Looking Around the Corner – 6G Visible Project

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Aim

This project aims to harness the power of traffic-related data beyond a vehicle's own sensors to provide unparalleled driver support and take autonomous driving to the next level! What's more, cutting-edge 6G infrastructure will be utilised for dynamic environment modelling, ensuring that every moment on the road is as thrilling as it is safe. Get ready to experience the future of driving like never before!

Project background

The project aims to develop advanced solutions for autonomous and semi-autonomous driving while testing the capabilities of 6G network technologies to support real-time, safety-critical services. These solutions aim to provide visibility for objects not visible to drivers or detectable by existing vehicle sensors, even in various weather conditions. This involves creating dynamic, real-time models of the environment and detecting obstacles for autonomous or semi-autonomous vehicles. Semi-autonomous driving includes remote control and in-vehicle systems for collision prevention and driver information.

Current autonomous vehicle solutions rely on static environmental models (such as maps of city streets and buildings, etc.) and integrated sensors on the vehicle. While they work well for many applications, they are limited in providing real-time information and rapidly changing situations beyond the sensor's range. Real-time dynamic environmental data, including weather adaptation, is essential to enhance autonomous systems.

The next generation of network technologies, including 5G and 6G, will introduce software challenges for product development and applications. These networks will enable various use cases and services by connecting numerous devices into unified solutions, from individual devices to powerful cloud-based systems. However, current architectures and methods struggle to support such complex, distributed 6G software systems and their related applications and services involving multiple stakeholders.

Research Consortium

Acknowledgements

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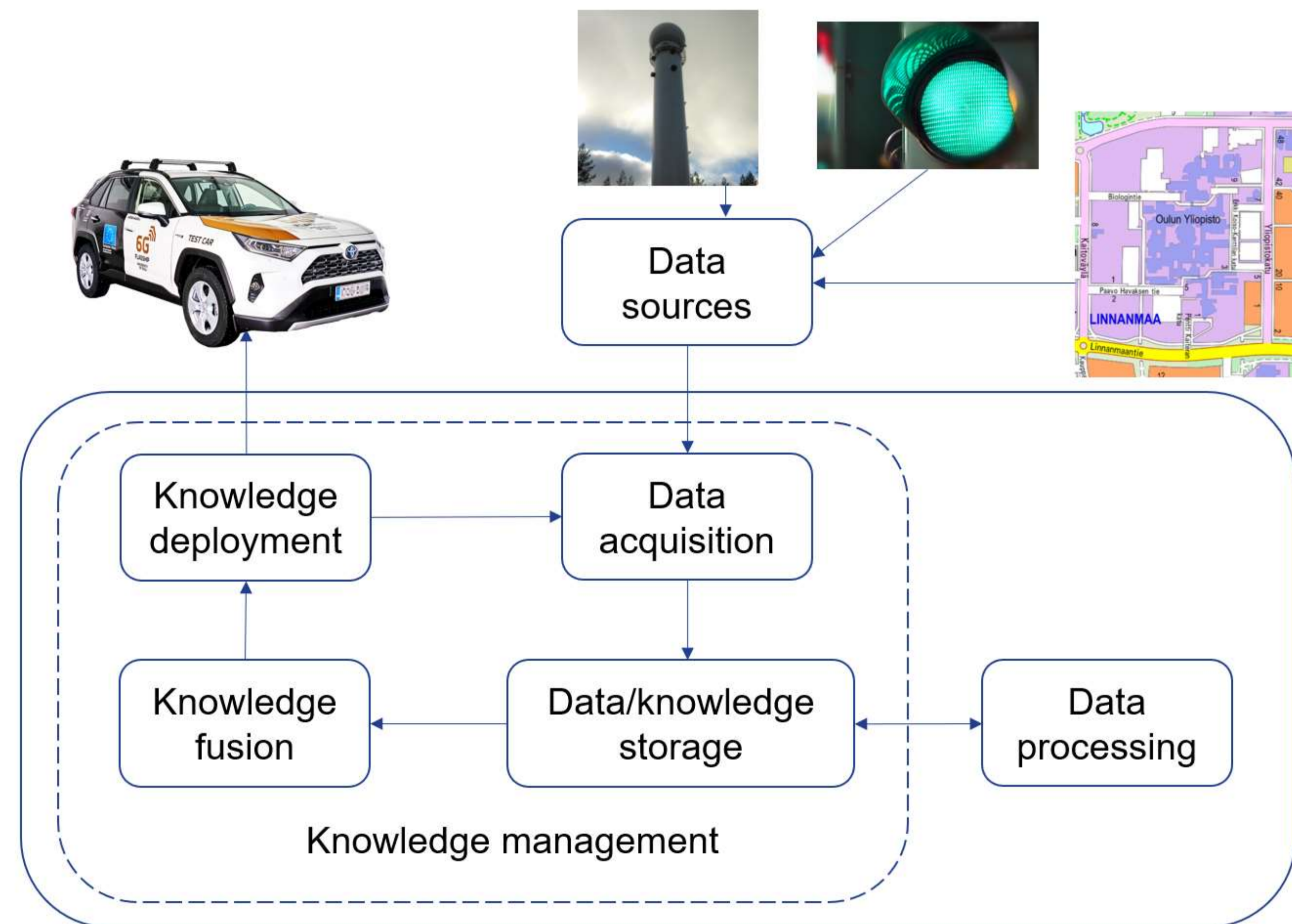Pertti Seppänen pertti.seppanen@oulu.fi

Figure 1. Knowledge-enhanced autonomous driving scheme in 6G Visible.

Research Objectives

Questions

- How can integrating 5G and 6G technologies enhance autonomous driving and weather-related road information services?
- What software architectures and solutions are best suited for effectively deploying the cloud continuum in the context of enhanced autonomous driving services in 5G/6G environments?
- What are the critical strategies for creating and maintaining business opportunities within multi-dimensional ecosystems, encompassing business, technology, and social dimensions in the 6G era?

Topics

- Smart traffic solutions, sustainability and societal dimensions
- Sensor data, Finnish open data and other traffic-related data over 5G/6G networks
- Big data, knowledge creation, AI and decision-making
- System and software architectures related to traffic and 6G
- Dynamic off-loading and orchestration

Potential Use Cases

Route planning & change
- Determine the optimal route and adapt to complex road situations, changes in the environment, and unexpected conditions.

Parking
- Support automating the parking process according to the conditions.

Weather & lighting adaptation
- Adjust to various weather and lighting conditions based on data and the environment.

Steering Team

Remoted Oy		A newly founded spin-off of Roboride Oy focusing on development of remotely controlled public traffic solutions. Remoted Oy participates in this project by providing it with use cases relevant to the remotely controlled bus traffic setting specific requirements.
SpectacularAI		A newly founded spin-off of a research project of the Aalto University. The company develops a spatial AI engine for human-like 3D imaging from stereo cameras. The relevant use case for this project are visual mapping and 3D reconstruction of the environments, and centimeter-level positioning.
Siili Auto		A subsidiary of the Siili Solutions, founded in 2020. Siili Auto continues the earlier-started development of digital cockpits, connected mobility services, mobile applications, and next generation digital user interfaces for automotive OEMs, Tier1 integrators and digital service providers.
DIMECC/VAMOS		Funded by Business Finland and participating industries, DIMECC/VAMOS is an innovation cluster that focuses on autonomous mobility in smart spaces. It brings together companies that jointly collaborate, compete, and create solutions based on smart spaces technologies, electrification, and autonomous smart mobility for the global market.
Elektrobit		A global vendor of embedded and connected software products and services for the automotive industry, offering solutions for car infrastructure software, connectivity & security, automated driving, and user experience. Elektrobit Automotive Finland Oy contributes to this project by offering an evaluation kit of their electronic horizon solution, the EB robinos Predictor.
Sitowise		A smart city company offering a broad palette of smart city and fluent traffic solutions and services developing and deploying modern digital technologies, such as digital twins, data gathering, analysis and processing solutions, and Virtual Reality and Augmented Reality solutions. Their contributions to this project are focused on the research of FMI and deployment of advanced traffic monitoring systems.

Science with Arctic Attitude