



IMEC embracing a better life

NEXT-GEN HIGH-PRECISION LOW-POWER ULTRA-WIDEBAND

Imec pioneers ultra-wideband (UWB) impulse radio (IR) technology for next-generation products which require secure distance bounding and high-precision, agile spatial awareness capabilities based on secure and precise wireless distance measurement or 2D/3D localization. Imec ultra-low power (ULP) circuit solutions offer 10x lower power consumption than state-of-the-art products. Based on imec's >15-year R&D track record on UWB technology, IMEC offers partners a wide portfolio of UWB hardware and software IP.

APPLICATIONS

- Secure access
- High-precision distance measurement
- Indoor localization and asset tracking
- VR/AR gaming
- Mobile payments



Contactless payment

OFFERING

Imec's **UWB technology offering** comprises a wide range of available **whitebox hardware and software IP**, as well as expertise in hardware (integrated circuit, PCB demonstrators, antenna) and software (system to physical-layer algorithm) design.

- **Whitebox system and application IP and demonstrators**, e.g., multi-anchor UWB localization demo, in-warehouse drone-based inventory inspection demo
- **Ranging (distance measurement) and direction finding (DF) algorithms for improved multi-path resilience** and non-line-of-sight (NLOS) versus line-of-sight (LOS) detection to achieve **best-in-class localization**.
- **Advanced localization algorithms** for smart anchor selection, particle filtering and sensor fusion techniques to achieve cm-accuracy in challenging environments, using imec prototypes as well as commercially available UWB chips.
- **Secure Distance Bounding (SDB)** for prevention of relay attacks
- **Whitebox silicon IP offering** – analog and digital integrated circuit (IC) designs, layout databases and testbenches (90nm, 40nm, 28nm) – of wireless transceivers and building blocks
- **Next-gen UWB 802.15.4z & 802.15.4a (legacy) transceiver** – cm-accurate, ultra-secure & ultra-low power (ULP)
- Building blocks for UWB systems, e.g. **phase-locked-loops (PLL)**, wakeup timers, timing references, **analog-digital-converters (ADCs)**, power management (PMU), digital baseband (DBB)
- Access to **proof-of-concept integrated circuit (IC)** implementations and demonstrators including demo protocol / MAC / SW stack of state-of-the-art wireless IP
- **Expertise** in RF/analog, digital design, system and algorithm, protocol design, security & distance bounding against relay attacks, embedded software design for partner's custom UWB designs
- **Benchmarking** – Evaluation of feasibility and performance of UWB, 802.11 WiFi fine time measurement (FTM) and

Bluetooth high accuracy (phase-based) ranging in certain scenarios and use cases, for helping imec partners to derive specifications and product prototypes for next-gen UWB products.

- Expertise in **antenna design** – General purpose or custom UWB antenna designs. Antenna array design for direction finding / angle-of-arrival (AoA).
- Imec participates in **standardization** bodies and industry consortia, e.g., IEEE, CCC, ETSI/FCC and others

WORK WITH IMEC

- **'White box' IP** licensing and technology transfer, including product design support, of silicon IP (e.g., analog/RFIC circuit design schematics and layout, digital RTL design and testbenches), algorithms and system models as well as demonstrators, HW/SW prototypes and measurement results.
- **Insight partnerships** – Gain early stage insights on latest technology developments via technology concept and prototype evaluation briefs.
- **Development on Demand (DoD)** – Custom R&D for your future product.



Imec IDLAB demo of high-accuracy UWB localization of drones in a warehouse

CONTACT US
WWW.CONTACTIMEC.COM

DISCLAIMER - This information is provided 'AS IS', without any representation or warranty. 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).