



Project Results

FIONA

Plotting a course into the (un)known

EXECUTIVE SUMMARY

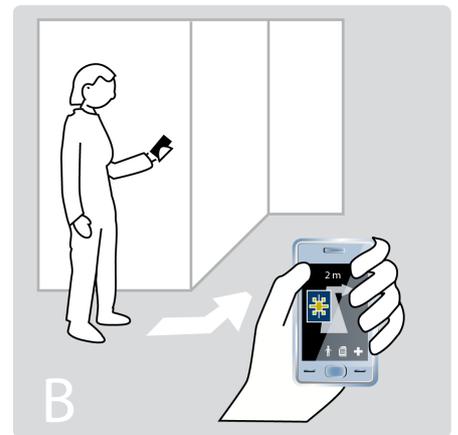
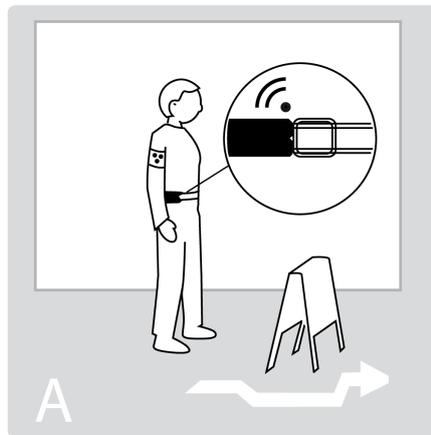
The ITEA 2 FIONA project developed a software framework to enable the easier, quicker and cheaper development and deployment of personal navigation assistants for indoor and outdoor use. The framework supports the use of multiple localisation technologies, visual, audio and haptic user interfaces as well as security and user authentication services.

PROJECT ORIGINS

Triple growth figures between 2010 and 2015 in location-aware devices and services underlines the significance of the global market for consumer navigation devices, services and systems in the integration of location-based services such as social networking and local search. The FIONA project set out to develop a framework to support the seamless combination of data from different types of motion and location sensors and to implement navigation applications that use sensor data and information about the environment to guide a user through it. The resulting generic framework for location-based navigation, including a repository of diverse components, lowers the access threshold for smaller players to the navigation market and makes it easier to develop future navigation services simply by adapting information about the environment or the user.

TECHNOLOGY APPLIED

The challenge the project faced was to realise a set of (system) demonstrators built around specific functionalities and use cases, such as integrating location-based information to enable personal navigation through an indoor area using a smartphone and help the visually impaired navigate seamlessly through indoor and outdoor areas. While all the partners focused on their own specific targets and use cases, the convergence



FIONA demonstrators

of insights and perspectives provided the input to create the generic framework from which all benefited. The components that provided the required localisation/perception, navigation, user interaction and other value-added functionalities (e.g. security and authentication, situation assessment) were analysed, developed and (re)used. The validation of the architecture came through the incorporation of these components into the common framework to produce functional systems for these use cases.

The ability to reuse software and other components leads to the fast assembly and demonstration of a system for possible commercial development. The FIONA tools,

architectures and communication objects provide the set of basic components in a model-driven software development kit based on open source access – so available to all. This enables everyone to use the FIONA tool under a free licence and add their own developments and components as well as reuse the solutions of the project. Furthermore, a handbook is available on how to integrate components within the framework.

MAKING THE DIFFERENCE

The wide technology framework developed by FIONA facilitates the development of applications and services targeted at assisting people and devices in localisation and navigation in unknown and known

environments. Systems for navigation and object recognition can be built by reusing the framework – one of the challenges of the project – and all the project partners are able to use the results of the project to create convincing navigation device demonstrators both for themselves and to show others how the solutions work in practice.

There are several examples of the project results being exploited. Bosch is using the results in its research department to fast-track development using the integration of different localisation and filtering algorithms and the explicit integration of user orientation to improve estimation quality. In addition, the Slovenian IT company Comland has developed the technology for robust visual localisation in real time based on a 3D model of the environment and is ready for use within the FIONA architecture and SmartSoft / SmartMDS Toolchain. The SmartMDS Toolchain and System Composition Know-how, an open-source Eclipse-based IDE for model-driven development of software building blocks and for model-driven composition of applications, was developed by the University of Applied Sciences Ulm to establish an ecosystem and a model-driven toolchain to support it.

Infineon has contributed to TCG and ETSI standardisation while Fraunhofer ESK developed a unique integration of different systems (IMU, localisation techniques) through multi-sensor data fusion to provide better accuracy and stability of the location output. Another project partner, Havelsan, used the results to develop the SmartMapProvider application that provides a requested map, for both single-floor and multi-floor, which corresponds to a specific user profile, as well as SmartPathPlanning, which provides the shortest and safest destination path from the current to the target location. Both applications can be used, free of charge under licence, for research purposes.

The immediate pay-off will be reflected in the enhancement of existing products with additional features to improve user experience, and new products are likely to emerge from the proofs-of-concept developed in this project. Longer term, new use cases and business models will be enabled through the use of the framework, as well as alternative perception systems (developed outside FIONA).

MAJOR PROJECT OUTCOMES

Dissemination

- Presentation at ITEA/Artemis Co-summits 2013/15, presentation at Sight City Conference 2014, 8 Scientific Publications, 8 Presentations at Scientific Conferences, Featured in German and Slovenian Media

Exploitation (so far)

SmartMDS Toolchain

- Open Source Eclipse-based IDE for model driven development of software building blocks and for model-driven composition of applications
- Handbook for Integration available
- Available online under GNU Lesser General Public License:
<http://www.servicerobotik-ulm.de/>

FIONA Architecture & Communication Objects

- The communication objects support the specification and development of applications and services for seamless indoor and outdoor navigation assistance for people. They form a vendor-independent set of domain-specific architectural elements which ensure interoperability and composition of co-existing software components as needed for a FIONA technology / business ecosystem
- Available online: <https://sourceforge.net/p/smartsoft-ace/code/HEAD/tree/trunk/src/interfaceClasses/CommIndoorOutdoorNavigationObjects/>

Standardisation

- 2 patent applications filed

ITEA is a transnational and industry-driven R&D&I programme in the domain of software innovation. ITEA is a EUREKA Cluster programme, enabling a global and knowledgeable community of large industry, SMEs, start-ups, academia and customer organisations, to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society.

FIONA

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Project start

August 2013

Project end

June 2016

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