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A Vibrant IoT Research & Innovation Ecosystem

Internet of Things (IoT) has entered the next stage of development bringing new values through IoT-enabled pilots with broader vision of IoT as a combination of connected devices, connectivity, software, platforms, stakeholders, information and applications as part of integrated ecosystems and new IoT driven business models. IoT technologies and applications have been moving towards a network of intelligent objects with social capabilities that need to address the interactions between autonomous systems and humans. IoT technology coupled with artificial intelligence (AI) can form the foundation of improved and eventually entirely new products and services. The powerful combination of AI, IoT, Distributed Ledger Technology (DLT) and Blockchain brings new challenges in addressing distributed IoT architectures and decentralised security mechanisms.

The IoT European Large-Scale Pilots Programme was launched in 2017 by the European Commission with the aim to foster the deployment and evolution of IoT solutions through the integration of advanced IoT technologies, from development to testing and integration, and as close as possible to operational conditions. The programme involves more than 250 organisations from 19 European countries, addresses over 80 use cases which creates opportunities for entrepreneurs, expanding local businesses to European scale, and supports the development of secure and sustainable European IoT ecosystems. The universities and the research institutes involved in the programme are important sources of new ideas in applied IoT technologies that contribute to

innovation in IoT deployments sites and applications, by producing new knowledge and exposing the IoT ecosystem stakeholders to that knowledge preparing the ground for transferring the implementation results into businesses.

The programme projects are applying IoT approaches to specific real-life challenges across different use cases, based on European relevance, technology readiness and socio-economic interest in Europe. By deploying IoT technology in different sectors of the society, more sustainable solutions could be achieved, and resources saved. If not investing in Europe now, there is a big risk that Asia and the USA will take the lead developing the area way further and leaving Europe behind.

With a total funding budget of €100M, these large-scale pilot projects address five different and specific domain areas, from smart living environments for ageing well, smart farming and food security, wearables for smart ecosystems, reference zones in EU cities and to autonomous vehicles in a connected environment. More particularly, these projects include:

- ACTIVAGE [1] - ACTIVATING INNOVATIVE IoT SMART LIVING ENVIRONMENTS FOR AGEING WELL – The project builds the first European interoperable and open IoT ecosystem enabling the deployment, at large scale, of a wide range of Active and Healthy Ageing IoT based solutions and services.

- AUTOPILOT [2] - AUTOMATED DRIVING PROGRESS BY INTERNET OF THINGS – The project develops an IoT connected vehicle platform and IoT architecture based on the existing and forthcoming stand- ►

THE IOT EUROPEAN LARGE-SCALE PILOTS PROGRAMME ADVANCES THE STRATEGIC DIRECTIONS NEEDED TO SUPPORT FUTURE RESEARCH, DEVELOPMENT AND INNOVATION OF THE NEXT GENERATION INTERNET OF THINGS TECHNOLOGIES AND APPLICATIONS

ards, as well as open source and vendor solutions.

- IoF2020 [3] - INTERNET OF FOOD AND FARM 2020 - is dedicated to accelerating the uptake of IoT technologies in the European farming and food chains and ultimately

strengthening their competitiveness and sustainability.

- MONICA [4] - MANAGEMENT OF NETWORKED IoT WEARABLES - VERY LARGE-SCALE DEMONSTRATION OF CULTURAL AND SOCIETAL APPLICATIONS - is a large-scale demonstration of how cities can use existing and new IoT solutions to meet sound, noise and security challenges at big open-air cultural and sports events, which attract and affect many people.

- SynchroniCity [5] - DELIVERING AN IoT-ENABLED DIGITAL SINGLE MARKET FOR EUROPE AND BEYOND - represents the first attempt to deliver a digital single market for IoT-enabled urban services in Europe and beyond.

To foster the take-up of IoT in Europe and enable the emergence of economically sustainable IoT solutions, the programme involves stakeholders across the whole value chain and address the validation, sustainability and replicability of architectures, interoperability properties, standards, and best practices for various IoT applications and deployments, as well as introducing innovative business processes and business models. The validation of user acceptability by addressing, issues of trust, security and privacy through pre-defined privacy and security impact assessments, liability and coverage of user needs in the specific real-life scenarios of the IoT pilots are the key elements for the adoption of IoT technologies and the verification of the related business models to guarantee the sustainability of the approach beyond the projects life time.

The projects in the programme that aim to foster user adoption addressing the topics of common interest include CREATE-IoT [6] - CROSS FERTILISATION THROUGH ALIGNMENT, SYNCHRONISATION AND EXCHANGES FOR IoT, that stimulates collaboration between IoT initiatives, foster the take up of IoT in Europe and support the development and growth of IoT ecosystems based on open technologies and platforms. Align with this, U4IoT [7] - USER ENGAGEMENT FOR LARGE SCALE PILOTS IN THE INTERNET OF THINGS, which combines complementary Responsible Research and Innovation - Social Sciences and Humanities (RRI-SSH) expertise encompassing social and economic sciences, communication, crowdsourcing, living labs, co-creative workshops, meetups, and personal data protection to actively engage end-users and citizens in the large-scale pilots.

The IoT Large-Scale Pilots make use of the rich port-

folio of technologies and tools developed and demonstrated in controlled environments and extend them to real-life use case scenarios with the goal of validating the advanced IoT solutions across complete value chains with actual users and proving its socio-economic potential. The operation of the IoT applications at large scale aims to respond to real needs of end-users (public authorities, citizens and business), based on underlying open IoT technologies and architectures that can be re-used across multiple use cases and enable interoperability across those.

Through the advanced solutions developed, the IoT European Large-Scale Pilots Programme supports the creation of a wide-ranging and diverse European IoT community, involving SMEs, midcaps, large enterprises from all regions in Europe including component suppliers, system integrators, and system implementers, academia and consumer groups and creates the basis for a rapid implementation of IoT technologies across various industrial sectors.

There are good chances that Europe, in the long run, clearly can be the world leader, both in terms of IoT research, innovation and IoT deployment by focusing on IoT solutions respecting the human-centric concerns in terms of privacy, security, openness, sustainability and control of personal data. In this context, the IoT European Large-Scale Pilots Programme advances the strategic directions needed to support future research, development and innovation of the next generation Internet of Things technologies and applications and provides major inputs to the elaboration of future research and innovation work programme Horizon Europe. ■

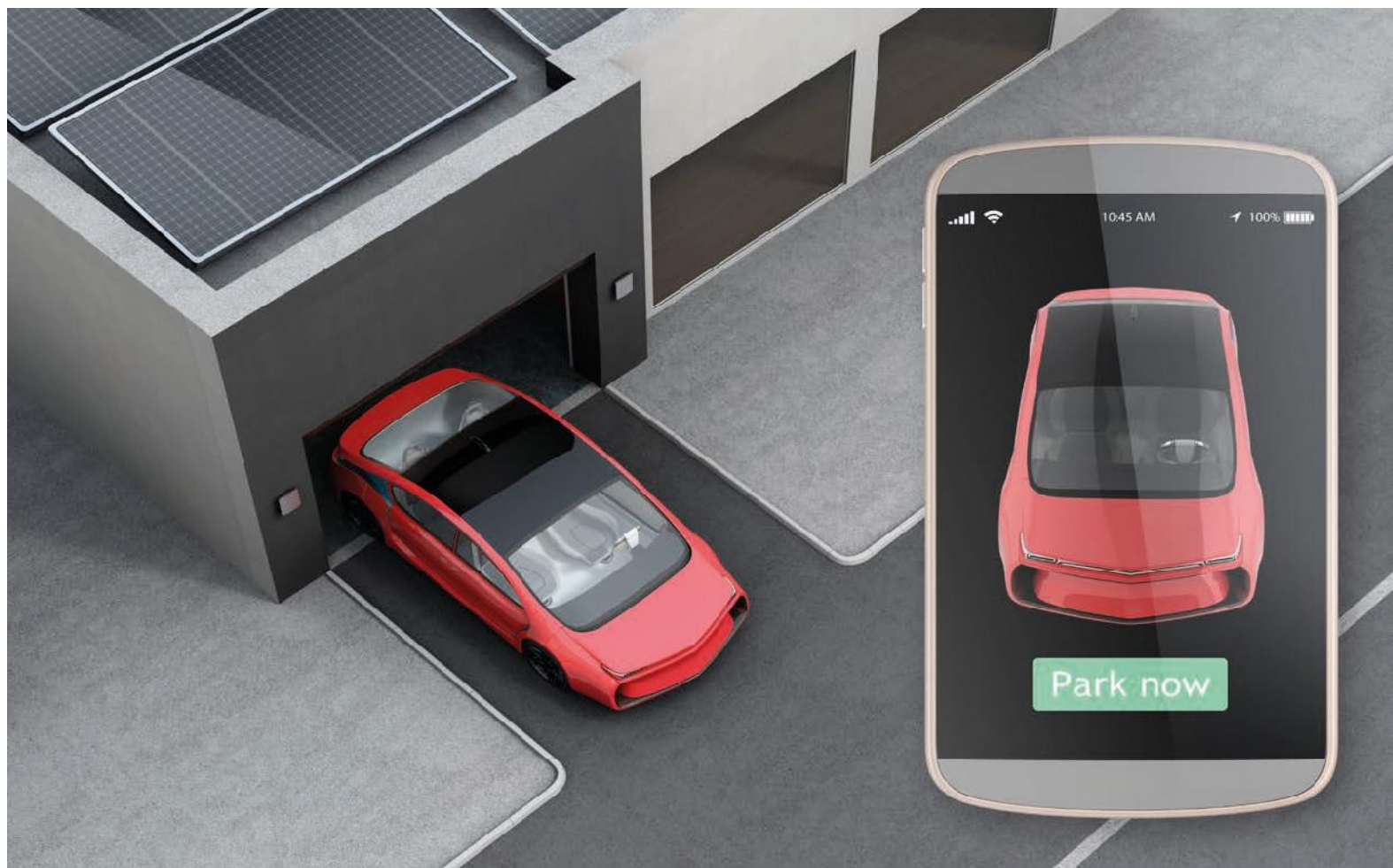
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Notes:

1. ACTIVAGE project <http://www.activageproject.eu/>
2. AUTOPILOT project: <https://autopilot-project.eu/>
3. IoF2020 project: <https://www.iof2020.eu/>
4. MONICA project: <http://www.monica-project.eu/>
5. SynchroniCity project: <http://www.synchronicity-ty-iot.eu/>
6. CREATE project - IoT: <http://www.create-iot.eu/>
7. U4IoT project: <http://www.u4iot.eu/>

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AUTOPILOT project: <https://autopilot-project.eu/>

MONICA project: <http://www.monica-project.eu/>

