Riding Smarter

How AI is Steering Motorcycle Fleet Safety

Introduction

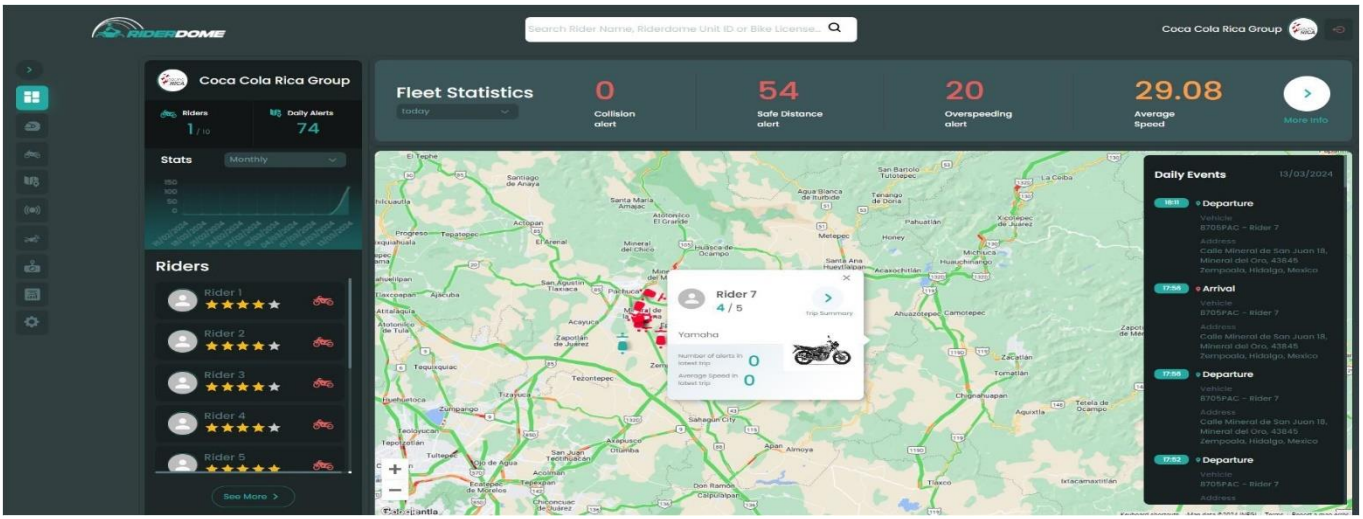
Both companies and public organizations rely on motorcycle fleets, which are deployed across areas as broad as food delivery to emergency response. Depending on the type of business or task, riders may find themselves navigating congested urban mazes or through remote landscapes, as well as everything in between.

Given their diverse deployment scenarios, motorcycle fleets and their managers face the unique challenge of maintaining operational efficiency while ensuring the safety of their riders.

Aiming to improve the capabilities of fleet managers, Rider Dome developed an AI-powered Advanced Rider Assistance System—the world's first comprehensive, safety-centric solution for motorcycle fleets.

To achieve this, Rider Dome needed a compact computing platform capable of reliable operation in harsh, mobile environments while providing the high-performance edge computing necessary to detect hazards in real-time.

To meet these demands, Rider Dome turned to AAEON's BOXER-8221AI, a compact, fanless embedded box PC powered by the NVIDIA Jetson Nano.



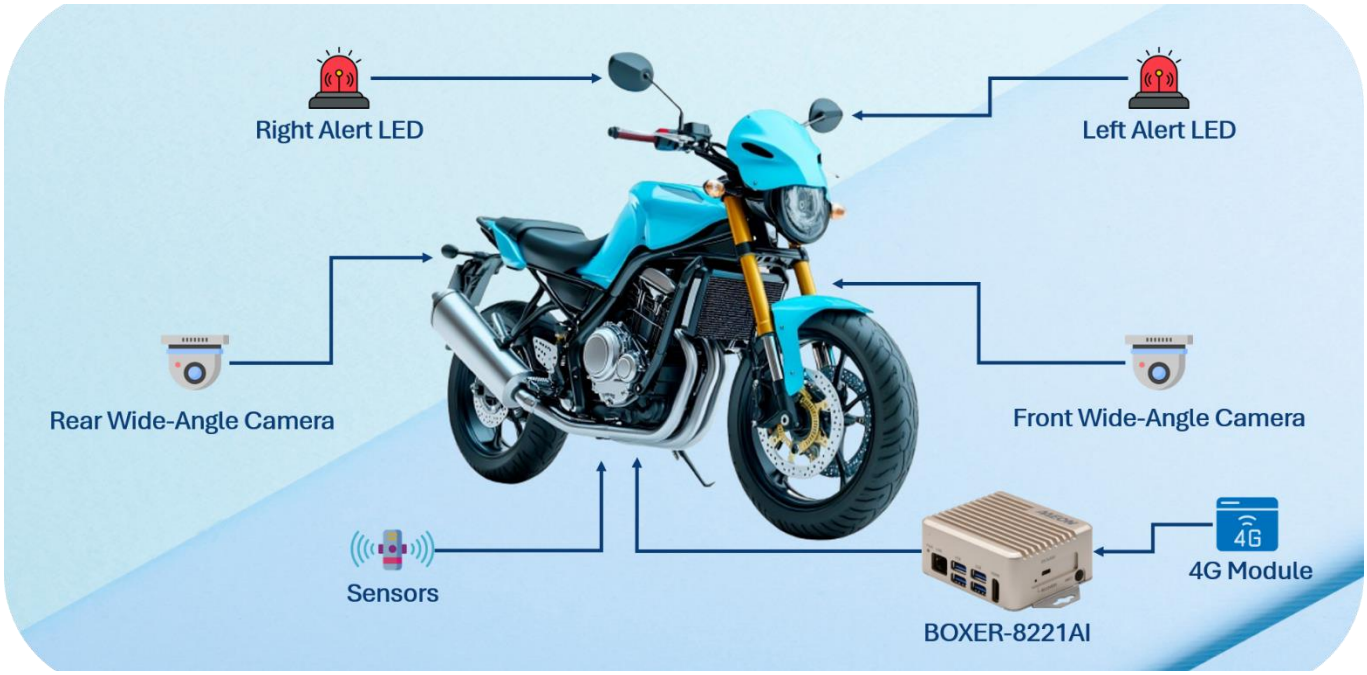
Lights, Cameras, Reaction

To make Rider Dome's Advanced Rider Assistance System possible, the embedded system powering it needed to be able to handle three primary tasks: host cameras for both the front and rear of each motorcycle, run complex machine vision models to analyze the motorcycle's surroundings, and communicate hazards it identifies to a Rider Alert Unit (RAU) mounted on the stem of each motorcycle's wing mirror.

While automatic hazard detection was the primary function of the system on the ground, Rider Dome's application also needed a solution that could support real-time fleet management tasks, such as vehicle tracking and rider behavior analysis. To achieve this, the computer needed to wirelessly transmit data from the edge to Rider Dome's web-based monitoring platform.

This platform could then be used by fleet managers to track, measure, and improve the safety performance of their entire fleet.

Application Architecture



Lights, Cameras, Reaction

With its AI-ready engine, rugged design, and multiple options for peripheral device installation, the BOXER-8221AI perfectly suited Rider Dome's requirements for the Advanced Rider Assistance System.

The first benefit to the platform was that it measured just 3.39" x 2.87" x 1.3" (88mm x 75mm x 39mm), while also weighing less than half a kilogram.

This small footprint allowed for installation within a motorcycle without necessitating modifications or adding excessive weight to the vehicle.

Furthermore, the BOXER-8221AI's robust design features, including a wide temperature range of -20°C to 50°C and vibration resistance, ensured optimal functionality even in the challenging environment of a moving vehicle.

Despite its compact size, the BOXER-8221AI was able to support all the necessary peripheral hardware required for the Advanced Rider Assistance System. The primary interfaces utilized were the platform's four USB 3.2 Gen 1 ports, two of which were used for the installation of front and rear wide-angle cameras for the collection of live, on-the-ground data.

Using the video feed from wide-angle cameras, the BOXER-8221AI's integrated NVIDIA® Jetson Nano™ module could execute optimized deep learning models at the edge to identify imminent collision risks, unsafe distances, blind spots, and hazardous overtaking maneuvers in real time.

When the BOXER-8221AI detected such an incident, a non-intrusive alert would be sent to the Rider Alert Unit (RAU), which consisted of two LED lights mounted either adjacent to the motorcycle's wing mirrors or on its dashboard. A major benefit to such a setup is that, since the analysis took place entirely at the edge, hazards could be detected in real time, allowing notifications to be sent to the Advanced Rider Assistance System without the latency associated with cloud-based data processing.

While the rider safety function of Rider Dome's Advanced Rider Assistance System was effectively managed at the edge, it also required a method to transmit key data points such as collision alerts, harsh braking, speeding, and vehicle location to Rider Dome's web-based monitoring platform.

To accomplish this, Rider Dome utilized the remaining USB port of the BOXER-8221AI to install a 4G module, enabling wireless transmission of the necessary data. This allowed fleet managers to track and assess the safety performance of their entire fleet through Rider Dome's web-based monitoring platform.

The Big Picture

Given its exponential progression from design to widespread adoption, Rider Dome's Advanced Rider Assistance System has clearly demonstrated not only the impact that edge AI can have on rider safety but also a number of operational benefits for motorcycle fleet operators, including:

Increased Rider Safety

By utilizing edge computing for real-time analysis, the application can provide immediate alerts to riders, proactively identifying potential safety hazards and reducing the likelihood of collisions.

Lower Operational Costs

By minimizing the number of collisions, the Advanced Rider Assistance System can reduce fleet operators' expenses on incidentals such as repair costs, insurance premiums, and vehicle downtime.

Efficiency from Point A to Point B

By providing real-time tracking and multiple data points from the edge to a centralized fleet management platform, fleet managers are able to optimize route planning and evaluate rider behavior for data-driven insights into operational performance.

Stable Operation

The BOXER-8221AI's small form factor and durable design provide Rider Dome's end users with confidence that the system can operate reliably across various fleet types while executing complex, AI-driven tasks on the move.

Project Impact

By choosing the BOXER-8221AI as the primary edge device for its project, Rider Dome successfully launched its Advanced Rider Assistance System, which is now operational in multiple countries and has been embraced by an impressive array of clients. This includes public sector emergency response fleets and the logistics divisions of some of the world's largest corporations.

About AAEON

Established in 1992, AAEON is one of the leading designers and manufacturers of industrial IoT and AI Edge solutions. With continual innovation as a core value, AAEON provides reliable, high-quality computing platforms including industrial motherboards and systems, rugged tablets, embedded AI Edge systems, uCPE network appliances, and LoRaWAN/WWAN solutions. AAEON also provides industry-leading experience and knowledge to provide OEM/ODM services worldwide. AAEON works closely with premier chip designers to deliver stable, reliable platforms. For an introduction to AAEON's expansive line of products and services, visit www.aaeon.com.