**RIFD related**

**GUEAIEB, W., MIAH, M.. A Modular Cost-Effective Mobile Robot Navigation System Using RFID Technology. Journal of Communications, North America, 4, mar. 2009. Available at: <http://www.ojs.academypublisher.com/index.php/jcm/article/view/0402089095>. Date accessed: 09 Oct. 2014.**

RFID commonly depends on complex image processing algorithms, expernsive hardware, and/or a priori knowledge of the environment

The fundamental idea behind dead-reckoning navigation systems is the integration of incremental motion over time

(J. Borenstein, H. R. Everett, L. Feng, and D. Wehe, “Mobile robot positioning: Sensors and techniques,” Journal of Robotic Systems, vol. 14, no. 4, pp. 231–249, April 1997. )

navigation method a small precision errors and sensor drifts inevitably lead to increasing cumulative errors in the robot’s position and orientation, unless an independent reference is used periodically to correct the error

(L. R. Ojeda, G. D. Cruz, and J. Borenstein, “Currentbased slippage detection and odometry correction for mobile robots and planetary rovers,” IEEE Transactions on Robotics, vol. 22, no. 2, pp. 366–378, April 2006. )

~~Hallmann et al. developed a mobile robot B14 to navigate in a partially known environment.~~

~~(I. Hallmann and B. Siemiatkowska, “Artificial landmark navigation system,” in International Symposium on Intelligent Robotic Systems, July 2001.)~~

Some navigation systems in man-made environments, such as hallways, were developed in [15], [16], where RFID tags are used as artificial landmarks for a mobile robot that is equipped with an on-board laptop computer, an RFID tag sensor and a vision system.

The RFID reader is mounted on the robot itself while the tags are pasted at particular locations on walls.

The current manuscript describes a novel navigation technique that uses a customized two-antenna RFID reader mounted on the robot and a number of tags attached in the robot’s workspace.

A novel RFID-based robot navigation system is proposed in this paper. The robot is first presented with a

**HyungSoo Lim; ByoungSuk Choi; Jangmyung Lee, "An Efficient Localization Algorithm for Mobile Robots based on RFID System," SICE-ICASE, 2006. International Joint Conference , vol., no., pp.5945,5950, 18-21 Oct. 2006**

presents an efficient localization scheme for an indoor mobile robot using an RFID system.

RFID tags on the floor to localize the mobile robot.

Each RFID tag stores its own absolute position which is used to calculate the position, orientation and velocity of the mobile robot.

~~a scheme to reduce the estimation error is newly introduced~~

**Desouza, G.N.; Kak, A.C., "Vision for mobile robot navigation: a survey," Pattern Analysis and Machine Intelligence, IEEE Transactions on , vol.24, no.2, pp.237,267, Feb 2002**

INDOOR NAVIGATION with Map-Based Approaches

INDOOR NAVIGATION with Map-Building

INDOOR NAVIGATION with Mapless Navigation

**Hahnel, D.; Burgard, W.; Fox, D.; Fishkin, K.; Philipose, M., "Mapping and localization with RFID technology," Robotics and Automation, 2004. Proceedings. ICRA '04. 2004 IEEE International Conference on , vol.1, no., pp.1015,1020 Vol.1, 26 April-1 May 2004**

In this paper we analyze whether recent Radio Frequency Identification (RFID) technology can be used to improve the localization of mobile robots and persons in their environment.

In the last of years RFID sensors [6] have started to enter the field of mobile robotics.

(Klaus Finkenzeller. RFID Handboook: Radio-Frequency Identification Fundamentals and Applications. Wiley, New York, 2000.)

information provided by tags can be used to support various tasks like navigation, localization, mapping, and even service applications such as people tracking

Most of the applications of RFID technology, however, assume that the readers are stationary and only the tags that are attached to objects or persons move. The main focus is to trigger events if a tag is detected by a reader or entering the field of range (for example, to keep track of the contents of storage places [2]).

~~Recently Kantor and Singh used RFID tags for mapping. Their system relies on active beacons which provide distance information based on the time required to receive the response of a tag. Additionally, the positions of the tags have to be known more or less accurately [14], [9].~~

~~Also Tsukiyama [16] requires given positions of the RFID tags. Their system assumes perfect measurements, therefore they are not using any technique to deal with the uncertainty~~

~~of the sensor.~~

~~The problem considered here is closely related to the simultaneous localization and mapping (SLAM) problem, in which a robot has to generate a map while simultaneously estimating its pose relative to this map.~~

**Gueaieb, W.; Miah, Md.S., "An Intelligent Mobile Robot Navigation Technique Using RFID Technology," Instrumentation and Measurement, IEEE Transactions on , vol.57, no.9, pp.1908,1917, Sept. 2008**

This paper presents an innovative mobile robot navigation technique using Radio Frequency IDentification (RFID) technology.

To exploit the ability of a mobile robot to navigate a priori unknown environments without a vision system and without building an approximate map of the robot workspace

how this is achieved by placing RFID tags in the 3-D space so that the lines linking their projections on the ground define the “free ways” along which the robot can (or is desired to) move.

MOBILE robot navigation has stood as an open and challenging problem over the last few decades

To date, most of the robot navigation algorithms proposed in the literature are either tailored toward particular structured environments or driven by an overwhelming degree of computational complexity [1].

([1] L. Peters, M. Pauly, and K. Beck, “Servicebots—Mobile robots in cooperative environments,” ERCIM News, no. 42, pp. 30–31, Jul. 2000.)

Numerous robot navigation methods have been suggested over the past few years. These systems generally fall under one of the following categories: dead-reckoning-based, landmarkbased, vision-based, and behavior-based techniques.

This navigation method is based on continuous encoder readings that provide the position, orientation, and linear and angular velocities of the robot. This type of navigation is widely used due to its simplicity and ease of maintenance.

In recent years, significant research has been conducted on mobile robotics that incorporate several sensors and landmarks as navigation media in the environment. In this section, we provide a briefing on some of the recent research related to mobile robot navigation, e.g., those dealing with landmarkbased, dead-reckoning-based, and behavior-based navigation.

The indoor mobile robot navigation presented in [6] uses a global ultrasonic system for the robot’s position estimation while navigating in an environment. The global ultrasonic system consists of four ultrasonic generators fixed at a priori known positions in the workspace and two receivers mounted on the mobile robot.

([6] S.-Y. Yi and B.-W. Choi, “Autonomous navigation of indoor mobile robots using a global ultrasonic system,” Robotica Archive, vol. 22, no. 4, pp. 369–374, Aug. 2004.)

Hallmann and Siemiatkowska [7] developed a mobile robot B14 to navigate in a partially known environment. The vehicle is equipped with 16 sonars, 16 infrared sensors, an onboard Pentium computer, and a gray-scale camera. A map of the robot’s environment is built based on the information fed by the sonar and infrared sensors mounted on the robot. Artificial landmarks with predefined shapes and colors are placed in specific locations to help, together with some image processing and pattern recognition algorithms, the robot locate itself.

([7] I. Hallmann and B. Siemiatkowska, “Artificial landmark navigation system,” in Proc. Int. Symp. Intell. Robot. Syst., Jul. 2001, pp. 219–228.)

natural landmarks have also been exploited in a number of robot navigation algorithms. For instance, Betge-Brezetz et al. [8] focused on the high-level representation of the natural scene to guide a mobile robot in an a priori unknown environment.

Wijk and Christensen developed a similar algorithm for natural landmark extraction from sonar data streamed from a mobile platform [9].

([9] O. Wijk and H. I. Christensen, “Localization and navigation of a mobile robot using natural point landmarks extracted from sonar data,” Robot. Auton. Syst., vol. 31, no. 1/2, pp. 31–42, Apr. 2000.)

In this paper, the robot’s absolute position is determined through a matching procedure between the recently collected landmarks and the reference map.

Among the dead-reckoning techniques investigated in this context is the one described in [10], which studied the integration of dead-reckoning and visual landmark recognition methodologies for the navigation control of a vehicle along a predetermined path in a forest.

([10] H. Makela and K. Koskinen, “Navigation of outdoor mobile robots using dead reckoning and visually detected landmarks,” in Proc. 5th Int. Conf. Advanced Robot., 1991, pp. 1051–1056.)

In this paper, we have presented a novel nonvision-based robot navigation algorithm using RFID technology.

1. Following a Line Segment
2. B. Following a Complex Path
3. C. Following a Hallway

The algorithm is demonstrated to be highly effective in guiding the robot to under any RFID tag by a simple intelligent processing of the phase difference of the signal sent by the tag and received at both antennas of the RFID reader mounted on the robot.

**Bonin-Font, F., Ortiz, A., & Oliver, G. (2008). Visual navigation for mobile robots: A survey. Journal of intelligent and robotic systems, 53(3), 263-296.**

Mobile robot vision-based navigation has been the source of countless research contributions, from the domains of both vision and control.