Towards Unlimited Mobile Application Collaboration

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Abstract

In-Vehicle Infotainment systems are very common in today's cars, offering a mix of information and entertainment to the driver. The ubiquity of smart, mobile devices opened new possibilities of innovation to car manufacturers. However, the relationship between a car's IVI system and the driver's mobile phone is a one-to-one mapping, limiting the set of available features and data. In this thesis, we present TUMACO, a cross-platform, extensible in-vehicle infotainment ecosystem. Inspired by already existing SOA-based approaches, we extended popular mobile platforms without requiring changes to the genuine distribution. This allowed us to break the current one-to-one relationship between a driver's mobile phone and the IVI in order to seamlessly integrate all present mobile devices aboard a car. Collaboration between the IVI and mobile devices is reached through the exchange of data and the use of both local and remote services. Collaboration between services run on different platforms may be engaged within workflows. Enriched with semantic hypermedia, exchanged data is platform-independent, self-descriptive and meaningful. Furthermore, each passenger is enabled to customize his user experience. This may be done for the overall IVI layout, for specific components and for services. The first two elements can be customized due to the use of Web Components, a recent technology to create reusable UI components for web pages, which can be provided with semantically annotated data. The last point can be realised through `TumacoKit`, a framework we developed to enable third-party developers to integrate their apps, data and services within the TUMACO ecosystem. This way, we achieved to extend our system with further application functionality without requiring architectural modifications. The different use cases presented throughout this work have been realised in a prototypical implementation.