS

Survey Photos

Scan to View all Survey Photos

Conclusion

- Urban challenges like theft and gas leaks emphasize the need for AI-integrated safety solutions.
- Strong support for technologies with real-time alerts and proactive responses.
- Alignment with SDGs 9 (innovation and infrastructure) and 11 (sustainable cities).
- Future directions:
  - System scalability and enhanced sensor capabilities.
  - Increased public awareness of SDGs and safety measures.
  - The Prototype preparation process is ongoing to refine the design and functionality.
  - Implementation of the project in village-side communities to address rural safety challenges and promote SDG alignment.

References

1. A. Sherif, S. Sherif, et al., "A LoRa-driven home security system for a residential community," International Journal of Technology, vol. 10, no. 7, pp. 1297-1306, 2019.
2. M. E. E. Alahi, et al., "Integration of IoT-enabled technologies and artificial intelligence (AI) for smart city scenarios," Sensors, vol. 23, no. 11, p. 5206, May 2023. [Online]. Available: https://doi.org/10.3390/s23115206
3. X. Li, R. Lu, et al., "Smart community: An Internet of Things application," IEEE Communications Magazine, vol. 49, no. 11, pp. 12-13, Nov. 2011. [Online]. Available: https://10.1109/MCOM.2011.6069779

Thank You

Queries and Discussion

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