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Multiple Target Tracking For Indoor Environment Using WPIR

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Abstract- An Indoor human and robot monitoring are important for providing services to people. Surveillance systems provide the capability of collecting authentic and purpose information and forming appropriate decisions to enhance safety. A location-aware computing may soon become a part of everyday life. Localization is a key technology to address how the robots and human localize themselves in the operating environment. Localization is, also called positioning. It is a technique for determining one's position accurately on the surface of earth. The main objective of the paper is providing the high security alert and is used to achieve the minimum power consumption. An indoor localization and monitoring system, which is based on a wireless and PIR (WPIR) sensory fusion system. The system is used in both morning and night mode, for security purpose and also the PIR sensor is used to minimize the power consumption.

Keywords-WPIR Sensory fusion system, PIR Sensor, localization, Data fusion, Navigation.

I. INTRODUCTION

The indoor location information is important for a ventilating, and air conditioning system, robotic service, illumination adjustment, humidity control, and so on. Many researches discuss indoor human and robot localization systems [1]–[12]. Localization is, also called positioning. it is a technique for determining one's position accurately on the surface of earth [4]. Sometimes localization is considered as a part of the navigation problem that provides orientation and routing information in addition to just location.

There are different types of localizations are present radio localization, indoor localization, GSM localization, satellite localization, sound localization. Radio localization and radio navigation is passive and active localization techniques using radio waves. Satellite localization is a positioning and navigation technique aided by satellites. Indoor localization is a positioning technique for indoor environment.GSM localization is a technique for determining the location of a user of a cell phone or wireless transceiver.

Robot localization is figuring out robot's position in an environment. Sound localization a listener's ability to identify the location or origin of a detected sound or the methods in acoustical engineering to simulate the placement of an auditory cue in a virtual 3D space.

These different localization techniques Active Badge that used IR sensors, Active Battery , that utilized ultrasonic sensors, Easy Living that used vision sensors, Motion Star that used a dc magnetic tracker, and RADAR that used a wireless local area network. Now a day's tracking a person's mobility has become a crucial issue these days be it tracking a criminal came on payroll or a detective going to detect a case or any other utility. In this context, mobile and multi-functional robots are generally adopted as means to reduce the environment structuring and the number of devices needed to cover a given area. An indoor tracking model using IEEE 802.15.4 compliant radio frequency and video monitoring system to monitor targets in a special way it is a low-cost implementation without additional hardware required [1].Active Badge [2] used inexpensive IR sensors to transmit positioning signals to a centralized location service through a network of sensors, but IR signals are limited to the available line of sight. Active Bat [2], [4] used ultrasonic sensors to locate the people in a 3-D environment, but this system suffers from multiple targets localization. Easy Living [9] used numerous cameras to identify the location of people, but it was limited with issues of line of sight, privacy, and high installation cost.

Smart Floor [3] used pressure sensors to measure proximity to a known set of points. Yet other positioning methods are the inertial methods [11]. Pyroelectric IR (PIR) sensors to localize and trace the resident [5]. Motion Star [8] used magnetic sensors to locate targets; however, the disadvantages are multiple target

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identifications, environment noise, and expensive cost. RADAR used inexpensive RF localization to identify targets, but this system is imprecise in locating targets. an artificial neural network-based [12] method to combine the received signal strength (RSS) and link quality to establish the relationship between location and targets. However, this method is imprecise when the topology of the sensor or environment changes. Smart Floor [3] used pressure sensors to monitor people however, the implementation cost is expensive and suffers from multiple target localization.The main reason behind the implementation of this project is to propose an indoor localization and monitoring system, which is based on a wireless and PIR (WPIR) sensory fusion system. The location information obtained from the Pyro electric sensor and RF propagation model can be improved with the WPIR system. Also propose a WPIR inference algorithm, which can generate a more reliable positioning estimate of targets.

This system aims to accurately locate a target in order to realize relevant services between robot and human. A WPIR localization system can monitor multiple targets with relative good resolution. The main contributions of the paper is Develop an RF and PIR integrated system, which is useful in locating and monitoring people and robots in an indoor environment. Develop an inference-based algorithm for wireless and Pyroelectric sensory fusion system, where the proposed algorithm can be extended to binary sensor localization system.

Propose a methodology that can register vacate zones to improve the accuracy of localization. The main objective of the project is tracking the multiples of target for human and robot. Also providing an autonomous mobile robot for surveillance of indoor environments. the person detection is used by a PIR sensor, PIR sensors allows to sense motion, which used to detect whether a human has moved in or out of the sensors range. Every object that has a temperature above perfect zero emits thermal energy (heat) in form of radiation.

The PIR sensors are tuned to detect this IR wavelength which only emanates when a human being arrives in their proximity. PIR sensor is basically made up of Pyro electric sensor which can detect levels of radiation. In that autonomous mobile robot PIR sensor, gas sensor, fire sensor are all mounted inside for the security purpose. The PIR sensor will be used in both security and the power consumption. The autonomous mobile robot will be roaming in the indoor environment if any unauthorized person enter it will give intimation to the controller.

II. SYSTEM DETAILS

The design has split into two sections: hardware design and software design. The design consists of a microcontroller that will process data coming from the different type of sensors. The processed data will get transferred to the serial port of the chip which is connected to a RF module. The data of all sensors is serially transferred from the RF module transmitter to the receiver device. The data are transferred between the robo model and the indoor environment. Here two microcontrollers is design one microcontroller is going to control the robotic section and another microcontroller is going to be control the indoor environment.

A.EXISTING SYSTEM

In the conventional system, the indoor localization and monitoring takes place in the Pyro electric IR (PIR) system. It provides less accurate information of human location and is restricted when there are multiple targets. Furthermore, the RF localization system is constrained by its limited accuracy. The alert system at the server side is also not proper and most importantly it requires 24hr monitoring of the video even no human at the vicinity which is a high work load for the human so monitoring is done manually and used numerous cameras to identify the location of people, but it was limited with issues of line of sight, privacy, and high installation cost.

B.PROPOSED SYSTEM

In the proposed system, indoor localization and monitoring system based on a wireless and PIR (WPIR) sensory fusion system .It can manage the multiples of targets and develop a sensor-network based localization method called the WPIR inference algorithm. This algorithm determines the fused position from both the PIR localization system and RF signal localization system, which utilize the received signal. This system will be used in both morning and night mode, in morning mode the system will be act as a power saving mode by using WPIR sensor. If the person enter in to the cabin the electrical appliances like fan, light, air conditioner are automatically gets on and if the person leaves the cabin it will get automatically off.

In today's world we need to save the electricity. The microcontroller counts the number of person enters in to the cabin. The number of persons is displayed in the liquid crystal display. When the number is equal to zero then the light and fan inside room are turned off by using the relay the counter used is bidirectional, this means count will increase when person inside the room and

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count will decrease when any person leaves the room. So whenever the number is greater than or equal to one then the relay is on and the light and fan gets on. It is useful because many times a person come outside the room and forget to turn off the fan or light. It wastes the electricity and power wastage

The PIR sensor is kept in the robotic section, if the person enters in to the cabin the PIR sensor will detect the person and the appliances turn on through the RF transmitter which is in the robotic section. In the mobile robot PIR sensor, fire sensor, [7] and gas sensor are all mounted inside. In night mode and morning mode if the unauthorized person enters in to the indoor environment it will send message to the controller through GSM modem. Here two microcontrollers are using one is used to control the indoor environment and the other is to control the robotic section.

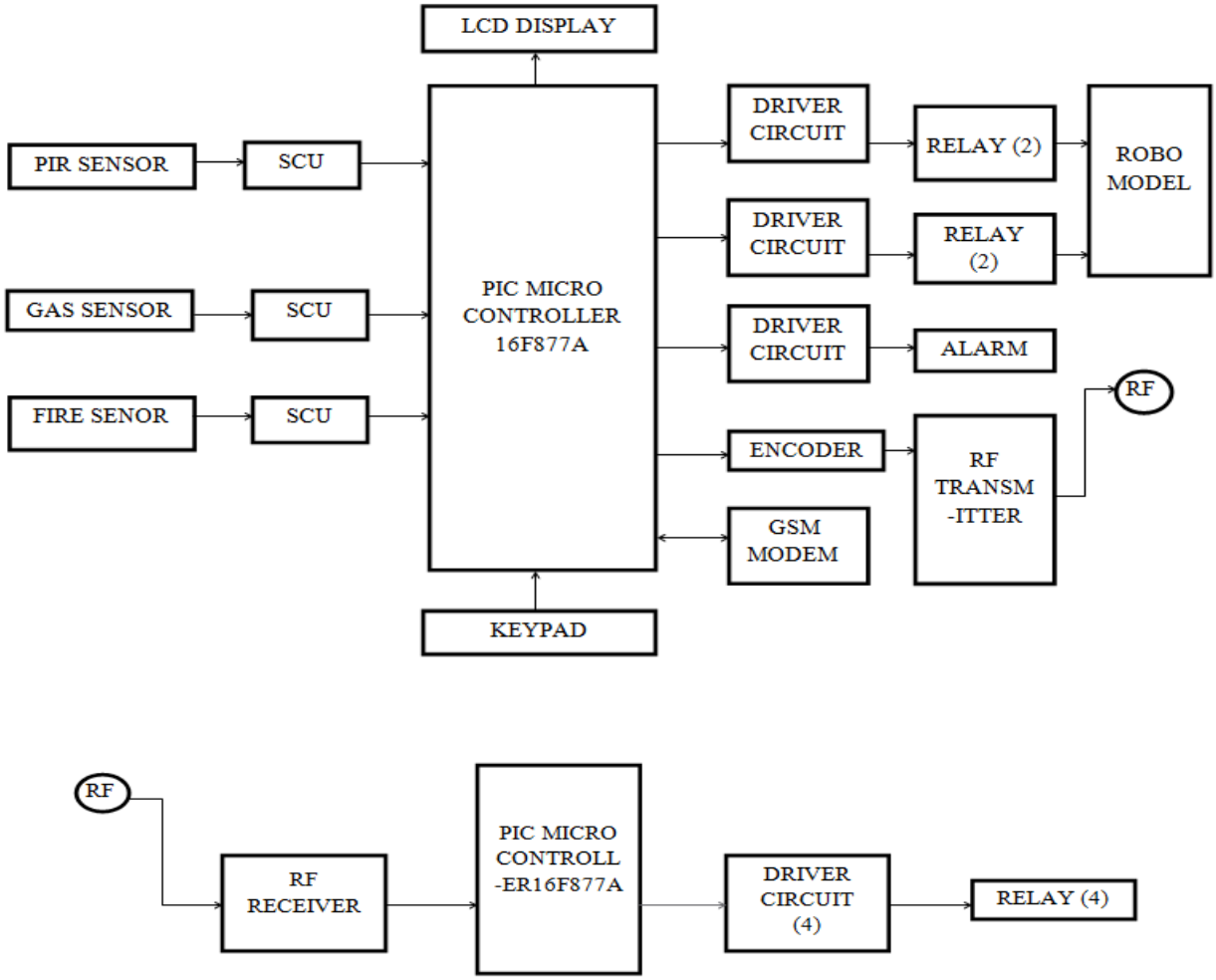

Figure 1: Block diagram of the proposed system

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III. RESULT AND DISCUSSION

The proposed system consists of hardware and software part. The software part consists of the simulation of the hardware implementation. The hardware output will be simulated using the software. The software used here is the ISIS proteus which helps in simulation of the hardware part. The rotation of the motor which helps in the robotic movement is simulated .The microcontroller is the main controller which will controls the movement of the motor. The controller will control the motor rotation in the respective direction such as left, right, forward and reverse direction. In the morning mode the switch will be in ON condition that time the PIR sensors allows to sense motion, which used to detect whether a human has moved in or out of the sensors range. Every object that has a temperature above perfect zero emits thermal energy (heat) in form of radiation.

In both morning and night mode the robot will navigate the indoor environment if any unauthorized people will come the PIR sensor will detect the person and the message will be sent to the controller through the RF transmitter. The PIC microcontroller accepts the command and it will control the whole system. In the simulation first the input voltage is set for PIR sensor, gas sensor, and fire sensor in the LCD display. The PIR sensor, fire sensor, and gas sensor has plus and minus symbol for increasing and decreasing the input value. If any unauthorized person will come the input voltage get exceed and the beep sound will come as well as the message will be sent to the controller. The same procedure for the fire and gas sensor.

Here six relays are used four relay for robot navigation, and two relay for electrical appliances. The robot will navigate the indoor environment and monitoring to the controller. The relay having ON and OFF condition if the first relay gets ON that time the motor will be run in the forward movement. If the second relay gets ON that time the motor will be run in the reverse movement. If the third relay gets ON that time the motor will left and the fourth relay for right movement. The last relay for stop condition.

Each relay has assign one particular port in the microcontroller and also for transmitting and receiving the message some commands are set. At first LCD display displays the normal value of PIR sensor, gas and fire sensor. And also the port is assign for alarm. In TRIS port the input and output values are assign.GIE and INTE pin is used to enable the interrupts. INTEDG is used to enable the interrupt in the edge. At the initial condition relays are set as zero, and then set value for relay. Each movement will be monitored. This system is mainly used for the security and to minimize the power consumption.

IV. CONCLUSION

The main focus point is localization and monitoring the human and robot in the indoor environment. Localization of objects and tracking of moving objects are essential to many location-based services. This system will be used in both night and morning mode. Localization and tracking of people and assets has significant benefits for logistics, security, and safety and it is also used to minimize the power consumption. The integrated WPIR sensor mounted on the ceiling in home, building, office, or factory for locating people and robots or other sensor network applications. And also in the system the robot will transmit message in a wireless fashion reducing the cost of wires, implementation of advanced technology so which is proposed to be a high security alert.

V. FUTURE SCOPE

In Future investigations will attempt to extend the PIR sensor to different binary sensors such as seismic, acoustic, and so on. Various tracking strategies such as fingerprinting, artificial neural networking and the Bayes filtering-based method will be considered.

VI. APPLICATION

In Real world applications of the proposed system include surveillance of wide areas like airports, museums, buildings, and monitoring of safety equipment. PIR based motion detection monitoring system will be used to provide security controlling indoor, master room, financial office, children's room, warehouse, hospital and any other places. And also the system used in such as hospital, depository, and shopping mall.

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REFERENCES

[1] Huan, D., Zhao, M. and Xiao, F. (2012) "Multi-target indoor localization and tracking on video monitoring system in a wireless sensor network", Department of Electronic Engineering, Jiangnan University.

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[2] Yang, Z., Piyush, A. (2012) "Directed by Directionality: Benefiting from the Gain Pattern of Active RFID Badges", IEEE transactions on mobile computing, Vol.11, No.5.

[3] Orr, R., J. and Abowd, G., D. (2000) "the smart floor: A mechanism for natural user identification and tracking", presented at the Conference. Human Factors Computer. System, The Hague, the Netherlands.

[4] John, K. (2004) "Location-Aware Computing Comes of Age", Mike Hazas, Lancaster University James Scott, Intel Research John Krumm, Microsoft Research.

[5] Kim, H., H., Ha, K., N., Lee, S. and Lee, K., C. (2009) "Resident location recognition algorithm using a Bayesian classifier in the PIR sensor-based indoor location-aware system", IEEE Transactions. System, Man, Cybern. C, Application Review. Archive, Vol. 39, No. 2, pp. 240– 245.

[6] Li, C., H., Hong, C., C., Cheng, C., C. and Cheng, C., K. (2011) "A ZigBee based monitoring and protection system for building electrical safety", Saint John's University, 499, Sec. 4.

[7] Lee, K., C. and Lee, H., H. (2004) "Network-based fire-detection system via controller area network for smart home automation", IEEE Transactions. Consumer Electronics. Vol. 50, No. 4, pp. 1093– 1100.

[8] Raab, F., Blood, E., Steiner, O. and Jones, H. (1979) "Magnetic position and Orientation tracking system", IEEE Transactions. Aerospace Electronics. System, Vol. 15, No. 5, pp. 709– 717.

[9] Krumm, J., Harris, S., Myers, B., Brummit, B., Hale, H. and. Shafer, S. (2000) "Multi camera multi-person tracking for easy living", presented at the 3rd IEEE Workshop on Visual Surveillance, Dublin, Ireland.

[10] Gungor, V., C. and Hancke, G., P. (2009) "Industrial wireless sensor networks: Challenges, design principles, and technical approaches", IEEE Transactions. Industrial Electronics, Vol. 56, No. 10, pp. 4258– 4265.

[11] Zhu, M. (2008) "Novel positioning algorithms for RFID-assisted 2D MEMS INS Systems", presented at the Institute Navigation GNSS, Savannah, GA.

[12] Liangyong, W., Tianyou, C., F. and Chunyu, Y. (2012) "Neural Network-Based Contouring Control for Robotic Manipulators in operational Space", IEEE Transactions on control systems technology, Vol. 20, No. 4.