



First ever industry demonstration of capacitive communication

Capacitive ID showcased at European Forum for Electronics Components and Systems

Technology enables electronics to be integrated into paper which can then be read by touchscreen devices

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Today, at the 2018 European Forum for Electronics Components and Systems (EF ECS), Horizon 2020 consortium CAPID has demonstrated prototypes of paper products augmented with new electronic functionality – Capacitive ID (CAPID). It's the industry's first demonstration of capacitive communication using ultra-thin electronic chips embedded in paper.

CAPID is a system through which a tiny, flexible tag is inserted into an object. That object — which could be as small as a card or a label — can then be identified when placed on a touchscreen. The potential of the technology is extraordinary particularly when you consider that almost every person in Europe has access to a connected touch device such as a smartphone or tablet.

The CAPID project aims to build on this ubiquity. Its aim is to develop a new generation of wireless tags that bring something different and valuable to touchscreen technology.

The CAPID tags are thin and flexible devices integrated in paper and plastic products. They send a dynamic capacitive signal into the reading devices which make it possible to identify and locate low cost and high-volume products, like cards or labels, to the internet, just by putting them on a touchscreen.

Every CAPID tag will have its own ID. A potentially vast number of tags, all of them identifiable, will make it possible to create unique codes for any product. The new devices will have a very small footprint making it possible to integrate them in a product as thin and flexible as paper.

Capacitive communication developed by the CAPID consortium is different from the traditional RFID and NFC technologies. Wireless exchange of information between the tag and the reader is now complemented by the new features – capacitive reader can detect position and orientation of the tags. In addition, this is a short range (contact) communication, which provides additional security feature compared to existing RFID solutions. Today's prototypes can send information to custom made reader devices. Next year CAPID consortium envisions the use of most standard capacitive touchscreens (smartphones, tablets, etc.) as readers for the next generation of capacitive tags.



The new communication devices are enabled by ultra-thin, flexible electronic circuits, which were optimized to operate at low power as part of the CAPID project. Small capacitive antennas are manufactured directly on-chips, as part of the chip manufacturing process. The result is a simple and very low cost tag, since no external antenna nor assembly process is required. Furthermore, the CAPID consortium developed new processes to better align chip fabrication and integration in paper products, reducing the cost of connected paper products.

The CAPID project brings together a number of players, from the worlds of research, technological innovation and manufacturing. Three of them will be developing the enabling technology for CAPID devices. They are: Cartamundi, the world's leading manufacturer of card and board games; Imec, a research and innovation hub in nano-electronics and digital technologies; and TNO, an independent research organisation.

Real life applications will be demonstrated in three concrete product prototypes: board games (through Cartamundi Digital, which creates unique applications for mobile and online usage) an example of which was demonstrated at the EF ECS Conference; ticketing and access control (through Simply-X, an information technology and services company); and mobile payments (through Rebased, which offers programming expertise).

The technology opens up enormous potential for these three areas. Taking what was good in the traditional game play of board games and adding endless possibilities through digital and online concepts e.g. digital animation and up to date changing, connected and immersive new game experiences.

From a ticketing perspective, CAPID enabled cards will offer event solutions beyond just the physical event itself, creating an entire experience for guests even after the event in combination with their smartphones. It will also enable event organisers and venue owners to have true end to end access control from authorizing a guest to a physical space or section as well as authorizing a guest via their mobile device.

The new CAPID enabled mobile payment system aims to liberate data that is currently restricted for use by leading providers (i.e. Visa, MasterCard etc.) while respecting European privacy laws – no personal data is exchanged. This opens up considerable potential for event or venue owners who don't have access to transaction data. In addition, the technology will allow any smartphone or capacitive touch screen to become a payment terminal.

EDITOR'S NOTES

The CAPID consortium is made up of a series of partners, supported by Horizon 2020, the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market.

Website: www.capid.eu

Video: www.vimeo.com/244196753



Partners

Cartamundi, the world leader in production and sales of playing cards and board games, is the coordinator of the CAPID consortium. Cartamundi will play a major role in enabling the integration of different CAPID components into finished products. Cartamundi will also conduct research into the games market and translate needs into relevant applications. At a later stage the company intends to assess the feasibility of various CAPID game products and work on the marketing and commercialisation of the most promising products.

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Cartamundi Digital is part of the Cartamundi Group. They create digital variations on board and card games, with a focus on hybrid models. They develop their own technologies to bring the strongest aspects of the physical and digital world together in one environment. Their role in the project is to define the right application and specifying the demonstrator. Cartamundi Digital will be the main contributor to develop software and manage the realization of the board game reader.

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Rebased - The CAPID project will develop enabling technology for C-token devices (Cartamundi, Imec, TNO). Real life applications will be demonstrated in three concrete product prototypes: board games (Cartamundi Digital), ticketing and access control (Simply-X), and mobile payments (Rebased).

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Simply-X is one of the leading technology providers for events, stadiums and festivals. Among the first companies to provide electronic access control systems in 2005, simply-X has been in the event space for over 20 years. Within the CAPID project, simply-X will be responsible for developing a CAPID-ticket and a corresponding access control-system. This will include a physical access-gateway as well as a Smartphone application that will be able to read and authorize CAPID-enabled tickets.

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IMEC is one of the largest independent R&D institutes world-wide and performs scientific research which runs 3 to 10 years ahead of industrial needs. They will elaborate the designs for the CAPID chips. For this imec will establish new low power logic styles and investigate energy harvesting electronics and bi-directional communication. In addition, imec will contribute to the capacitive reader development and the characterization of the CAPID chips and prototypes.

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TNO is an independent applied research institution and maintains close contacts with universities and basic research institutions in order to translate up-to-date knowledge and insights into practical applications. Within the project TNO works on process development and fabrication of the TFICs. Integration of TFICs and other



thin-film components into inlays. A process for dicing deboning and transferring TFIC onto a temporary carrier will be developed ensuring no damage to the TFIC.

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