Robotics ecosystem
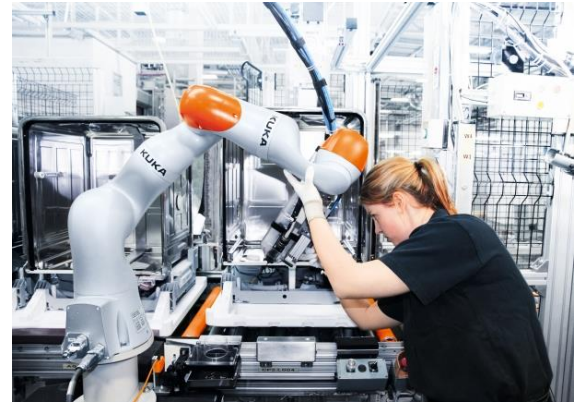
A constantly changing environment: facing challenges

Improving spatial awareness in robotics applications is challenging

Robotics ecosystem

A constantly changing environment: facing challenges

Enable full autonomous robot operation

- Little or no human intervention
- Automate tasks in dangerous environments
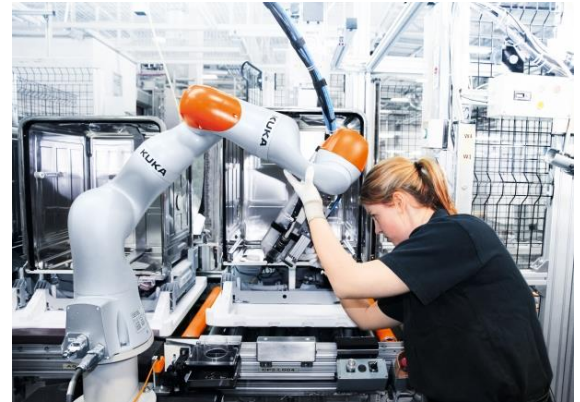- Reduce costs, increase efficiency

Robotics ecosystem

A constantly changing environment: facing challenges

Enable full autonomous robot operation

- Little or no human intervention
- Automate tasks in dangerous environments
- Reduce costs, increase efficiency

Improve logistics and warehouse operation

- Improve robot cooperation to reduce orders management time
- Increase customer satisfaction

Robotics ecosystem

A constantly changing environment: facing challenges

Enable full autonomous robot operation

- Little or no human intervention
- Automate tasks in dangerous environments
- Reduce costs, increase efficiency

Improve logistics and warehouse operation

- Improve robot cooperation to reduce orders management time
- Increase customer satisfaction

Improve human-to-robot and robot-to-human cooperation

- Improve worker's safety
- Remove physical barriers without compromising on security

Mobile
Knowledge

Do you want to bring *robot spatial awareness* to the next level?

MobileKnowledge developed a **solution based on Ultra-Wideband technology** that just does that…

… And you can be the first one integrating it into the robotics ecosystem!

Mobile Knowledge

UWB

Do you want to bring *robot spatial awareness* to the next level?

MobileKnowledge developed a **solution based on Ultra-Wideband technology** that just does that…

… And you can be the first one integrating it into the robotics ecosystem!

Improves robot ability to position itself in the environment and interact in an effective way with other robots and humans

Highly accurate and precise positioning data, even in indoor and challenging environments:
- Accuracy: ± 5cm, ± 1º offset
- Precision: ± 7cm; ± 4º std dev

Easy to integrate and flexible. The first UWB Plug & Play solution that can be adapted to the most common positioning use cases.

One of the most cost-effective solutions if compared to other positioning solutions.

Mobile Knowledge

to know more about spatial awareness accuracy and precision please check our website

UWB technology
Benefits in brief

Secure
Integrity of distance result due to PHY layer encryption

Real time
Refresh rate of 200~1000 times/second

Co-existent
Support band different from Bluetooth/Wi-Fi

UWB

Reliable
Immune to narrowband fading or jamming

Accurate
Centimeter resolution in dense multipath environments

Low energy
Ultra short airtime

UWB technology in Robotics
Applications overview

Robotics ecosystem

UWB

Drones
Platooning
Autonomous landing

AGV/AMR
Worker's safety
Indoor navigation
Platooning
Home base navigation

Household robots
Home base navigation
Indoor navigation
Follow me

Cobots
Worker's safety

Social Robots
Follow me
Indoor navigation
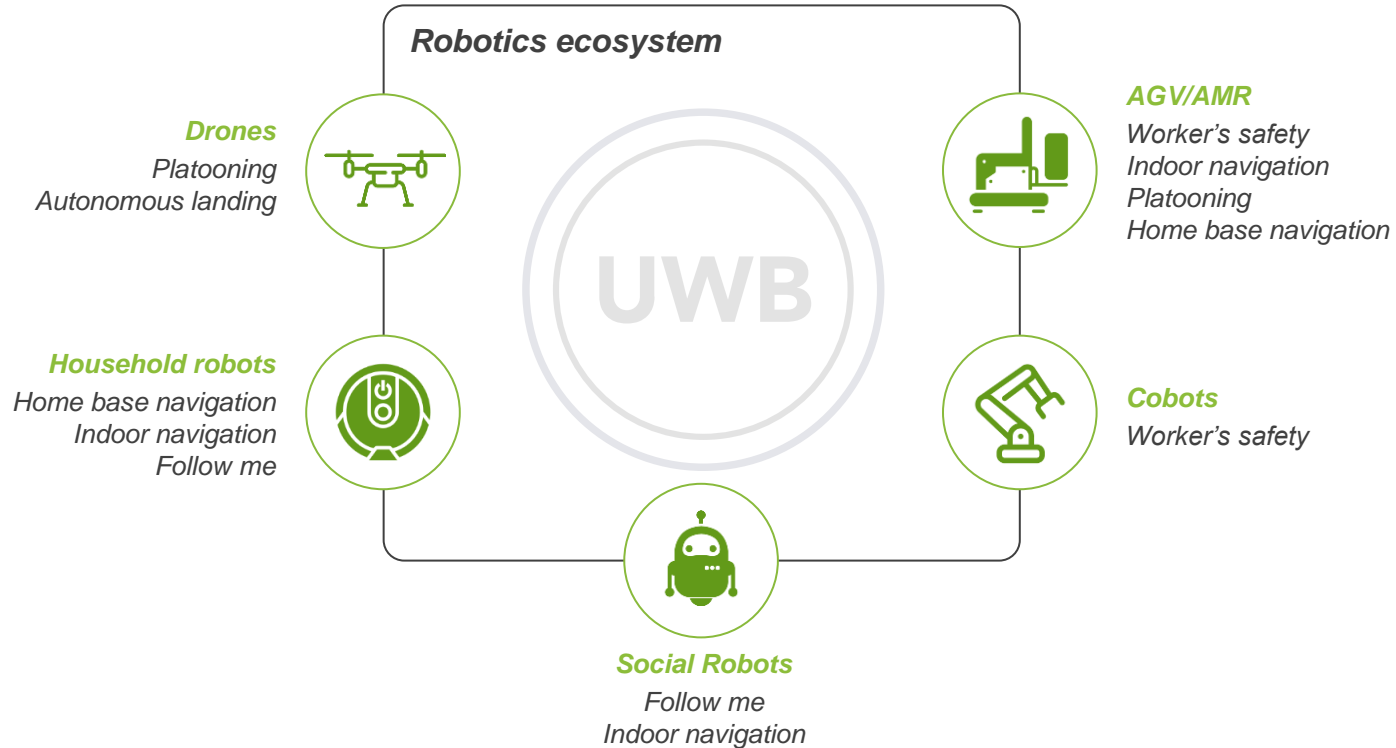
UWB technology in Robotics

Main use cases

Robotics ecosystem

Autonomous landing
- Payload delivery in logistics (drones)
- Hover and land on indoor ground stations (drones)
- Drone in a Box use cases (drones)

Platooning
- Warehouse multi payload delivery (AGV/AMR)
- Flying cellular networks (drones)
- Environmental monitoring (drones)
- Entertainment (aerial shows) (drones)

Worker's safety
- Stop machinery if worker is in a dangerous area (*AGV/AMR, cobots*)
- Keep robots at safe distance from nearby workers (*AGV/AMR, cobots*)

Follow me
- Heavy loads moving in industrial environments (*AGV/AMR*)
- Personal assistance robots (*social robots*)

Home base navigation
- Returning to charging station when out-of-battery (*AGV/AMR, household robots*)
- Returning to storage room after completing a task (*AGV/AMR, household robots*)

Indoor navigation
- Accurate autonomous navigation in industrial and household environments (*AGV/AMR, household robots*)

MK UWB Kit Robotics

MobileKnowledge solution

MK UWB Kit Robotics

Take **spatial awareness** to the next level with UWB technology

Add **high precision spatial awareness** to your autonomous robot **even in challenging environments** (low/no visibility, high density, indoor) at a **competitive cost** compared to other location technologies:
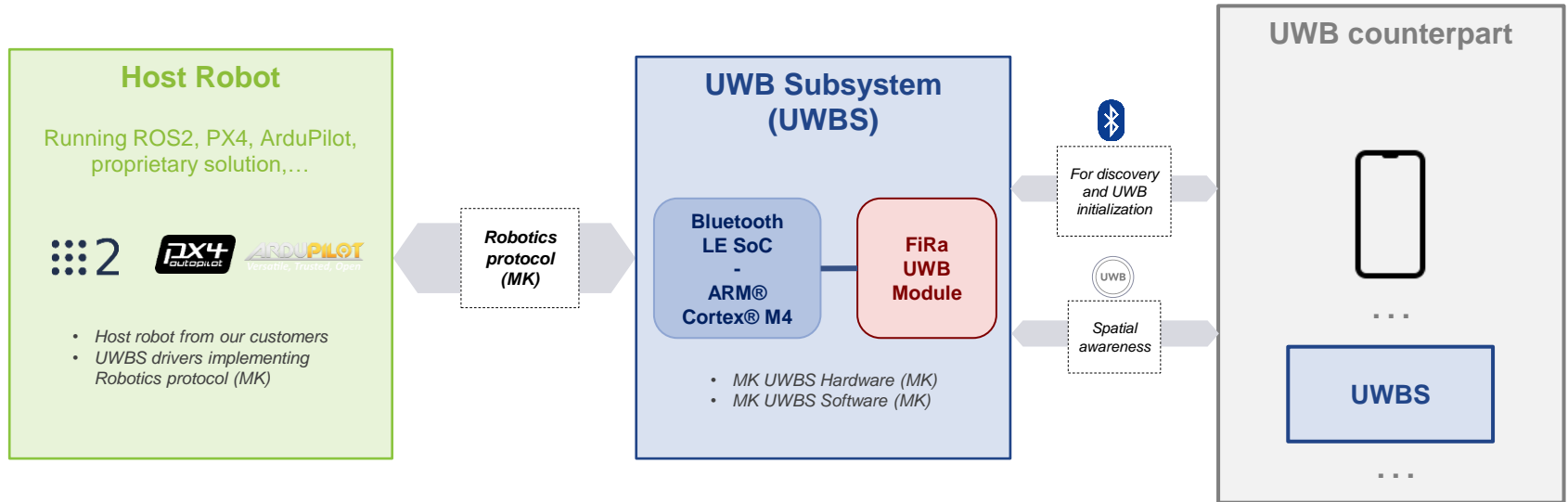
- Accuracy: ± 5cm, ± 1º offset
- Precision: ± 7cm; ± 4º std dev

Leverage on MobileKnowledge's **UWB Subsystem** hardware and software to handle over **6 different use cases** for multiple robotic applications. A true **Plug & Play experience**.

Experience and evaluate the technology immediately through **off-the-shelf solution**. Be ready to **adopt UWB technology in order to differentiate your solutions from those of your competitors.**
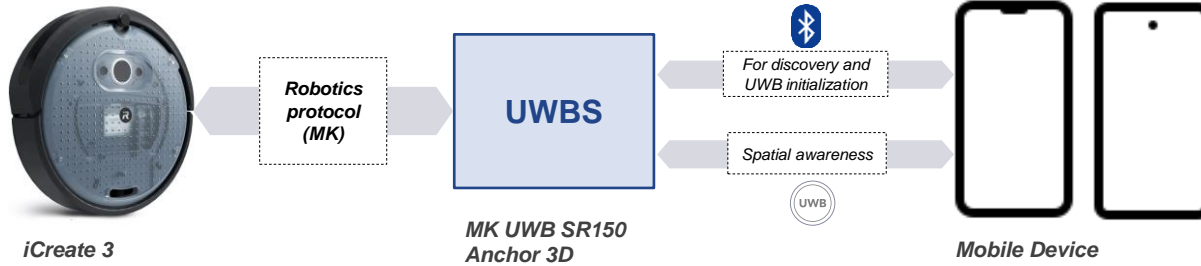
MK UWB Kit Robotics
How does it work?

UWB

Host Robot

Running ROS2, PX4, ArduPilot, proprietary solution,…

::::2   **px4** autopilot   **ARDUPILOT**

- *Host robot from our customers*
- *UWBS drivers implementing Robotics protocol (MK)*

Robotics protocol (MK)

UWB Subsystem (UWBS)

Bluetooth LE SoC - ARM® Cortex® M4

FiRa UWB Module

- *MK UWBS Hardware (MK)*
- *MK UWBS Software (MK)*

For discovery and UWB initialization

Spatial awareness

UWB counterpart

UWBS

. . .

. . .

Mobile Knowledge

MK UWB Kit Robotics

Example: Household robot application – follow me use case

iCreate 3

- Rover uses the ranging data to follow the phone
- Robotics UWB protocol between Anchor and Rover (supporting Follow me use case)
- Rover running ROS2

Robotics protocol (MK)

UWBS

MK UWB SR150 Anchor 3D

For discovery and UWB initialization

Spatial awareness

Mobile Device

- Mobile application running on Android and iOS platforms
- Works in background mode (phone in pocket)

Mobile Knowledge

MK UWB Kit Robotics

Example: Household robot application – follow me use case

UWB

CLICK TO SEE
IT IN ACTION!

iCreate 3

- Rover uses the ranging data to follow the phone
- Robotics UWB protocol between Anchor and Rover (supporting Follow me use case)
- Rover running ROS2

Robotics protocol (MK)

For discovery and UWB initialization

Mobile Device

- Mobile application running on Android and iOS platforms
- Works in background mode (phone in pocket)

Mobile
Knowledge

MK UWB Kit Robotics

Content

UWB

Software

- *MK UWBS Software (binary)*
- *Follow me iOS and Android application*
- *ROS2 driver/reference application*

Hardware

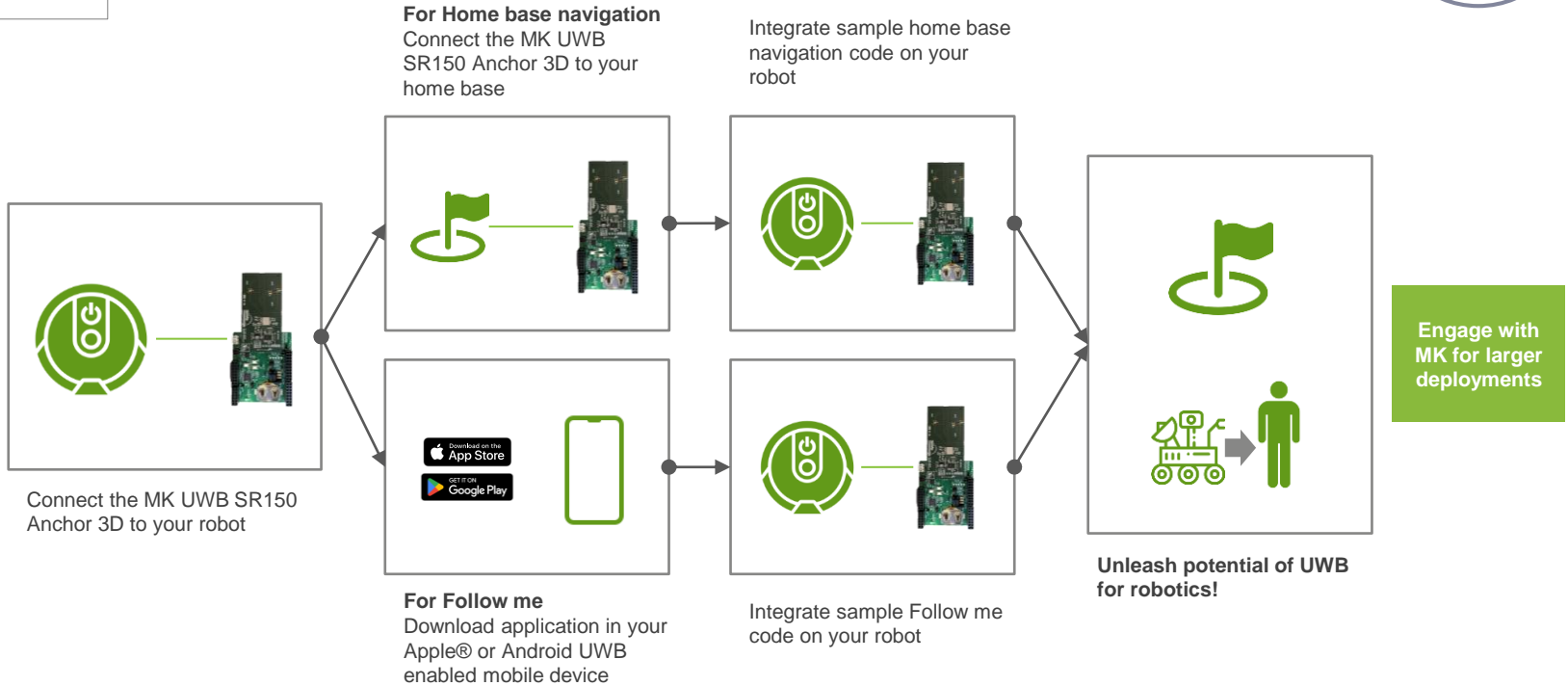- *2x MK UWB SR150 Anchor 3D (MK UWBS Hardware)*

Documentation

- *Follow me Quick Start Guide*
- *Home base navigation Quick Start Guide*
- *Robotics protocol*
- *MK UWB SR150 Anchor 3D User Manual*

Exclusive support from the MobileKnowledge team for the **integration of MK UWBS HW and SW into your solution**

**Contact us at contact@themobileknowledge.com to access
MK UWB Kit Robotics**

MK UWB Kit Robotics
How to use it?

Connect the MK UWB SR150 Anchor 3D to your robot

For Home base navigation
Connect the MK UWB SR150 Anchor 3D to your home base

Integrate sample home base navigation code on your robot

For Follow me
Download application in your Apple® or Android UWB enabled mobile device

Integrate sample Follow me code on your robot

Unleash potential of UWB for robotics!

Engage with MK for larger deployments
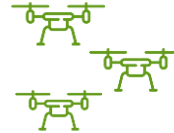
MK UWB Kit Robotics
What's coming up

Autonomous navigation and mapping (SLAM with UWB)

- Extending Robotics UWB protocol to cover TDoA
- Target to use Downlink TDoA (Robot knowing its position)

Platooning through UWB

- Extending Robotics UWB protocol to cover multicast
- Master robot sending multicast ranging to slave robots

Autonomous landing (PX4/Ardupilot integration)

- Extending Robotics UWB protocol to autonomous precision landing
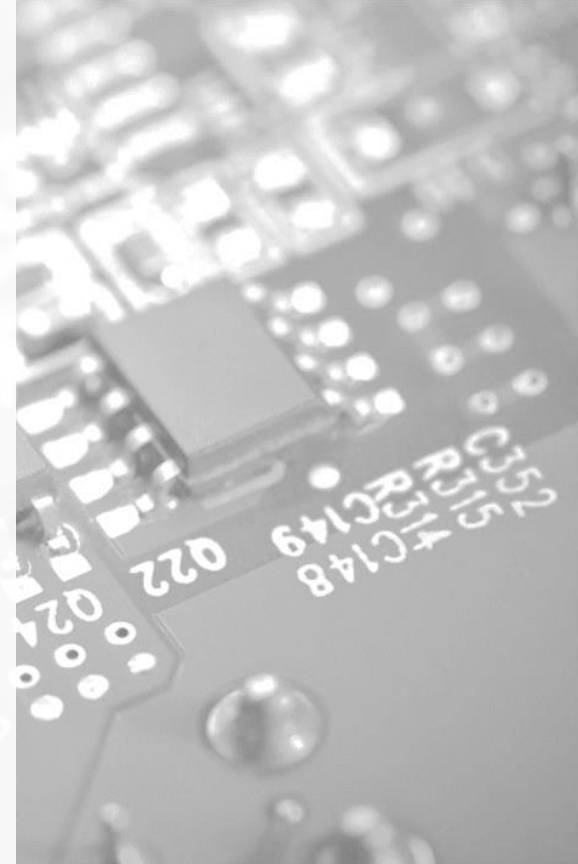- Working on moving targets

Mobile
Knowledge

MobileKnowledge UWB Kit Services
Supporting our customers

Long-standing expertise in UWB technology to help you reduce your time to market and focus on your own UWB solution development

- **Development of customized UWB use cases:** Embedded software development, mobile application software development, back-end integration, system integration,…

- **UWB technology consulting and support services:** Guidance on use case definition and system integration, system architecture, software requirements, Q&A resolution, FIRA related process and use cases,…

- **Design and development of customized antenna board** based on customer requirements and constraints in order to optimize ranging and AoA measurements

- **Porting of MK UWBS Software** into a customer platform, enabling MK UWBS Software, tools and functionalities on any customer platform that meets the MK UWBS requirements

- **Licensing of MK UWBS Software**, for an easy integration of UWB technology while accelerating the time to market

Mobile
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www.themobileknowledge.com
contact@themobileknowledge.com

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DE DIGITALIZACIÓN
E INTELIGENCIA ARTIFICIAL

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