Rethinking Multimodal Localization Systems at Scale in Challenging Scenarios

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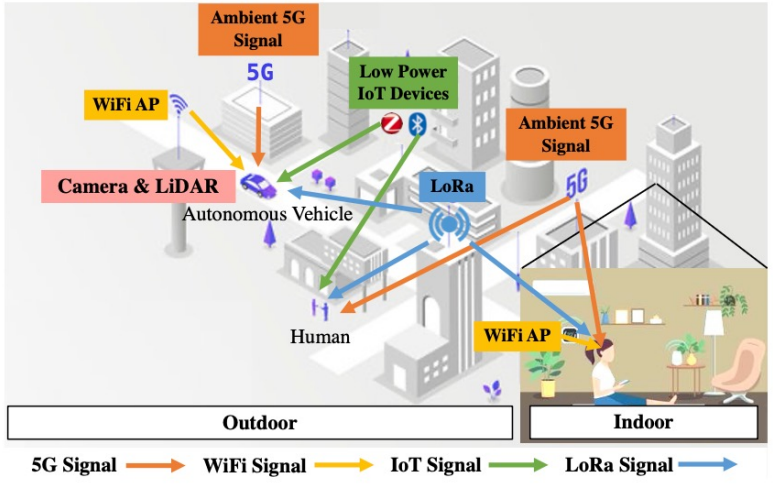
Objective:
Enhance localization accuracy in challenging conditions using multimodal technologies.

Purpose of project, value add statement:
- Address limitations of current localization systems that rely on single-mode radio frequency signals.
- Utilize multimodal sources for reliable localization under various environmental conditions.

"Why and What" the project / high-level tasks will do:
-Research the scalability and reliability issues of existing radio signal-based localization methods.
-Develop algorithms for multimodal localization systems incorporating ORAN within 5G, cameras, LiDAR, and smart multimodal antennas.
-Enhance safety features for autonomous vehicles to prevent collisions and withstand localization attacks in adverse weather.



An example of our envisioned future localization system: heterogeneous techniques (i.e., 5G, WiFi, IoT, LoRa, and Computer Vision-based techniques) are collaborating with each other to provide accurate localization for different applications (e.g., autonomous driving and human localization) in various scenarios.

Approach:

- Prototype multimodal localization techniques for real-world applications such as self-driving cars, mobile healthcare, and precision agriculture
- Leverage existing infrastructure of commercial smartphones, sensor technology, and 5G radios for prototyping.
- Conduct experimental validations and refine systems for enhanced multimodal localization performance.

Key Milestones (postdoc hiring date 4/1/2024)

1.Research and Algorithm Development (by June 30th):
Literature review, develop initial algorithms, and complete simulation tests to validate their feasibility.

2. System Design and Prototype Implementation (by September 30th):
1. Finalize the design of the prototype system, integrating multimodal technologies.
2. Begin implementation on selected hardware platforms, ensuring that the prototype is functional.

3. Testing, Analysis, and Optimization (by December 31st):

4. Grant and papers writing based on Initial Results (By March 2025)

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