Imec, TNO and Cartamundi develop flexible tags that communicate with standard touch screens

Breakthrough IoT technology for IoT applications featured on cover of Nature Electronics

BELGIUM (Belgium), Dec 17, 2019 — Imec, a world-leading research and innovation hub in nanoelectronics and digital technologies, TNO, and Cartamundi announced that they have developed a flexible capacitive identification tag that communicates with standard touch screens (C-touch). C-touch tags can be integrated in a wide range of paper and plastic based objects such as tickets, certified documents, payment cards, realizing smart products. The connection to the internet is established simply by placing the tagged object on the touchscreen or vice-versa. The results, developed in the framework of Holst Centre, an open innovation initiative by imec and TNO, were published in this week's Nature Electronics.

C-touch tags are thin and flexible chips that can be integrated in paper and plastic products. They have a unique identifier which can communicate via any touchscreen. Smart cards or other objects with embedded C-touch tags can securely interact with the 4.5 billion mobile phones used worldwide, as well as with the large number of touch screens now being integrated in cars, booths, walls, coffee machines and all sorts of everyday objects. Without requiring additional hardware and major reconfigurations or additional costs for the users, C-touch tags provide a solution to label trillions of everyday objects to truly create the Internet-of-Everything. These tags offer security thanks to the very short communication range; general compatibility thanks to the presence of capacitive touchscreens everywhere; and the potential to be produced at low cost thanks to the monolithically integrated antenna. Compared to existing RFID technologies such as NFC, the new C-touch tag does not require an external antenna. The tiny antenna is part of the chip itself, making the tag much smaller compared to current NFC tags. The small size enables integration into everyday objects. Thus, C-touch tags are an alternative in all those use cases where interaction via touchscreens is feasible, but RFID/NFC tags are either too large or too expensive or where contactless reading is a disadvantage. For example, in board games where cost is discriminator, to provide higher security in payment cards, or to replace difficult to service and manage hardware readers and access control points with easy to service and update apps on standard mobile devices, etc.

The new C-touch tag that imec, TNO and their partners have described in Nature Electronics is based on thin-film transistor technology and is powered by a thin-film battery or a thin-film photovoltaic cell that converts light from the touchscreen. The 12-bit thin-film capacitive identification tag achieves up to 36bps data transfer rates at 0.6V supply voltage, which is compatible with commercially available touchscreen devices without requiring modifications. The flexible thin-film integrated circuit has a 0.8cm^2 on-chip monolithic antenna and dissipates only 38nW of power at 600mV supply voltage.

"Our C-touch tag paves the way to a multitude of new applications compared to standard RFID or NFC solutions as it takes advantage of the widespread availability of touchscreen readers compared to the limited amount of NFC readers," says Kris Myny, principal scientist and R&D team leader at

imec. “We are testing the tag system and communication method using a range of different touchscreens from a variety of brands, including Apple, Samsung and Huawei.”

“These tags provide new possibilities of connecting objects to internet and enabling Internet-of-Everything. Our next steps will be to further improve the performance of the tags, enable new features such as bi-directional communication with touchscreens, and work with companies in developing solutions based on C-touch tags in different application domains”, says Prashant Agrawal, program manager for thin film electronics at imec.

Steven Nietvelt, CTO of Cartamundi says: “We are very excited to be part of this project. The C-touch tages will enable us to even further blur the boundaries between digital and physical gaming and unlocks exciting new consumer experiences.”

This project was executed in the framework of Holst Centre, an open innovation initiative by imec and TNO. It has received funding from the European Union’s Horizon 2020 research and innovation program, project CAPID, under grant agreement No 732389 , the ERC project FLICs, under grant agreement No 716426 and through the Flexlines project within the Interreg V-programme Flanders-The Netherlands, a cross-border cooperation programme with financial support from the European Regional Development Fund, and co-financed by the Province of Noord-Brabant, The Netherlands.

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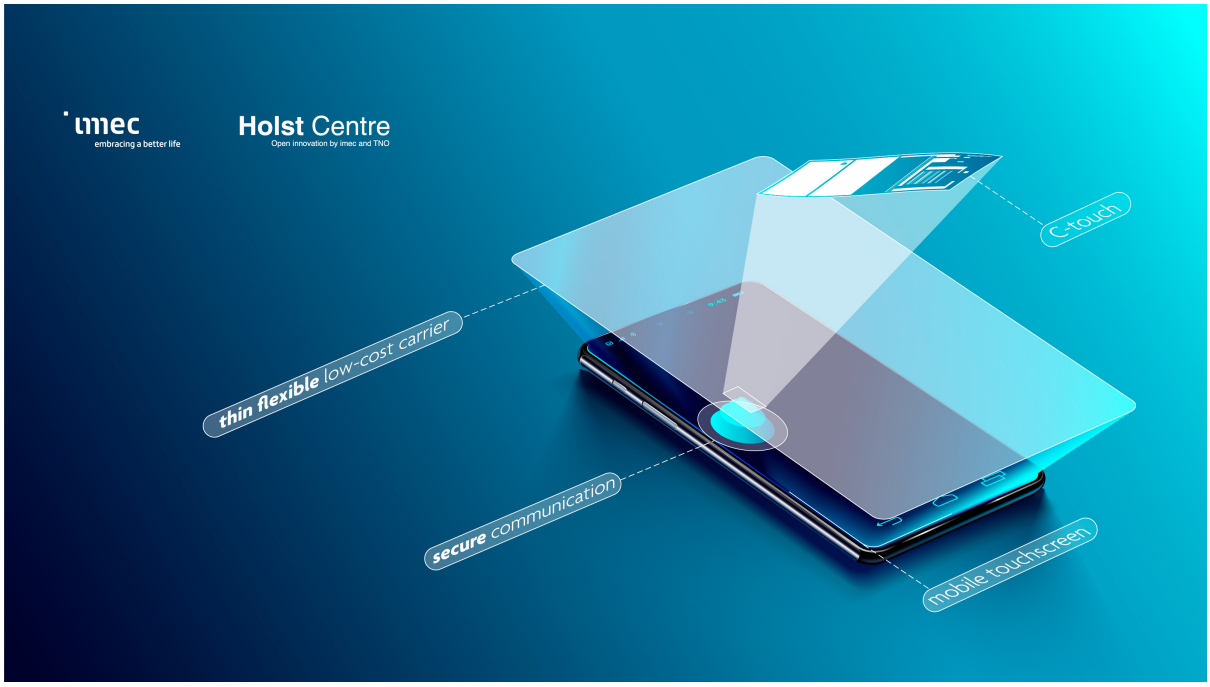


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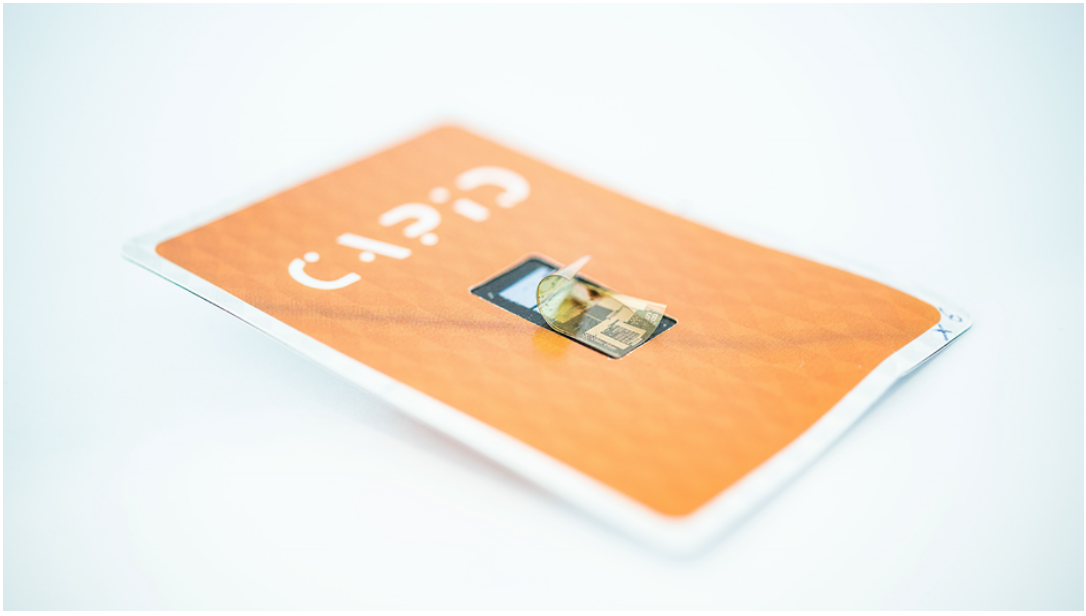

About imec

Imec is a world-leading research and innovation hub in nanoelectronics and digital technologies. The combination of our widely acclaimed leadership in microchip technology and profound software and ICT expertise is what makes us unique. By leveraging our world-class infrastructure and local and global ecosystem of partners across a multitude of industries, we create groundbreaking innovation in application domains such as healthcare, smart cities and mobility, logistics and manufacturing, energy and education.

As a trusted partner for companies, start-ups and universities we bring together more than 4,000 brilliant minds from over 97 nationalities. Imec is headquartered in Leuven, Belgium and has distributed R&D groups at a number of Flemish universities, in the Netherlands, Taiwan, USA, and offices in China, India and Japan. In 2018, imec's revenue (P&L) totaled 583 million euro. Further information on imec can be found at www.imec-int.com.

Imec is a registered trademark for the activities of IMEC International (a legal entity set up under Belgian law as a "stichting van openbaar nut"), imec Belgium (IMEC vzw supported by the Flemish Government), imec the Netherlands (Stichting IMEC Nederland, part of Holst Centre which is supported by the Dutch Government), imec Taiwan (IMEC Taiwan Co.) and imec China (IMEC Microelectronics (Shanghai) Co. Ltd.) and imec India (Imec India Private Limited), imec Florida (IMEC USA nanoelectronics design center).

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About TNO

TNO connects people and knowledge to create innovations that boost the competitive strength of industry and the well-being of society in a sustainable way. This is our mission and it is what drives us, the over 3.000 professionals at TNO, in our work every day. We work in collaboration with partners and focus on nine transitions that we have identified together with our stakeholders. For more information www.tno.nl/en/

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About Cartamundi

Cartamundi is Latin for "Cards for the World". With a history dating back to 1765, Cartamundi is the world's leading manufacturer of card & board games and digital solutions. With a network of owned sales offices, 11 state-of-the-art manufacturing facilities and a workforce of over 2,200 people, Cartamundi is a prominent and growing supplier to the global cards, games and toys industry. In 2018, Cartamundi generated a revenue of approximately $440 million.

Legendary games such as Monopoly® and Pokémon® run off the Cartamundi production lines, as do many different varieties of playing cards and card games for consumers as well as casinos.

With its strong brands such as Color Addict®, Shuffle®, COPAG® and Grimaud®, Cartamundi created a compelling range of playing cards, children's card games and family games which can be found in all major retailers across the globe. All contributing to fulfilling the Cartamundi purpose of "Sharing the Magic of Playing Together".

Cartamundi's corporate headquarters are located in Turnhout, Belgium. Manufacturing facilities are located in Japan, India, Poland, Germany, France, Belgium, United Kingdom, Ireland, United States of America and Brazil. For more information visit www.cartamundi.com.

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