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SYNOPSIS

on

“IOT BASED AUTOMATION OF INDUSTRY 4.0”

Submitted in the partial fulfillment of the requirements for the award of the Degree of

Bachelor of Engineering in Electronics & Communication Engineering

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CHAPTER 1

ABSTRACT

The current industrial revolution is the industry 4.0. One of its main aims is the replacement of old communication that uses wired links with new communication that is wireless communication. This System design a mobile rescue robotic Vehicle system based on Arduino to help the people on time which are trapped in industrial calamities gives timely & accurately reflect dynamic situation of human in disaster region like in the underground regions to control room, so that rescue team of Experts & doctors can be sending to the victim's location for primary treatment and can be sent to the safe place or hospital. The entire process takes place within a few seconds as the system is controlled by a Arduino unit. PIR sensors are passive infrared sensors which detects movement of people with the help of changes in the infrared (heat) levels emitted by surrounding objects.

The human body emits thermal radiation at a wavelength of about 10 microns. It is received and manipulated by the PIR sensor to detect human beings. It operates at 5V DC. The motion of the human being can be detected by checking for a sudden change in the surrounding IR patterns. Obstacle sensor detects the obstacle and sends the analog signals to the Arduino. Arduino is programmed to guide the robot automatically depending on the obstacle detected and to send the human being information to remote control place through the Bluetooth Technology. The Data is received in the Base Station (Control Center). Analyzing the data, the Rescue team can take necessary steps to rescue the trapped human Beings.

This system is very useful for small scale industry for to achieve maximum throughput and to avoid from accidents by SMS alerts and email, it is a simple, smart monitoring and security system and also tells the importance of IoT in industrial applications. Proposed method very well suitable for small scale industries monitoring and controlling.

CHAPTER 2

LITERATURE SURVEY

TOPIC OF PAPER REFERRED/ Journal	Design & Implementation Of IoT Based Industrial Automation System IEEE 2020
Problems which paper has addressed	Previously used technology which has some disadvantages like communication range, system which is network dependent.
Problem solution that we can find out from this	To implement IoT based industrial automation using Raspberry pi which provides self-analyzed data.
Algorithm used/ programming language used/device used	<ul style="list-style-type: none"> • Cayenne software • HTML, CSS, JavaScript, chart js library and jQuery JavaScript library for web server • Linux OS • INA219 power module • Raspberry pi • Laser light and LDR to count product
Positive's	<ul style="list-style-type: none"> • User friendly. Anyone can manage their system with device. • Continuous monitor and web-based data can overcome upcoming industrial accident. • Anyone can live monitor the system from web server.
Negative's	<ul style="list-style-type: none"> • Image or video processed through camera is approximate 3 second late. • Cayenne software used for controlling purpose which has a very small internet connectivity problem. • Cooling fan used was operated by manual process. Didn't keep auto turn on feature.

TOPIC OF PAPER REFERRED/ Journal	IoT Based Smart Multi Application Surveillance Robot IEEE 2020
Problems which paper has addressed	Issues of power supply and related to short-range communication to control the movement of the robot
Problem solution that we can find out from this	Using IoT technology for robot movement can be controlled on an android phone.
Algorithm used/ programming language used/device used	<ul style="list-style-type: none">• Cayenne software• Arduino UNO• IoT server• ESP8266 (NodeMCU)• IP camera (V380)• GSM, GPS• Laser gun
Positive's	<ul style="list-style-type: none">• Surveillance field is replacing the humans, thus reducing the risk of life.• Robot can be used in automatr mode.• It consumes low internet data and the camera can be rotated with an angle of 360 degrees.• Solar panels are used for power supply.
Negative's	<ul style="list-style-type: none">• Size and weight of the robot• Inability of the robot to move in the rain.

TOPIC OF PAPER REFERRED/ Journal	Industrial and Home Automation, Control, Safety and Security System using Bolt IoT Platform IEEE 2020
Problems which paper has addressed	Monitoring of critical parameters such as fire, temperature, gas leakage etc.
Problem solution that we can find out from this	Designing of control and security system for industry and home using Bolt Iot Platform
Algorithm used/ programming language used/device used	<ul style="list-style-type: none">• Machine Learning Algorithm• Bolt IoT Platform• ESP-8266 Wi-Fi• LM 35 temperature sensor
Positive's	<ul style="list-style-type: none">• Cost-effective• Interface is accessible on the internet and so the device can be controlled from anywhere in the world.• Temperature values are stored on the Bolt cloud which can be used for future prediction.• Bolt IoT reduces code and has faster time for deployment.
Negative's	IR rays which are visible to human eyes but can be seen through cameras in mobile phones and any other such devices. An alternative to this IR LEDs must be used.

TOPIC OF PAPER REFERRED/ Journal	IoT Based Intelligent Industry Monitoring System IEEE 2019
Problems which paper has addressed	Excessive pollution of environment when the entire world is moving towards modernization and automation.
Problem solution that we can find out from this	Development of pollution monitoring system with deployment of intelligent sensors.
Algorithm used/ programming language used/device used	<ul style="list-style-type: none">• Raspberry Pi• DHT-11• Google Cloud
Positive's	The system provides reliable, accurate analysis to prevent any case of accidents. This system makes use of Raspberry Pi providing cheap solutions for safety.

CHAPTER 3

SYSTEM REQUIREMENTS

3.1 Hardware Requirements

- Arduino Uno
- SG90 Micro-servo Motor
- PIR sensor
- Ultrasonic Sensor
- Motor Driver IC
- DC Motor
- Power Supply

3.2 Software Requirements

- Tool Arduino IDE
- Programming languages used Embedded
- C/C++
- Python

CHAPTER 4

OBJECTIVE OF PROPOSED PROJECT AND PROBLEM STATEMENT

Problem Statement

To monitor the health of the workers in the industry and to prevent the accidents that may occur in the industry.

Objectives

- **Interconnectivity:**
 - IoT can be connected to anything from anywhere in the world for intelligent decision to be taken in industry or other application.
- **Heterogeneity:**
 - Different device and sensors are connected to the IoT and they form heterogeneous group. They can communicate with other devices and groups to form an intelligent decision.
- **Scalability:**
 - The number of devices connected is large when compared to the traditional internet. The amount of data generated is enormous.
 - This data is utilized to improve the functionality of the industries and hence scalability is not a problem with IoT.
- **Dynamic:**
 - The number of sensors and devices connected changes dynamically.
 - Some sensors and devices go to sleep and wake up after sometime according to requirements.
- **Connectivity:**
 - Network connectivity becomes accessible due to connectivity.
 - Due to this the network becomes assessable and compatible to produce and consume the data.
- **Safety:**
 - Along with benefits comes the safety issue. When IoT system is designed, we must consider the safety of the application.
 - Safety includes the safety of the human-beings and safety of the industrial data.
 - Securing the data and network will secure the entire system.

CHAPTER 5

RESEARCH GAP

- Based on our previous survey's the software which they used that is cayenne software which had a very small internet connectivity problem which had been used for controlling purpose.
- Also, size and weight of the robot has increased in past few years.
- Inability of the robot to move in the rain.
- IR rays which are visible to human eyes but can be seen through cameras in mobile phones and any other such devices.
- In order to overcome the above limitations they used IR LED's as an alternative.
- In order to overcome the existing problems we are using PIR's sensors.
- This system makes use of Arduino UNO providing cheap solutions for safety.
- The communication by the robot does not ranges for the long distance by the module.

CHAPTER - 6

METHODOLOGY OF IMPLEMENTATION OF PROJECT WORK

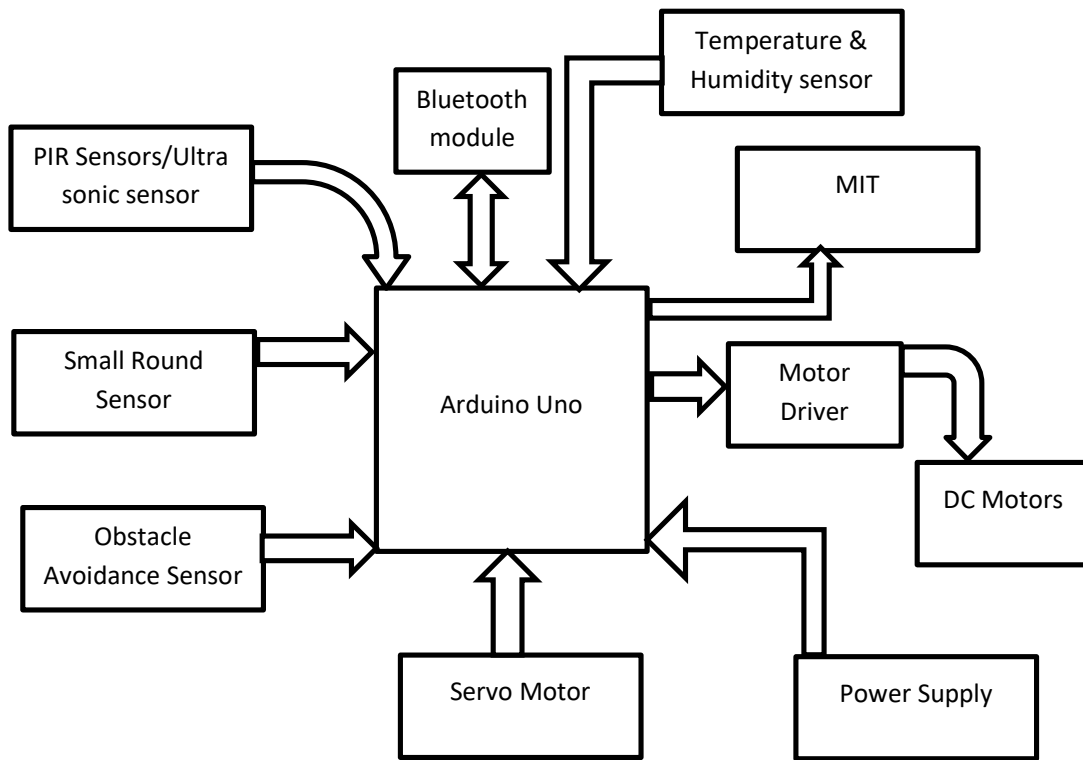


Fig 1: BLOCK DIAGRAM OF INDUSTRY AUTOMATION FOR SAFETY AND MONITORING USING ARDUINO

The robot uses the Ultrasonic distance sensor to measure the distance in front of it. When this distance reduces to a particular level, the robot interprets it to mean the presence of an obstacle in its path. When the robot detects an obstacle in its path, it stops, goes backward for a few cm, looks around (right and left) then turn towards the direction that shows more free space in front of it.

The Robot has two sides, receiver side and the transmitter side. The transmitter side consists of ATMEGA328 microcontroller (Arduino Uno); the inputs to the microcontroller are PIR sensor, and an Obstacle sensor. The outputs are RF transmitter and L293D motor drive module, to which a DC motor is connected. A DC motor is used to move the robot in left, right and forward and backward directions. L293D motor drive module controls the DC motor to move in the direction. The direction of the movement is decided from the signals given by the obstacle sensors.

Obstacle sensor uses infrared signal to find if there are any obstacles present in front of it, its range is up to 5 cm. The obstacle sensors are placed in front, right and in left directions. If any sensors sense any obstacle it changes to the direction

where there is no obstacle. This makes the robot move automatically without external source controlling it. Human can be detected using a PIR sensor. A PIR sensor is a sensor that produces passive infrared signals, these signals can detect heat. Human being produces heat which is detected using this sensor.

Human being produces 9 to 10 microns of heat. A PIR sensor's angle of detection is restricted to 180° i.e. except the area below the robot it can sense in all the other directions. The distance up to which PIR sensor can detect is restricted within 12 ft. As the sensor's range is less, the sensor is mounted to a robot that can move automatically. If the sensor detects the human, it sends the signal to the transmitter to produce Radio Frequency signals.

The Receiver Side consists of ATMEGA328 microcontroller (Arduino Uno). Its input and output are Radio frequency receiver and a buzzer respectively. Once the signal from the transmitter is received by the RF receiver it notifies the Arduino. Arduino in turn sends a signal to the buzzer, which triggers the buzzer to produce continuous beeps. This continuous beep indicates that there is a presence of a human to the user. The diagram below shows the connectivity for the receiver side.

The RFID is mainly used for the purpose of person identification in case the person identification card is made up of RFID. If the person identification card is read through the RFID receiver then that will search the person details and send to the authorities.

REFERENCES

- [1] 15th international conference on computer engineering and systems(icc)es) “iot based ai and its implementations in industry” [978-07381-0559-8/20/\\$31.00@2020ieee](#) | doi:10.1109/icc51560.2020.9334627 ,2020
- [2] javier de las morenas carolina miller da silva. gustavo silva funchal,victoria melo,macro vallim,paulo leitaó “security experiences in iot based applications for building and factory automation” [978-1-7281-5754-2/20/\\$31.00@2020](#) ieee, 2020.
- [3]Tayeb bin lokman, mohammed touhidul islam mouslah uddin apple ,international islamic university chittagong, “design and implementation of iot based industrial automation system” ieee-49239 july 2020.
- [4] kavitha b.c ,vallikannu.r, hindustan institute of technology and science,chennai ,india “iot based science,chennai ,india “iot based intelligent industry monitoring systems” [978-1-7281-1380-7/19/\\$31.00@2019](#) ieee.
- [5] sahil garg,member,ieee,kuljeet kaur,member,ieee,georges kaddoum,member,ieee,kim-kwang raymond choo, senior member,ieee “towards secure and provable authentication for internet of things” 2327-4662©2019 ieee.
- [6] Shaikh Rehan ,Risha Singh Institute of Technology, Nirma University Ahmedabad India "Industrial and home automation,control and safety and security system using bolt iot platform. IEEE 2020.
- [7] Nirma University Ahmedabad ,India "Industrial and home automation,control and safety and security system using bolt iot platform. IEEE 2020.
- [8] Aishwarya K Telkar,Baswaraj Gadgay Technological university centre for PG studies kalburgi India,"IoT based smart multi application surveillance Robot,IEEE 2020.
- [9] BhosaleKiran Uttam,Galande Abhijeet Baspusaheb,Jadhav Pappu Shivaji, ““Industrial automation using IOT”, International Research Journal of Engineering and Technology, vol.4, issue6, June2017

- [10] Divyesh Zanzmeriya, Ankita Panara, Implementation of industrial automation using RaspberryPi by iot with FIREBASE”, International Research journal of Engineering and technology,
- [11] A. Swapna and K. Archana.(2017). "A new approach for detecting living human beings in devastating environments using a low cost autonomous robot" in International research journal of engineering and technology, vol. 4, no. 4 (pp. 3078-3081)
- [12] M. S. Nagakanya Lakshmi , S. Sridhar, M. Navya, G. V. V. Saikiran, B. Swathi and D. Mohan Krishna.(2017). "Human detection and tracking via radar module robot" in International journal of innovative research in computer and communication engineering
- [13] T C Muralidhara, C. Kanagasabapthi, Siva S Yellampalli.(2017)."Unmanned vehicle to detect alive human during calamity" in Electrical Electronics Communication Computer and Optimization Techniques (ICEECCOT) 2017 International Conference (pp. 84-88) J. Grönman, J. Viljanen, J. Vihervaara, M. Saari.(2020).