

ERA: Emergency Response Assist

Jatin Madan; Sharvesh Patki;
Isha Ghiria; Vaishnavi Desai

May 6, 2024



Meet the ERA Team



Vaishnavi Sunil Desai



Jatin Madan



Isha Ghiria

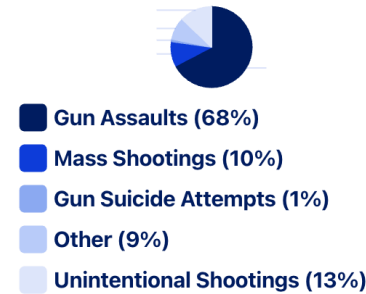


Sharvesh Patki

Current Problems in Campus Safety

- Inadequate Real-Time Response:
 - Issue: Existing systems often have significant delays in detecting and responding to emergencies, reducing their effectiveness.
 - Impact: Delays can result in increased risk to safety and security, potentially leading to harm before help arrives.
- Limited Threat Detection Capabilities:
 - Issue: Many systems only react to threats they are specifically programmed to detect, such as unauthorized entry, without the ability to localize sounds or movements related to other types of emergencies like shootings.
 - Impact: This limitation restricts the system's ability to effectively manage diverse and dynamic emergency situations, leaving gaps in campus security.
- Inefficient Evacuation Support:
 - Issue: Lack of integration between emergency alerts and actionable evacuation instructions can lead to chaos and confusion during evacuations.
 - Impact: Without clear and dynamic guidance, individuals may not find the safest exit routes, potentially leading to bottlenecks and increased risk during evacuations.
- Scalability and Flexibility Issues:
 - Issue: Many systems are not designed to scale or adapt with growing campus environments or evolving technology landscapes.
 - Impact: The inability to scale or adapt can make systems obsolete more quickly and hinder their effectiveness as campus layouts and populations change.

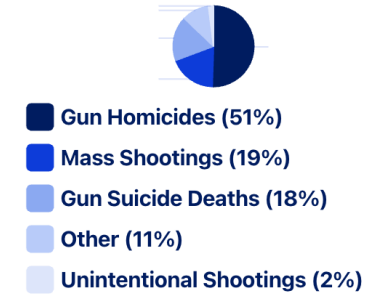
Gun Injuries on School Grounds by Intent



Gunfire on School Grounds



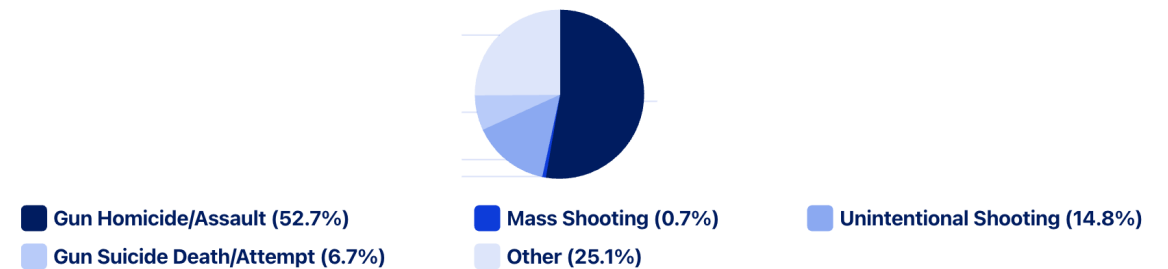
Gun Deaths on School Grounds by Intent



Gunfire on School Grounds



Gunfire on School Grounds: Incidents By Intent



Gunfire on School Grounds



Introducing ERA

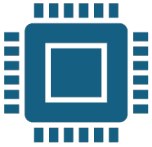
We have a desire to create a system that can assist people in case of emergencies by locating them and providing the safest exit routes to the affected.

To move toward achieving these goals, we need to build advanced machine learning and triangulation algorithms to assist the people

Key Objectives

1. **Gunshot Detection and Localization:** The emergency response system will incorporate gunshot detection and localization capabilities. This feature enhances the system's ability to swiftly identify and respond to active shooter incidents, further bolstering campus security and safety measures.
2. **Real-Time Tracking Algorithms:** In conjunction with the existing features, the emergency response system will incorporate real-time network tracking algorithms linked with network access points across the university campus. This feature enhances the system's ability to monitor and track the movement of individuals during emergencies, facilitating targeted assistance and evacuation procedures.
3. **Planning Escape Routes:** In addition to advanced threat detection and real-time tracking capabilities, the emergency response system will integrate a feature for planning escape routes using the provided floor plans of university buildings and facilities. This feature will enhance the system's ability to guide individuals to safety during emergencies such as active shooter incidents, fires, or natural disasters.

Enhanced Scalability and Technological Sophistication of ERA



Infinitely Scalable Architecture

Containerization: Each module of ERA is containerized, meaning it operates independently within a virtual "container" that can be duplicated and deployed across various hardware setups without compatibility issues. This approach allows for modular updates, maintenance, and scaling.

Impact: Containerization ensures that the ERA system can scale seamlessly with the university's needs, regardless of the size of the campus or the number of buildings. It can be easily expanded to new areas or adjusted with additional functionalities without disrupting the existing infrastructure.



Operates on Low-Power Hardware

Energy Efficiency: ERA is designed to run efficiently on low-power hardware, which not only reduces the system's overall energy consumption but also minimizes operational costs.

Impact: The ability to run on low-power hardware ensures that the system can be deployed widely across vast campus environments without necessitating significant electrical upgrades or high ongoing energy expenses. This makes ERA both environmentally friendly and economically viable.



Integration with an Extensive Array of Sensors

Versatile Sensor Input: ERA is engineered to incorporate inputs from an unlimited number of sensors, including but not limited to acoustic sensors for gunshot detection, motion sensors for tracking movements, and environmental sensors for detecting hazards like smoke or chemical releases.

Impact: The capability to integrate with any number of sensors means that ERA can be customized to meet specific security and safety needs of the campus. It can adapt to include newer sensor technologies as they become available, ensuring that the system remains at the cutting edge of emergency response technology.



Visualization and Practical Application

Administration Dashboard: Provide a Real Time Dashboard for all ERA Administrators for ease of access

Real-World Application: The university administration sought to expand the ERA system to include new buildings on campus, Leveraging ERA's modular architecture and user-friendly interface, system administrators seamlessly integrated the new floor plans, ensuring comprehensive emergency response coverage across the expanded campus infrastructure. This scalable approach facilitated swift deployment and testing, enhancing situational awareness and contributing to the safety of campus occupants.

ERA – A Modular Approach

ERA Key Components



User Input Interface

- ❑ Streamlined Data Input: The interface facilitates easy input of crucial information like floor plans, access points, and audio sensors.
- ❑ Comprehensive Metadata Repository: A "Metadata" section serves as a repository for network configurations, sensor specifications, and building layout details.



Network Logs Analyzer

- ❑ Centralized Logging Server Connectivity: Orchestrates retrieval of network logs from a centralized repository, enhancing efficiency.
- ❑ Identification of Users and Devices: Analyzes network logs to map user activities, strengthening security measures.



Sensor Connectors

- ❑ Seamless Sensor Interface: Establishes seamless communication with deployed acoustic sensors, ensuring reliable data transmission.
- ❑ Swift Gunshot Detection: Evaluates audio signals for gunshot detection using sophisticated algorithms, enabling rapid response.



Notification API

- ❑ Prompt First Responder Notification: Initiates notifications to first responders promptly upon detecting emergency situations.
- ❑ Nearby Devices Alert: Swiftly alerts nearby devices via emergency push notifications, fostering collective awareness.



User Localization

- ❑ Accurate User Positioning: Employs triangulation techniques to pinpoint user positions accurately, enhancing response efforts.
- ❑ Real-time Device Tracking: Tracks affected devices in real-time, enhancing situational awareness during emergencies.



Escape Route Detection

- ❑ Timely Identification of Exit Points: Swiftly identifies nearest exit points for timely evacuation during emergencies.
- ❑ Safe Route Generation: Devises safe routes, circumventing any emergency blockers, ensuring secure evacuation.

Simplifies the process of incorporating building layout data into the system, ensuring accurate and efficient planning of emergency response strategies.

Early detection of unauthorized devices allows for prompt action to prevent potential security breaches and safeguard network integrity.

High precision in gunshot detection minimizes false alarms and ensures timely response to active shooter incidents, enhancing campus security.

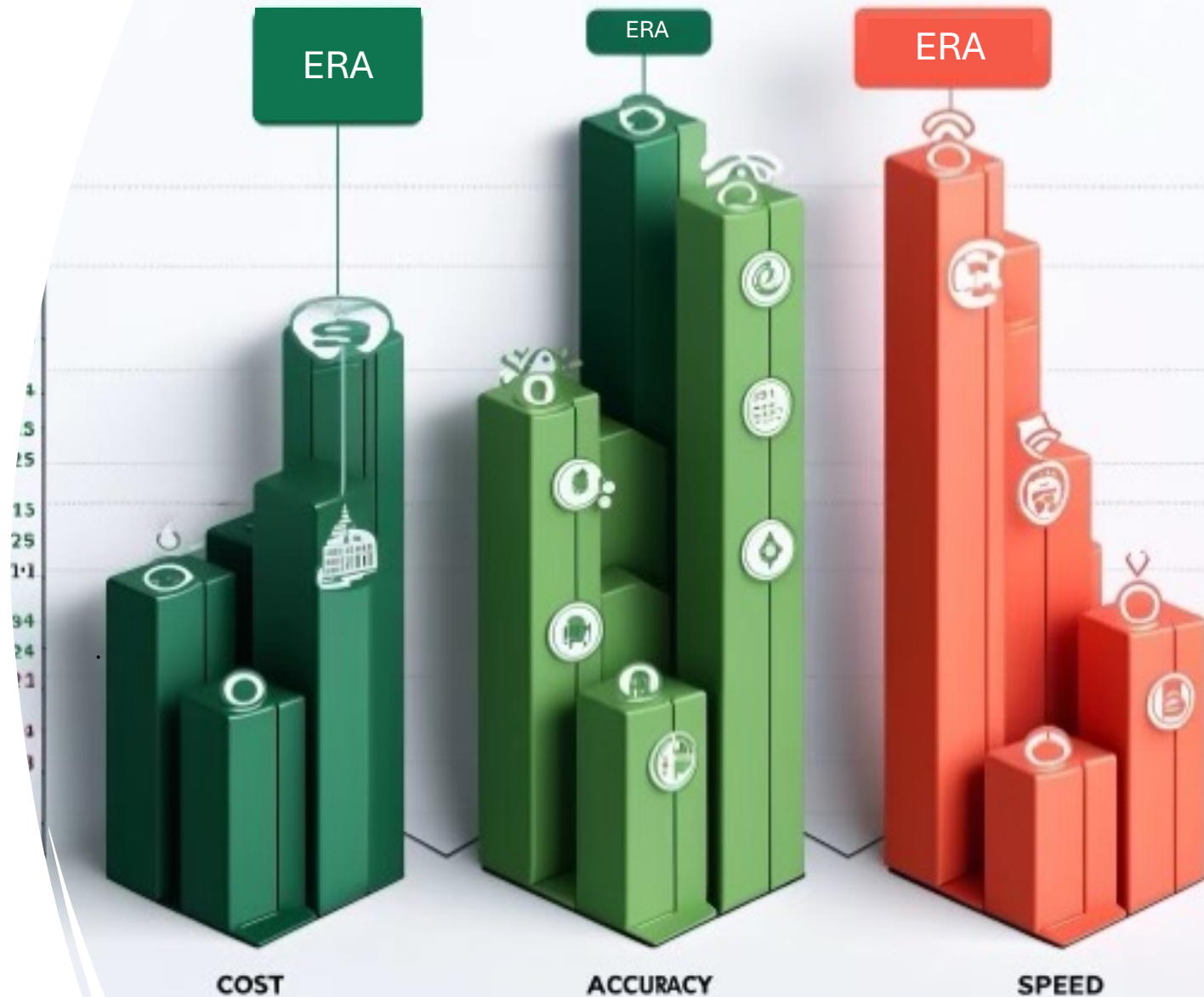
Prompt notification of first responders enables swift intervention and mitigation of risks. Alert Nearby Devices via Emergency Push Notification

Real-time tracking of affected devices allows for dynamic response to evolving situations, ensuring the safety of individuals in crisis scenarios.

Avoidance of emergency blockers reduces risks during evacuation, ensuring the safety of individuals and responders.

ERA vs Existing Emergency Response Systems

ERA vs Existing Solutions



Maximizing Investment through ERA: Cost-Effectiveness and ROI



REDUCTION IN EMERGENCY RESPONSE TIMES

Benefit

ERA's advanced detection and real-time tracking significantly reduce the time it takes to respond to emergencies, from threat detection to evacuation.

ROI

Faster response times can prevent escalations, reducing potential damages and associated costs. This improvement can also impact insurance premiums, potentially lowering them due to enhanced security measures.



OPERATIONAL EFFICIENCY

Benefit

The containerized nature of ERA allows for easy scalability and maintenance, reducing the need for extensive hardware upgrades and minimizing downtime during updates or expansions.

ROI

Lower operational costs due to efficient system management and the ability to run on low-power hardware, reducing both energy consumption and energy costs.



RESOURCE ALLOCATION

Benefit

Real-time data and analytics provided by ERA allow for more accurate deployment of campus security resources during emergencies, preventing wastage of resources.

ROI

Optimized use of security personnel and emergency responders can lead to significant cost savings by ensuring that resources are utilized where they are most needed, enhancing overall security service effectiveness.



ENHANCED SAFETY AND SECURITY

Benefit

By providing a safer campus environment through effective emergency responses, ERA helps in maintaining a positive reputation for the institution.

ROI

A strong safety record enhances student enrollment and retention rates, directly impacting the university's revenues. It also fosters a better working environment, attracting top faculty and staff.



COMPLIANCE AND GRANTS

Benefit

ERA's innovative approach to campus safety can help institutions meet and exceed various safety regulations and standards.

ROI

Compliance with these standards can qualify institutions for government or private safety grants and subsidies, offsetting the costs of system implementation.



LONG-TERM SCALABILITY AND ADAPTABILITY

Benefit

The scalable and flexible architecture of ERA ensures that the system can grow with the institution, aiding future technological advancements and campus expansions without significant additional investments.

ROI

The future-proof design mitigates the risk of obsolescence, ensuring that the initial investment extends over a longer period, maximizing the cost-effectiveness of the deployment.

Hypothetical Scenarios Showcasing ERA's Impact

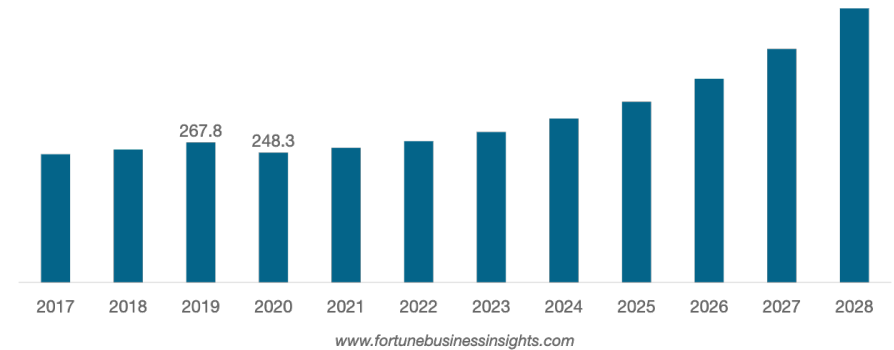
- Active Shooter Scenario:
 - Situation: An unidentified individual opens fire in a crowded university library.
 - ERA Response: Acoustic sensors detect the gunfire and immediately localize it. ERA alerts security and law enforcement while directing students and staff to safe exits away from the shooter's location using real-time tracking and escape route planning.
 - Outcome: Rapid response and clear evacuation routes minimize chaos, help in apprehending the shooter faster, and significantly reduce potential casualties.
- Fire Emergency:
 - Situation: A fire breaks out in the chemistry lab due to an equipment malfunction.
 - ERA Response: Smoke detectors integrate with ERA, triggering an immediate alarm. The system calculates and communicates the safest evacuation routes to avoid the fire and guides trapped individuals through alternative exits.
 - Outcome: Efficient evacuation prevents injuries and ensures that emergency services can focus on containing the fire quickly.



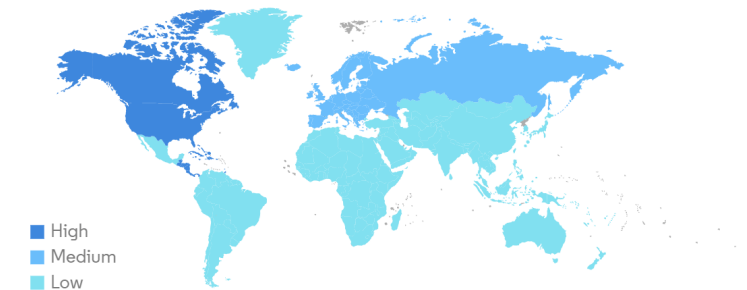
Join Us in Revolutionizing Campus Safety

- The Gunshot Detection System Market is estimated to grow from USD 657.66 million in 2021 to USD 1365.01 million by 2028 at a healthy CAGR of 10.74% during the forecast period
- **Key Considerations for Investors**
 - **Deployment and Scaling:** ERA is a modular, low power solution with a high precision solution, which allows for tailored implementations across diverse campus environments
 - **Customization Opportunities:** Investments can go towards customizing ERA features to meet specific campus needs, enhancing its applicability and effectiveness
- **Key Considerations for Schools and Universities**
 - **Increased Campus Attractiveness:**
 - **Safety as a Selling Point:** Enhanced safety measures are a critical factor for prospective students and their families. Implementing ERA can elevate the institution's profile as a safe place to study and live.
 - **Reduced Incident Response Costs:**
 - **Efficiency Gains:** ERA's rapid detection and response capabilities can significantly reduce the resources (both time and money) currently spent on managing and mitigating emergency situations.
 - **Preventive Savings:** Potential cost savings from preventing major incidents through early detection and management, which can also reduce insurance premiums and liability costs.
 - **Long-term Financial Benefits:**
 - **Sustainability and Growth:** Project the long-term financial benefits of investing in a scalable and upgradable technology like ERA, which can adapt to future safety challenges and technologies.
 - **Attracting Partnerships and Funding:** Position ERA as a magnet for further funding and partnerships, including potential government grants for safety innovations.

North America Gunshot Detection System Market Size, 2017-2028 (USD Million)



Gunshot Detection Systems Market: Market CAGR (%), By Region, Global, 2023



Source: Mordor Intelligence



Questions?

