GEORGE MASON UNIVERSITY

Predicting Potential Vehicle Ramming Attacks

21-029

Detection and Damage Mitigation of Vehicular Ramming Attacks

Problem

Vehicular ramming attacks are a significant security issue. Presently, most of these attacks are committed by human drivers. However, as more widespread adoption of autonomous vehicles occurs, there is an increasing risk of malicious driverless vehicle takeovers for committing ramming attacks. Advances in telematics and the growing number of computers and sensors built into vehicles make it possible to collect and process more vehicle data, making vehicular behaviors increasingly trackable and predictable.

Technology Solution

The subject technology is a system that detects vehicular ramming attacks and performs countermeasures to mitigate potential damage. The technology generates trajectories for vehicles and identifies trajectory abnormalities that may be indicative of ramming attacks. The system includes a complex deep-learning neural network feeding a Generative Adversarial Network with a feedback-learning system that analyzes available vehicle data and determines whether a vehicle's trajectory indicates it is likely in the process of executing a ramming attack. In response to detecting a ramming attack associated with a particular vehicle, the technology automatically generates alerts and notifications that include metadata from the particular vehicle's state and travel trajectory, and transmits these alerts and notifications to appropriate organizations (such as law enforcement, hospitals, emergency services, and others). The alerts significantly reduce the typical delay in initiating a response to the attack, including deploying ambulances and/or firetrucks, notifying law enforcement, and readying hospital ERs.

Features

- Identifies whether or not a vehicle's trajectory indicates it is likely executing a ramming attack
- Alerts first responders when a suspected ramming attack is detected.
- Helps protect against attacks executed by the takeover of autonomous vehicles.

Stage of Development

Research Prototype

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