



PROJECT PROFILE

16101



Technology and fabrication methods are making ultra-sound diagnostics affordable and impacting continuous medical care [ULIMPIA]

ULIMPIA combines state-of-the-art MEMS ultra-sound technology with innovations in conformably patch technology to create an open platform for diagnostic ultra-sound patches. These body patches will enable continuous monitoring of bodily functions, making ultra-sound diagnostics affordable to the consumer, but also keeping health costs down by moving continuous medical care from the hospital to the home.

Back in the early the 1990's, practically all electronic cameras were based on so-called plumbicon recording tubes. These tubes were bulky and needed high voltages, as well as, magnetic focusing and deflection coils, making electronic cameras expensive and mainly reserved for the professional market. Within a decade that situation changed completely. With the introduction of silicon-based CCD (charge-coupled device) and CMOS (complementary metal-oxide-semiconductor) image sensors, the price of electronic cameras drastically went down, while at the same time quality increased with a dramatic reduction in size.

Significantly, this has consequences for medical ultra-sound imaging and therapy. Until now, most ultra-sound diagnostics were based on traditional piezo ceramic ultra-sound transducers. These are labour-intensive to fabricate and therefore expensive, limiting the use of ultra-sound diagnostic to professional users. Now, this situation is set to change dramatically during the next decade because exactly the same development in electronic cameras is at the moment taking place in medical ultra-sound diagnostics. After 60 years, during which it has proven its immense clinical value, ultra-sound is now ready to enter the consumer marketplace, thanks to projects such as ULIMPIA.

Open platform with continuous monitoring

ULIMPIA will combine state-of-the-art MEMS (micro-electro-mechanical systems) ultra-sound technology with innovations in conformably patches to create an open platform for diagnostic ultra-sound patches. These body patches will enable the continuous monitoring of bodily functions on the surface of the skin, but also deep inside the body. ULIMPIA will also demonstrate such applications as blood-pressure measurement; bladder monitoring; blood-vessel inspection of diabetes patients; early breast-cancer detection; needle guidance; and wound monitoring. The resulting platform will be accessible to multiple users, enabling them to concentrate on application development, rather than on the development of technological point-solutions.

A large European consortium consisting of 28 partners from seven countries will develop the necessary technological building blocks, which include: a programmable universal ultra-sound engine, conformable patch technologies and functional adhesive and bio-compatible materials.

The objectives of ULIMPIA are to:

- Enable ultra-sound diagnostics to become a consumer commodity;
- Create new markets, encompassing micro-fabrication, patch fabrication and applications;
- Fuel the market for large-area conformable assembly technologies;
- Help manage the cost of health care, by bringing point-of-care diagnosis to the patient.

Spreading the word

Dissemination of the project results to be delivered by the ULIMPIA consortium constitutes a key aspect of the project. Relevant activities are foreseen to ensure the visibility and public awareness of the project, and to support the adoption of its results in industry and its related research communities.

Dissemination activities will include:

- Workshops and demonstration events;
- Journal publications and conference contributions;
- A special session at the annual 'Be-Flexible' forum;
- Press releases;
- White papers and brochures;
- A web platform.

Medical, commercial and financial gains

The cost of health care in Europe amounted to \$383 billion in 2016, and it is expected to grow to \$425 billion in 2025. This expenditure is exacerbated by a rapidly ageing population. With ageing, the occurrence of many chronic diseases increases exponentially.

KEY APPLICATION AREAS

-  Health & Well-Being
-  Digital Industry
-  Digital Life

ESSENTIAL CAPABILITIES

-  Systems and Components Architecture, Design & Integration
-  Connectivity & Interoperability
-  Safety, Security & Reliability
-  Computing & Storage
-  ECS Process Technology, Equipment, Materials & Manufacturing

PARTNERS

IMEC VZW / MEPEY BENELUX / PICOSUN OY / VTT Technical Research Centre of Finland Ltd / LINXENS France / Fraunhofer EMFT / GED Gesellschaft für Elektronik und Design mbH / Henkel AG & Co KGaA / Institutes of Textile and Fiber Research Denkendorf (DITF) / KARL OTTO BRAUN GmbH & Co. KG / NXP Semiconductors Germany GmbH / warmX GmbH / Delft University of Technology / Novioscan BV / Philips Electronics Nederland BV / TNO / Eurecat

COUNTRIES INVOLVED

-  Belgium
-  Finland
-  France
-  Germany
-  Netherlands
-  Spain

PROJECT LEADER

Ad de Beer
Philips Electronics Nederland BV
<http://ulimpia-project.eu/>

KEY PROJECT DATES

01 April 2018 to 31 March 2021

The ULIMPIA project will be vital in:

- Accelerating the current paradigm shift from large diagnostic equipment in hospitals to point-of-care diagnostics;
- Shifting continuous medical care from the hospital to the home environment, thus reducing the cost of health care and alleviating the socioeconomic burden;
- Enabling European players to capture substantial market share in consumer and clinical-grade, smart-body patches;
- Enhancing Europe's competitive advantage in the ultra-sound diagnostics and imaging;
- Consolidating Europe's leading position as a high-end semiconductor and MEMS supplier.

Diverse market opportunities

The global market for point-of-care diagnostics in 2015 was valued at nearly \$18 billion. This market is expected to grow from \$19.3 billion in 2016, to \$28.3 billion in 2021, at a compound annual growth rate (CAGR) of 8%. This growth, which is expected to continue for the coming years, is substantially fuelling the growth in the entire in-vitro diagnostics industry. In recent years, the market has witnessed an exponential increase in technological innovations in wearable electronics by the incorporation of sensors and wireless connectivity. This will play a crucial role in the growth of personalised diagnostics and monitoring markets.

The global market for wearable health-care devices is expected to reach a revenue level of \$18.9 billion in 2020, growing at a CAGR of about 30%. The consumer-health market, including wellness, fitness, and sport wearables, is expected to grow at a CAGR of 27.8% (2015-2020). And medical and clinical-grade wearables, the most promising product segment within health-care wearables, is expected to grow at a CAGR of 32.9% between 2015-2020.

Smart on-body conformable patches will be attractive candidates to boost the wearables health-care market. It is envisioned that they will record a mass-market proliferation in the near future due to the

growing interest from end-users, such as manufacturers of medical equipment and bandages, and pharmaceutical companies. The market size for "traditional, non-ultra-sound" smart patches has been estimated at over \$12 billion in 2015 with a CAGR of 11%.

It is relevant to also review the traditional ultra-sound imaging market. Europe accounted for the largest share of the global ultra-sound market in 2015, in which the second largest manufacturer of ultra-sound equipment globally had a market share of 20% and a turnover close to \$800m. Globally, the ultra-sound imaging segment is growing, and is expected to reach \$6.9 billion by 2020, at a CAGR of 5.5% from 2015.

Finally, the semiconductor market for health care in Europe is expected to reach \$3.4 billion in 2018 with a CAGR of 5.5%. This market consists of medical imaging (CAGR of 3.6%), clinical diagnostics and therapy (1.1%), and consumer medical electronics (8.7%). Importantly, the advent of consumer ultra-sound applications is expected to significantly grow this segment of the MEMS industry. MEMS processing and design knowledge is highly specialised and relatively scarce. Europe currently holds a leading position in the worldwide strongly growing €10 billion MEMS market, which has a CAGR of 13%⁹. The medical MEMS market will account for \$7.25 billion in 2019 with the highest CAGR of 23.9% in the global MEMS market (2012).

Continuity and growth ensured

At completion, the project consortium will ensure that the open platform is maintained and will continue to be available for validation and prototyping. This arrangement will be in place until the start of a venture that will own and exploit this platform. Here, project partners will have the opportunity to participate in the venture (owned by the participating partners) to exploit the pilot line. Initially, it will make use of the manufacturing facilities and pilot lines of project partners.

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Penta (E!9911), is EUREKA Cluster whose purpose is to catalyse research, development and innovation in areas of micro and nanoelectronics enabled systems and applications.

