Transportation at the Edge

Intelligent transportation systems allow governments to use data to transform mobility in their communities. **Kevin Tunks**, *technology advisor for Red Hat (at right), and* **David White**, *practice lead for Red Hat (far right), explain how edge technology, machine learning and artificial intelligence can help transportation leaders make more informed, data-driven decisions.*

What are the benefits of intelligent transportation systems?

Tunks: Intelligent transportation systems (ITS) provide a better human experience, increase energy savings and improve safety while simultaneously reducing congestion. When ITS technologies and their benefits are distributed across the entire spectrum of society, we unlock the maximum potential from everyone.

What challenges arise when managing data from smart vehicles and transportation infrastructure?

Tunks: The amount of data that intelligent transportation environments create and collect is enormous. The rise in alternative transportation options like scooters and e-bikes has created new hazards in driving operations. These fast-moving lightweight vehicles present new risks to drivers.

In a sea of complex data from mixed sources, one simplifying approach is to separate "fast data" from "slow data." Fast data refers to information that is necessary for immediate decision-making, such as object detection and avoidance. Fast data is most commonly associated with improving safety. Fast data helps us build smarter systems that augment human operations by reducing the risks of distracted driving.

Slow data refers to large volumes of unstructured and semi-structured content that informs research and development. Leaders and data scientists don't need to use that data immediately, but they will use it for long-term decision-making and future model training.

How can artificial intelligence (AI) and machine learning (ML) help sort through all that information?

White: To react to fast data to make an informed decision, you are going to want some kind of automation intelligence. And if that application can learn continuously, adapt to changing conditions specific to precise geographic locations, it can reveal insights that enable faster, better decision-making.

AI and ML technologies are helping organize, tag, interpret, analyze and deliver model-driven predictions.

How can edge technologies help process data more effectively?

Tunks: Edge computing provides decentralized capabilities that allow fast data to be quickly processed and acted upon.

Vehicles do not all have consistent high-speed connectivity to the web. They often only have intermittent connectivity that may disconnect at unpredictable times. When architecting solutions that take advantage of the massive number of new data sources that can power ITS, leaders have to plan for systems that operate in disadvantaged – often offline – environments. These systems still have to process fast data quickly and efficiently.

That said, with slow data, agencies need to be able to store large volumes of information and extract it for processing later. Since slow data isn't immediately needed for safety-related operations, this information can be transferred into a hyperscale cloud or to an on-premises data center at a time that provides the best cost and performance tradeoffs. This is perhaps when an electric vehicle is plugged in and charging, or when a container ship is in port. This is similar to how your cell phone prioritizes processing backups and updates when it is it is plugged into stable power and connected to a Wi-Fi network.