HUMATICS

THE HUMATICS VISION FOR RAIL NAVIGATION

Humatics' approach to Rail and Transit hinges on four principles: (1) industrial UWB provides the precision, reliability, and robustness needed for train control; (2) high performance navigation requires fusing sensor data together for a given application; (3) safety critical applications, such as modernizing signaling, require a system's level approach to safety certification, and (4) system performance and capabilities are proven through data.

Humatics Created Industrial-Grade UWB

Humatics invented UWB in 1987 and has spent three decades perfecting and deploying the technology worldwide. The result is industrial-grade UWB. Most UWB systems use commercial UWB radios which have shorter range, inferior precision, and limited reliability and security. However, harsh environments and safety critical applications require more. Humatics industrial-grade UWB addresses these challenges through precise positioning down to an inch or less and unmatched security and robustness to challenging environmental conditions, such as dust and snow, multipath and interference.

Humatics' systems have a proven track record in rail applications: transit agencies and rail engineering firms have used Humatics' solutions to improve and modernize rail signaling. Humatics UWB was the underlying technology for two of the four signaling winners of the 2017 MTA Genius Challenge. Humatics' own success in the 2019 MTA UWB Pilot, outfitting over 5 miles of track and four trains, further proves the power of industrial UWB: for example, Humatics' UWB solution required wayside beacons every 360 feet on average compared to nearly 100 feet for commercial UWB solutions.

For Critical Applications, You Need More Than UWB

When safety and robustness matter, UWB alone won't do the job. UWB plays a key role, but critical navigation systems require fusing data from additional sensors. Relying on just one technology reduces performance and, more importantly, creates failure modes (when the singular technology fails) that compromise safety and reliability. Taking the best aspects of each sensor and tying them together with software provides a superior solution. History has proven this concept time and time again: it took people to the moon 50 years ago and is the foundation of how critical systems such as airplanes and industrial robots navigate.

Humatics acknowledges that UWB plays an important role in navigation moving forward but it is only part of the solution. Humatics combines UWB ranges with data from an inertial measurement unit device to fortify and enhance performance. This approach has been proven in the field: not only did Humatics' solution meet the performance requirements, but it also successfully positioned the train even when UWB sensors were unavailable for short periods of time. System "up-time" also benefits from this approach with the solution providing 99.9999% or greater availability in a 2-out-of-3 architecture in our deployment with the MTA. Furthermore, Humatics' navigation solution is capable of ingesting any sensor data allowing for the right sensors to be used to solve the problem at hand.

Safe Systems vs. Safe Components

Rail systems aren't just critical, they're safety critical. Transit systems all over the world are undergoing signaling transformations trying to upgrade the capacity and reliability of entire systems in a matter of years instead of decades. UWB-based navigation systems play a key role in signal modernization efforts, but achieving these goals --- increased rider capacity through more frequent, reliable train service --- requires coupling navigation systems with train control solutions such as communications-based train control. Combining two independent systems in a complex safety application requires a holistic approach towards system design and, more importantly, safety certification, examining navigation and train control together rather than an evaluation of the discrete parts.

Humatics advocates for a systems-safety centric approach to every project we undertake. Key decisions, such as implementing a specific safety architecture, should not be made in a vacuum. Rather than focusing on creating a "safe black box" for just the Humatics technology within the system, we collaborate with partners to create integrated safety-certified systems that solve the customer's problem. Safety has no shortcuts and the fastest path to revenue service is to certify an entire solution in a single process from the start.

The Proof is in the Data

At Humatics, claims of performance and capabilities are nice, but data speaks the truth. Data is what we use to gauge performance of our system, fuel continual improvement, and articulate our capabilities to our customers. Claiming that Humatics has a robust solution is fine, but showing a 99.9999% system availability over the course of thousands of runs proves that our customers can be confident in using our solution as part of their integrated system. Data collection and analyses is ingrained in our DNA and we provide the data driven evidence necessary for our customers to make informed decisions.

As Humatics partners and customers look to move forward with resignaling initiatives around the world, these concepts --- commiting to UWB sensor technologies built to perform in harsh environments, understanding that robust, high performance navigation requires combining UWB with other sensor technologies, recognizing that safety requires a system approach, and continually assessing with data --- are the fastest pathways to modern, robust, and safe transit signaling systems.

About Humatics

Recognized as the inventor and leader in industrial ultra-wideband, Humatics has built the first microlocation system for the industrial world that fuses proprietary industrial-grade UWB, sensors, and data, delivering best in class range and precision and enabling transit systems to navigate safely and reliably. Customers use Humatics' systems to solve mission-critical localization and navigation challenges in harsh environments where other technologies fall short.

Founded by world leaders in AI-assisted piloting, autonomous navigation, and high-precision radar, Humatics is headquartered in Waltham, Massachusetts with an office in Huntsville, Alabama. Humatics is the underlying technology behind two out of the four winners in the Signaling category for the MTA Genius Transit Challenge and, in 2019, completed a successful UWB Pilot with the MTA, demonstrating that UWB can cost effectively accelerate MTA signaling modernization. For more information, visit www.humatics.com.

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