

Mobile device  
self-location method using at  
least one passive radio-  
frequency device



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**PATENT STATUS:** FILED

**PRIORITY NUMBER:** 102019000016988

**PRIORITY DATE:** 23/09/2019

**PUBLISHED AS:** EP

## Invention



The **auto-localization system of RFID Robots in indoor environment (AURORA)** is a low-cost, reliable and scalable system, which allows robots or other mobile devices to self-locate in an indoor scenario using passive UHF band RFID tags placed at known locations.

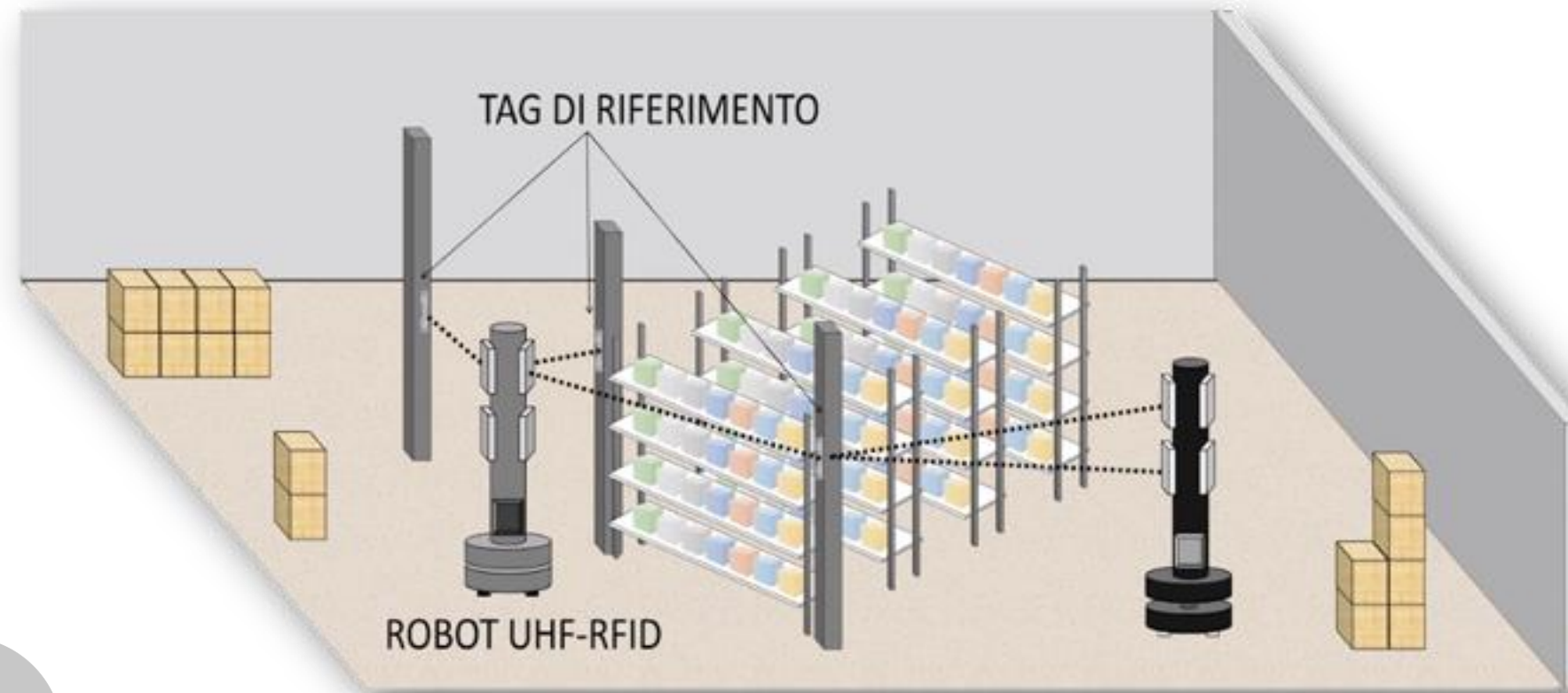
Radio Frequency IDentification (RFID) technology in the UHF (Ultra-High Frequency) band was born for object identification, but in recent years it has been increasingly used for localization purposes. By equipping a robot with some kinematic sensors and an RFID reader, it is possible to develop a tracking system using passive RFID tags, now readable up to distances of 10 m.

The robot, realized as a laboratory prototype, estimates its position in the scenario in which it moves, through an algorithm that merges data from kinematic sensors and the RFID system, allowing to achieve performances comparable to state-of-the-art systems (e.g. laser or sonar). The reference tags are installed in arbitrary positions in the scenario and with low density. The system is capable of running on commercial hardware and can be integrated into robots or mobile devices that already inventory with RFID-UHF technology.

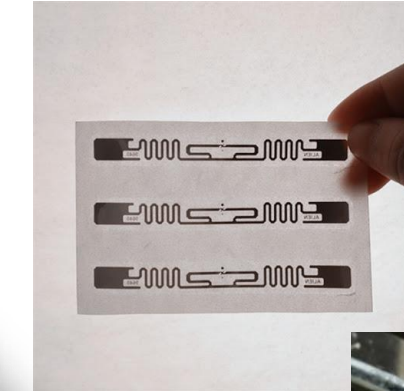
Drawings  
& pictures



AURORA system allows to auto-locate robot RFID in indoor scenario leveraging data acquired from passive tags and kinematic sensors.



Tag RFID-UHF inlay

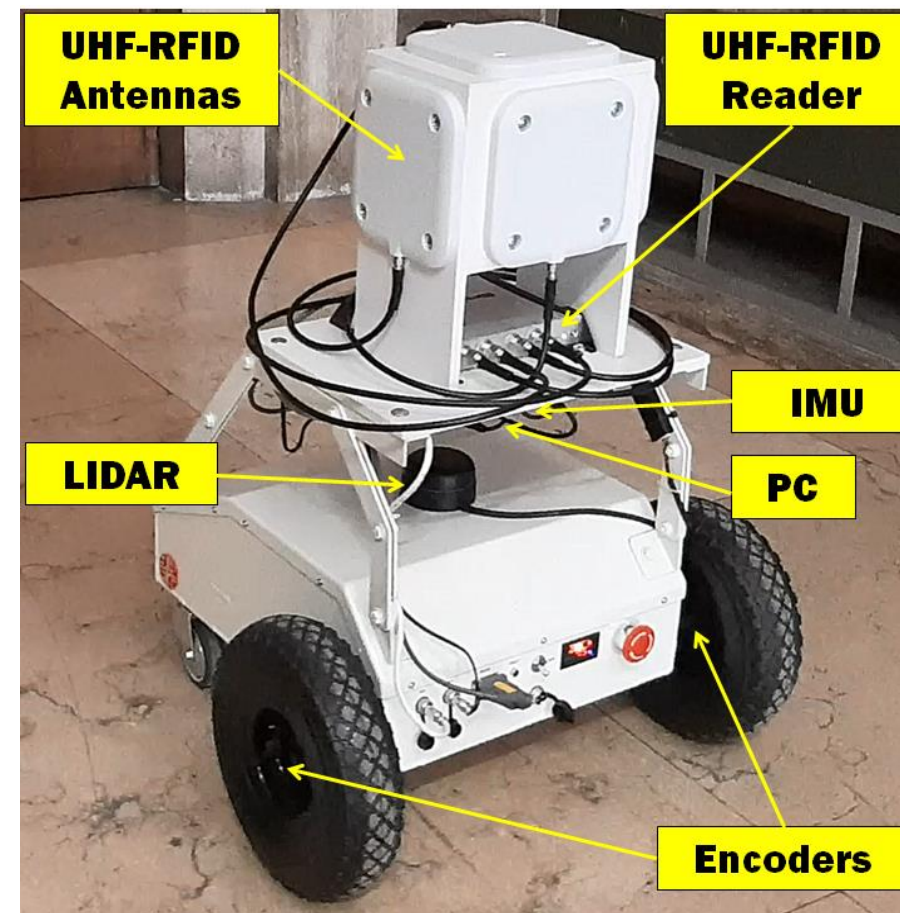


Tag RFID-UHF for metal surfaces.

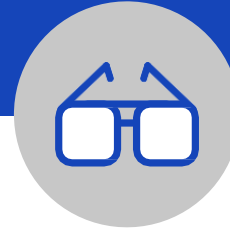


Space-saving, passive RFID-UHF reference tags can be installed on all surfaces, including metal surfaces.

PROTOTYPE



# Industrial applications



The main applications of the proposed technology involve autonomous vehicles in various scenarios:

## **Industry 4.0;**

Logistics;

Management of department stores and stores;

Autonomous robots;

Collaborative Robotics;

*Industrial Internet-of-Things;*

Shop assistant;

Elderly/elderly care (Ambient Assisted Living);

Healthcare and hospitals (point-of-care).

AURORA system uses RFID technology which is **standardized and economical**.

It allows a good operation in dynamic environments thanks to the robustness of the RFID-UHF signal.

The proposed system has **high scalability and performance independent of the mobile device and the scenario**, it also allows **easy deployment, installation and management**, ensuring greater privacy than camera-based systems.

## Possible developments



In the vast scenario of Industry 4.0 applications, the development of next-generation autonomous vehicles, able to operate in a **complex and dynamic industrial context with high flexibility and reliability**, is growing rapidly. One of the most critical functionalities required to enable such operation is definitely localization, i.e., the ability to maintain an accurate estimate of each robot's position over time.

Possible future evolutions of the proposed invention include the real-time implementation of the self-localization method, whose performance has been validated and demonstrated by means of an offline processing of the data measured by the various sensors on board the robot (TRL-4).

Moreover, we will proceed with the validation of the prototype in real application scenarios (e.g. warehouses, stores) to bring it to a higher level (e.g. TRL-7).

For more information:



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