

AI Across Tennessee NSF MRI Proposal Development

AI at ETSU

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AI at ETSU

The significant progress in AI research at East Tennessee State University (ETSU) over the past decade has been made, highlighting various applications and interdisciplinary collaborations.

The ETSU Department of Computing currently employs five fulltime faculty who work with graduate researchers that focus on AI-related topics.

ETSU's AI research spans multiple domains

Cybersecurity Enhancement

ETSU researchers are developing AI-driven systems to classify and mitigate cyber attacks, strengthening digital defenses across various sectors.

Disinformation Detection

AI algorithms are being crafted to identify and combat the spread of false information, promoting information integrity in the digital age

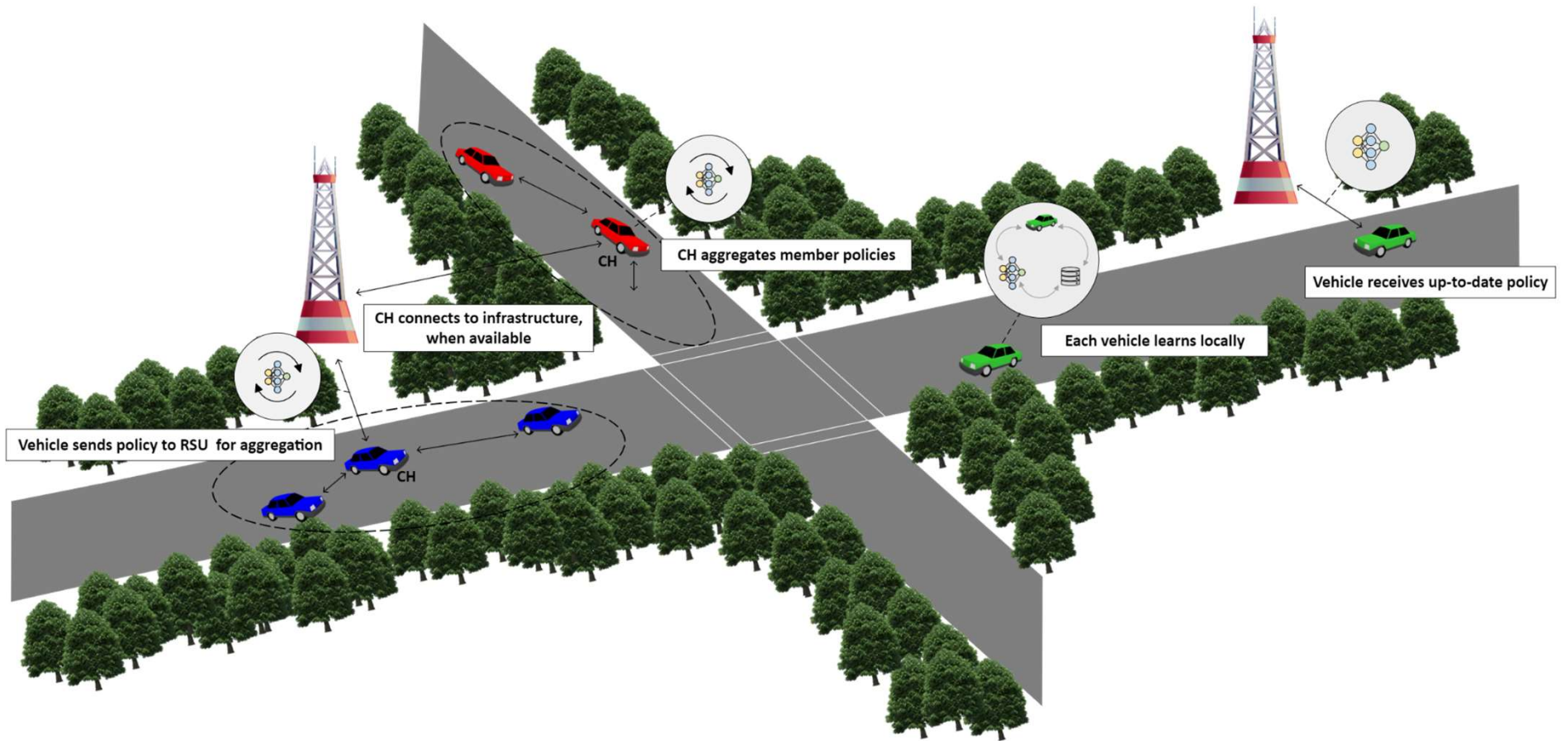
Intelligent/Smart Transportation

ETSU is at the forefront of optimizing connected vehicle technology and developing intelligent infrastructure systems for safer, more efficient transportation.

Healthcare Innovations

AI-powered image processing techniques are being utilized for early disease detection and automated cognitive health assessments, revolutionizing patient care.

Cluster Head Selection





Distributed Training Acceleration: Expedites training by harnessing the computing power of individual vehicles.



Localized Learning: Each vehicle learns from its own data, maintaining data privacy through decentralized learning and avoiding centralized data sharing.



Periodic Aggregation Process: Following N training iterations, vehicles share their locally trained policies with a cluster head or roadside infrastructure. This enables the aggregation of policies into a current and comprehensive policy.



Policy Update Mechanism: The aggregated policy is then distributed back to the vehicles, empowering them to update their local policies and seamlessly continue the training process.

Learning

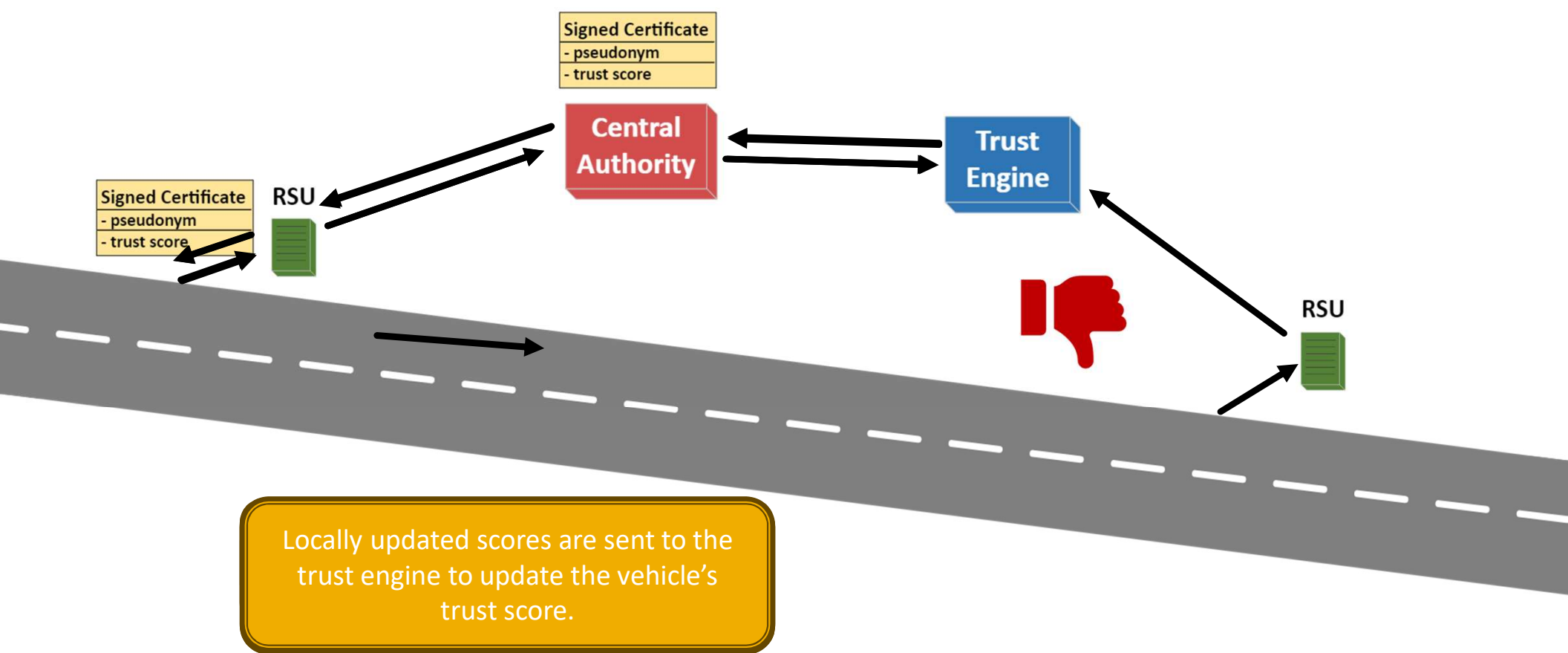


Vehicle Entry into Region: Upon entering a region, a vehicle receives a policy detailing thresholds and coefficients for weighted functions, guiding cluster head and fitness determinations.

Dynamic Policy Utilization: These thresholds and scores govern cluster-related decisions, such as elections, joining, leaving, and dissolution, through weighted functions.

Adaptive Policy Updates: Interacting with the environment, vehicles dynamically update their local policies based on cluster performance, adjusting coefficients for each weighted function.

Aggregation for Regional Impact: Local policies are transmitted to cluster heads and roadside infrastructure, facilitating aggregation to establish a comprehensive region-wide policy.



Interdisciplinary AI Research at ETSU

Computing Department

The hub of AI research at ETSU, with five full-time faculty members dedicated to AI-related topics. Graduate researchers work alongside faculty to push the boundaries of AI technology and applications.

Mathematics and Statistics

Focuses on advanced AI techniques such as generative AI through graph neural networks, contributing to the theoretical foundations of AI research.

Rehabilitative Sciences

Applies machine learning to improve orthotics and prosthetics, enhancing the quality of life for individuals with physical disabilities.

Computational Resources for AI Research

Current Limitation	Collaborative Computing Networks	Future Infrastructure Plans
<p>The progress of AI research at ETSU is currently constrained by the lack of adequate High-Performance Computing (HPC) resources, hindering the potential for more complex and data-intensive AI projects.</p>	<p>The university is exploring partnerships with other institutions and industry leaders to create a collaborative computing network, enabling shared access to advanced AI research resources.</p>	<p>ETSU is actively working on expanding its on-campus HPC infrastructure to support the growing demands of AI research, including plans for dedicated AI research clusters and cloud computing resources.</p>

Access to the planned 3.4 peta-flop instrument at the UTK campus will therefore be of critical importance for the AI initiative at ETSU.