IoT enabled Transportation Systems: Scalable and Sustainable Infrastructure and Protocols for Smart Cities

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Overview

With an ever-increasing population, rapid urbanization and the availability of cheap & reliable communication networks, various measures have been taken by communities to enable more efficient and sustainable services to its members loosely define as ‘Smart Cities’. With such a broad vision, several independent attempts have been made by multiple players with various approaches. This implies the need for an open standard on basic computational operations over heterogeneous network environments[1,2,3].

Recent industry efforts [4] envision fully independent agents that are able to communicate and transact reliably with other agents in the system. Leveraging distributed ledger and consensus technologies will enable the complete decentralization of Intelligent Transport Systems and welcome 'Device Democracy'. It can be envisioned that the intelligent agents, as recently suggested lightTraffic system [7,8] by MIT to develop smart intersections, would mostly benefit from such a system. Because these types of systems require scalable solution to IoT data streams, leveraging distributed architectures is a stepstone toward a solution.

The aim of the project is to investigate and leverage distributed computational protocols to develop open standards and scalable architectures for Intelligent Transportation Systems. The goal is to create an exemplary solution to these problems, that can be adopted by system designers and agencies.

Intellectual Merits

Development will need to address fundamental issues in implementing Distributed Protocols over Heterogenous networks[10]. This development is interdisciplinary and will also lead to the development of intelligent agents which will drastically change existing transportation behaviour and transit system designs.

Broader Impact

Decentralization of computing would lead to increased resilience amongst the ITS solutions, a burning issue given the increased climate scenario. In addition, an open standard would imply a more robust and more secure architecture for such systems at relatively low costs. A transition from the expensive PaaS based solutions to cheaper Information Centric Network based solutions will drastically boost the adoption of Intelligent Transport Systems.
References: