Impact Objectives

- Develop methodologies, tools and platforms for the design and production of personalised meta-products
- Enable collaborative design, production planning and supply chain management for this new range of combined product-service offers
- Offer third parties tools to develop new services for mobile device users

Supporting the future of intelligent wearables

*The **EASY-IMP** project has successfully created a collaborative platform for meta-product development. Now this pan-European consortium is showcasing their market-ready demonstrator to highlight all of the different possibilities for this cloud-based initiative*

Creating an open and easily accessible cloud-based platform to foster future technologies is not an easy task. Over the last three years a multifaceted EU-funded project called EASY-IMP (Collaborative Development of Intelligent Wearable Meta-Products in the Cloud) has managed to overcome a number of challenges to deliver an innovative open interface platform.

As a successor of the PAMAP (Physical Activity Monitoring for Aging People) and COGNITO (Cognitive Workflow Capturing and Rendering with On-Body Sensor-Networks) projects, this research aims to create a functional and available suite of technologies that can be utilised by a wide audience interested in writing applications in the field of wearable meta-products. After three years of research the team have sucessfully developed a demonstrator for their open interface platform in the domain of motion tracking which can be applied to sports, health and entertainment scenarios. This platform employs a completely novel method which the researchers have used to handle the development process.

COLLABORATIVE EFFORT

Building synergies between academics and industrial partners has been one of the key objectives for this project says Project Coordinator Professor Didier Stricker, Scientific Director and Head of the Augmented Vision department at the German Research Center for Artificial Intelligence: 'EASY-IMP is designed to bring technology to the market and provide new opportunities to the SMEs who are part of the consortium, as well as outside of the project. I am hopeful that our efforts will generate a lot of upcoming activities in this field.'

With the significant technological progress in meta-product development comes increasingly complex product design and production stages. In order to reduce the barriers to wider adoption of these technologies, interdisciplinary expertise is essential to improve the methodologies and tools used. This is an area that the EASY-IMP collaboration addressed in the early stages by bringing on board partners with a broad range of expertise in the required disciplines. These partners have been using a number of different tools and methods to progress the technology throughout various stages of the demonstrator development.

CAD software and 3D printing, for example, has been used to realise mechanical design, and electrical design is based on layout and routing software, as well as assembly and manufacturing of electrical components. In addition, textile integration and software development for web and mobile applications is being completed by several of the project partners.

SCENARIO SELECTION

Choosing the different scenarios and pilots that would form the heart of this project was a critical component, and these were established at the very beginning. The goal, explains Stricker, was to make sure their work appealed to a large audience. They achieved this by developing a number of different feasible demonstrators to ensure they attained solid market coverage. As a result, they have now prepared a number of very interesting pilots in the fields of sports, online gaming and medical applications.

One outcome the team is particularly proud of is the EASY-IMP cardiac rehabilitation pilot which has achieved a very high commercial level of acceptance. This pilot has been given medical approval for its use within hospitals – a great achievement. The platform for this specific device has to fulfil security issues due to the nature of the data (personal and medical), which the team have had to balance against the vision of open access that is at the core of EASY-IMP. Another pilot – the entertainment use scenario – has now achieved complete development from the mechanical, electrical, textile and software points of view. 'This is a perfect demonstrator for joint development which would not have been possible without EASY-IMP, and offers great insight into the potential for other applications to use this technology platform,' explains Stricker.

TOOLS FOR NEW SERVICE DEVELOPMENT

The idea driving this project is fostering collaboration on the design, production planning and supply chain management for intelligent wearables. The novelty of

EASY-IMP is its partnership development environment, which allows for greater flexibility. A key goal has been to offer business scalability so that third parties are able to use the tools developed themselves to advance new technologies and services in a vast range of target markets. 'For the future, we are expecting interest in the developed technology from third parties,' clarifies Stricker. 'This interest might be in part of the project or the system as a whole. The goal of the project is to enable new markets specifically for SMEs and emerging businesses.'

The results speak for themselves. At the mid-point of the project they had successfully achieved the specifications, implementations and first testing of contributing components for wearable meta-products. For example, a first functional demonstrator has been produced which offers a generic business process flow for meta-products, as well as a simulation environment for inertial sensors. 'The first version of the front-end services has been implemented to combine Facebook profiling applications, recommendation methodologies and collaborative development into a common web-based front-end service,' explains Stricker. This means that hardware prototypes could be developed, as well as communication protocols for integration into wearable textiles.

OPEN ACCESS

Dissemination of results is a priority for the group. From the research point of view they have published a number of papers in international journals and presented at international conferences. They have also delivered several dissemination events, including the large and successful 5th European Platform for Sport Innovation Conference in 2016. The upcoming conferences organised by the Federation of the European Sporting Goods Industry will be an important platform for sharing the EASY-IMP project results. An essential part of this is providing open access to the research. The consortium is sharing their research through making the documentation and prototypes readily available.

'We have built more than 10 physical devices of the motion tracking demonstrator which is now available for testing. The platform itself is operational and can be tested,' says Stricker. The team have made information available on the EASY-IMP website and the partners are readily available to be contacted in case of questions from prospective users. Stricker believes that effectively sharing their results with the public requires good functional demonstrators, and notes that the communication of the project findings in future will depend on the interest of the partners or external entities in developing the technology further.

There is much excitement about what the future holds for this team and their work, as Stricker observes: 'This project has successfully achieved a working demonstrator, which we are excited to now be able to offer to external partners for further development.' From his perspective, what is most exciting is the future impact of the project, and this looks set to be huge.

Smart thinking

Professor Didier Stricker discusses the rapidly expanding field of personalised meta-product development, and how his team's latest efforts to deliver a working demonstrator are fostering strong linkages between software creators, product developers and end users

How far has R&D of personalised meta-products progressed in the last few years?

The personalisation of meta-products is often possible on the software side and has made strong progress in the last few years. Various applications offer learning mechanisms and adaptations depending on the use of the device. This flexibility is provided by the manufacturer, and is either proprietary or limited. Personalised hardware devices are not yet available. The same is true for the development process as a whole, including the availability of interfaces and the exchange of information between developers and users. Our platform targets a completely new way of handling the development process.

What has the development of the meta-product methodology and framework involved so far?

The EASY-IMP project is embedded in the Factories of the Future programme. The main target of this funding is not research but bringing research technology to the market. Indeed, the future of this platform, in the optimal situation, is commercial. The whole project is about creating new market capabilities by developing new concepts and even business cases for industry-level applications. Concerning future research, the project has boosted the development of a collaborative platform which now allows close cooperation for upcoming and future tasks.

Can you share a little about the innovative virtual prototyping tools you have been developing?

The concept of virtual prototyping allows the testing of meta-products before the actual development. Using a simulator for wearable devices you can estimate the capabilities and performance of a device before someone builds it. This concept is advanced but very hard to achieve since the simulation of humans has strong limitations. Inside the EASY-IMP project the virtual prototyping is only available for motion sensors due to the complexity of the problem. I would consider this topic interesting but not solved.

What do you see as the main technological challenges presented by the project?

EASY-IMP is complex, from both the technological and organisational point of view. Many partners have to contribute to a successful platform, which is complex for a large number of reasons. The most critical issue is the fair handling of all partners' contributions to the platform. Basically it is about protecting the individual contributions in a way that all partners benefit and the overall project also benefits. Nevertheless, it is interesting to see that the combination of all partners enables us to provide new tools which would not be possible alone.

How important has the collaboration within the EASY-IMP consortium been to progressing the concept and delivering the working demonstrator?

It has been extremely important since each pilot requires the contribution of several partners. We have a well-connected but diverse set of partners who are responsible for all the different components involved, including business case modelling; web development for social media; development of the collaborative laboratory and health applications; running the pilot; motion analysis and game development; and dissemination activities. The knowledge of all the partners was important to achieve the results we have now. This project has proven that collaboration in such a complex system is possible.

Project Insights

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PARTNERS
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