International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 04 | Apr 2021 www.irjet.net p-ISSN: 2395-0072

Robot Navigation System with RFID and Sensors

Aditi Shinde[1], Toshita Nehete[2], Bipasa Patra[3]

[1]*Scholar, Electrical Engineering, GHRIEM, Jalgaon, Maharashtra, India*
[2]*Scholar, Electrical Engineering, GHRIEM, Jalgaon, Maharashtra, India*
[3]*Head & Assistant Professor, Electrical Engineering, GHRIBM, Jalgaon, Maharashtra, India*

Abstract -: *The paper proposed a method enable robot to navigate in indoor space is indicated. The system use RFID tags as landmarks to locate the robot. A topological map corresponding to the real environment is used for robot navigation. The robot goes along the ways, and turn to the right direction at each intersection of the hallways. The robot navigation system can be used in real life and do efficient work.*

Key Words: **Robot, Navigation, RFID, Sensor, Atmega16, RFID reader, RFID tags, etc.**

1. INTRODUCTION

The definition of "Robot" has been confusing from the very beginning. The word first appeared in 1921,in Karel Capek's play R.U.R, or Rossum's Universal Robots. "Robot" comes from the Czech for "forced labor." These robots were robots more in spirit than from, though. They looked like humans, and instead of being made of metal, they were made of chemical batter. The robots were far more efficient than their human counterparts, and also way more murder-y-they ended up going on a killing spree.

The real-world definition of "robot" is just as slippery as those fictional depictions. A robot is an intelligent, physically embodied machine. A robot can perform tasks autonomously to some degree. And a robot can sense and manipulate its environment. But it wasn't until the 1960s that a company built something that started meeting those guidelines. That's when SRI International in Silicon Valley developed Shaky., the first truly mobile and perceptive robot. This tower on wheels was well-named-awkward, slow, twitchy. Equipped with a camera and bump sensors, Shaky could navigate a complex environment. It wasn't a particularly confident-looking machine, but it was the beginning of the robotic revolution. Robots, though, remained largely confined to factories and labs, where they either rolled about or were struck in place lifting objects. Then, in the mid-1980s Honda started up a humanoid robotics program. It developed P3, which could walk pretty darn good and also wave and shake hands, much to the delight of a roomful of suits. The work would culminate in Asimov, the famed biped, which once tried to take out president Obama with a well-kicked soccer ball. (OK, perhaps it was more innocent than that.)

2. LITERATURE SURVEY

In1997, Olaf Kibitz, Introduced Application of Radio Frequency Identification Devices to support Navigation of Autonomous Mobile Robots.

There exist two main methods to provide the RFID tag with energy for the communication and for an internal processor that might be integrated in tags. Either an internal long-life battery powers the transceiver or energy from the interrogatoris transmitted to the tag as follows. The energizing field is emitted from the transmitter in the interrogator in the form of a carrier wave signal at a fixed frequency. This energy from the transmitter is collected by the transponder antenna, rectified and used to power the transponder. The transponder generates a data stream comprisinga clock signal and the data to be communicated is a form of a modified Manchester code.

In1998, Wail Gueaieb & Suruz Miah . An intelligent mobile robot navigation technique using RFID technology

In2012 S. Srilakshmi & K.Venkata Phani Raja proposed A Mobile Robots Navigation System Using RFID Technology.

In2012 Shi Peng, WangDong Robot Navigation system with RFID and Sensors.

In2016 Seshanka Venkatesh & K. Vamsi Krishna Produced Robot Navigation System with RFID and Ultrasonic Sensors.

Problem Identification:

1. Accuracy in indoor navigation
2. Robot localization and navigation

3. PROPOSED TOPOLGY

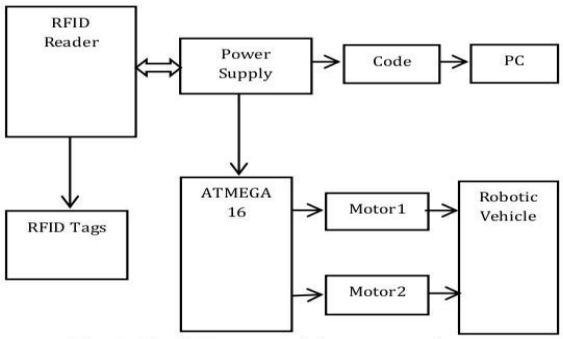

Fig -1: Block Diagram of the proposed system

Atmega 16

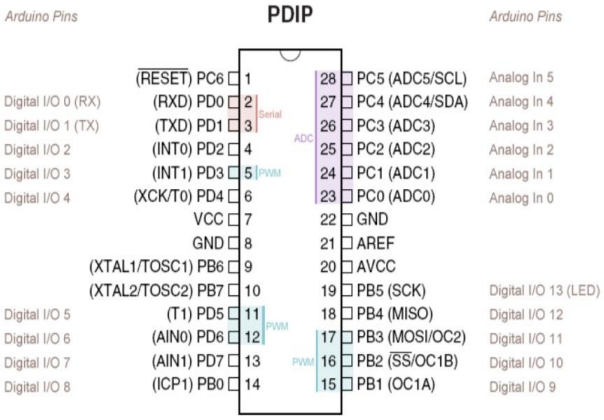

Fig -2: Pin configuration of Atmega16

The AVR is a modified architecture 16-bit RISC single Chip microcontroller. It is one of the microcontroller which use on-chip flash memory. It is used to store the data collected from various RFIDs, such huge data cannot be stored by normal microcontrollers.

DC Motor

A 30 rpm DC motor is used. The microcontroller sends a signal to the motor driver indication the direction the robot is to be moved. Along with the 2 motors 2 dummy wheels are also used to provide balance.

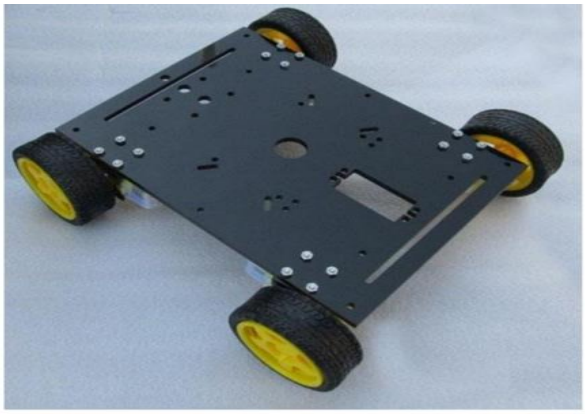

Fig -3: Base of the Robot

Fig -4: Sample Battery of 6V

Battery

A 6v/1.3A battery is used initially. This is supplied to atmega8 which is the VCC pin. Before this the battery is supposed to stepped down to 5V which drives the Atmega16.

RFID Reader and RFID Tags RFID (radio-frequency identification) is the wireless non-contact use of radio-frequency electromagnetic fields, for the purposes of identifying. A radio-frequency identification system uses tags, or labels attached to the objects to the identified. Two-way radio transmitter -receivers called interrogators or readers send a signal to the tag and read its response. RFID tags can be passive, active or battery- assisted passive.

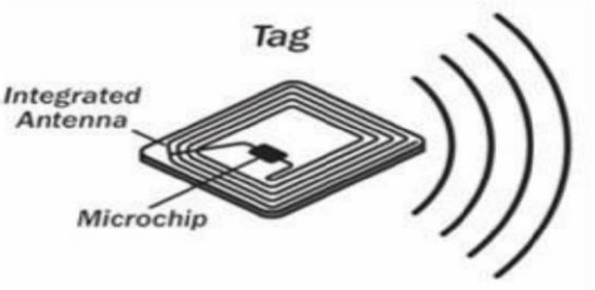

Fig -5: RFID Tag

Voltage Regulator 7805

A regulated power supply is very much essential for several electronic devices due to the semiconductor material employed in them have a fixed rate of current as well as voltage. The device may get damaged if there is any deviation from the fixed rate. The AC power supply gets converted into constant DC by this.

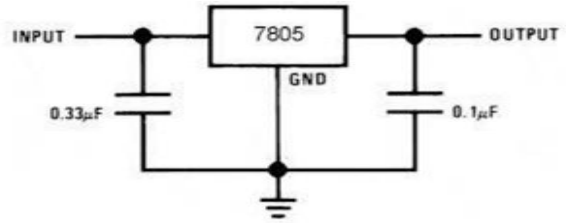

Fig -6: Circuit of Voltage Regulator

4. Application

1. **Security and Surveillance:** These robots are used for security and surveillance wherein the robot has to move around the hallways in a fixed direction / following a given route.

2. **Room service/Hospitals :**

   the designed robot can also be used for room service or for replacing the staff in hospitals. This can be done by placing RFID tags outside each room or patient beds in case of hospitals and the robot can move along accordingly.

3. **For the disabled:** The navigation robot made can give directions to the disabled, with further development it can also help them get things or guide ways for them tracing the tags.

4. REFERENCES PAPER & General

1. James Crowley, "World modeling and position estimation for a mobile robot using ultrasonic ranging", in Proceedings of IEEE International Conference on Robotics and Automation, May 14-19 1989, pp. 674-680,

2. P. Hoppen, T. Knieriemen, and E. Puttkamer, "Laserradar based mapping and navigation for an autonomous mobile robot'' , in Proceedings of IEEE International Conference on Robotics and Automation, May 13-18 1990, pp. 948-953, Cincinnati, OH.

3. A. Kak, K. Andress, Lopez-Abadia, and M. Caroll, "Hierarchica evidence accumulation in the pseiki system and experiments in model-driven mobile robot navigation" Uncertainty in Artificial Intelligence, vol. 5, pp. 353-369, 1990, Elsevier Science Publishers B. V., NorthHolland.

4. Ulrich Strunz, Umgebungs modellierung und sensorunterstutzte Navigation fur mobile Roboter, PhD thesis, RWTH Aachen, 1993.

5. I. Hallmann and B. Siemiatkowska, ―Artificial landmark navigation system, ‖in Proc. Int. Symp. Intell. Robot. Syst., Jul. 2001, pp. 219–228.

6. C.P. Urmson, M.B. Dias and R.G. Simoms Stereo Vision Based Navigation for Sun-Synctoonous Exploration Proc. of IROS, pp. 805-810, 2002.

7. Wail Gueaieb, An Intelligent Mobile Robot Navigation Technique Using RFID Technology, IEEE Transactions on instrumentation and measurement, Vol. 57, No. 9, September 2008

8. L. Armesto, J. Tornero "Automation of Industrial Vehicles: A Vision-based Line Tracking Application" IEEE Conference on Emerging Technologies & Factory Automation, 2009, pp 1-7.

9. L. Kneip, F. Tache and et al. Characterization of the compact Hokyo URG-04LX 2D laser range scanner Proc. of IEEE Int. Cof. On Robotics and Automation pp.1447-1454, 2009.

10. M. Ogaz, R. Sandoval and M. Chacon Data Processing from a Laser Range Finder Sensor for the Construction of Geometric Maps of an Indoor Environment Proc. of IEEE 52nd Midwest Symposium on Circuits and Systems pp. 306-313, 2009

11. T. Tsukiyama, RFID Based Navigation System for Indoor Mobile Robots, Preprints of the 18th IFAC World Congress Milano (Italy) August 28 - September 2, 2011 A. Seshanka Venkatesh, K. Vamsi Krishna, N. K. R. Swamy

12. S. Srilakhsmi, K. Venkata Phani Raja, A Mobile Robot Navigation System Using RFID Technology, IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), Volume 4, Issue 3 (Nov. - Dec. 2012)

13. Bipasa Patra, "Smart electricity generation with solar technology - A Transformation", International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE) Vol 4, Issue 6, IFERP, pp. 394- 399, ISSN:2394-6849, June 2017

14. Bipasa Roy Patra, "Sustainable trends & Necessity of improving power quality for future smarter nation by smart grid", National Conference on Current Trends in Engineering, Science and Technology (NACCTEST- 2018) Organized by GF's Godavari College of Engineering, Jalgaon International Journal of Innovations in Engineering and Science, Special Conference Issue, pp. 443-448, e-ISSN: 2456-3463, April 2018.

15. Bipasa Bimalendu Patra "Smart Grid -Sustainable Shaping of the Future Smarter Nation", International Journal of Emerging Technology and Advanced Engineering, First International Conference on Innovations & Engineering, Volume 8, Issue 10, Oct 2018 (ISSN 2250 – 2459 (Online)), pg. 101-107

16. S. Arulselvi, Robot Navigation System with RFID and Ultrasonic Sensors, Middle-East Journal of Scientific Research, IDOSI Publications, 2014

17. A. Seshanka Venkatesh, K. Vamsi Krishna, N. K. R. Swamy, P. Simhachalam, Robot Navigation System with RFID and Ultrasonic Sensors, International Journal of Engineering Research & Science (IJOER), Vol-2, Issue-9, September- 2016.

18. Bipasa Bimalendu Patra "Necessity for future smarter nation with Sustainable Trend- Smart Grid", PRATIBHA: International Journal of Science, Spirituality, Business and Technology (IJSSBT), Vol. 6, No. 2, September 2018, pp. 35-41, ISSN (Print) 2277-7261.

19. Sarang Malusare, Moin Kazi, Mohammad Abrar Shaikh Sharukh, Manish Mahale," IOT Based Smart House and Short Circuit Protection and Detection System" IRJET Volume-7, Issue 7 - July 2020, e-ISSN- 2395-0056, p-ISSN - 2395- 0072

20. Guruprasad P. Sali, Mohini J. Deshmukh, Mrunalini S. Wankhede, Bipasa B. Patra, "Smart IOT Automation for Advanced Home Security", International Journal of Engineering Research in Electrical and Electronic Engineering (IJEREEE), Vol 6, Issue 4, IFERP, April 2020, ISSN (Online) - 2395-2717, pp.1-6, doi: 01.1617/vol7/iss4/pid45820