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INDOOR ROBOT LOCALIZATION SYSTEM USING WIFI SIGNAL

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Abstract: Oil and gas refineries can be a dangerous environment for numerous reasons, including heat, toxic gasses, and unexpected catastrophic failures. In order to augment how human operators interact with this environment, a mobile robotic platform is developed. This paper focuses on the use of WiFi for communicating with and localizing the robot. More specifically, algorithms are developed and tested to minimize the total number of WiFi access points (APs) and their locations in any given environment while taking into consideration the throughput requirements and the need to ensure every location in the region can reach at least APs. When multiple WiFi APs are close together, there is a potential for interference.

A graph-coloring heuristic is used to determine AP channel allocation. In this project, the robot is controlled autonomously and will be monitoring the industry as in the application. The robot is designed with the high end controller and featured with the Gas Sensor, if this sensor is activated by means any leakage in the industry , will detect and gives a alert buzzer sound. The LCD is also interfaced to the controller such that the data is displayed on it for the visual enhancement.

***Index Terms*:** MQ2 Gas Sensor, DTH11, Smoke Sensor, Arduino, Buzzer, LCD, WiFi Module.

I.INTRODUCTION

Removing humans from inhospitable environments is often desirable. For instance, in the oil and gas industry, during inspection, maintenance, or repair of facilities in a refinery, people may be exposed to severely high temperatures (+50C) for an extended period of time, to toxic gasses including methane and H2S, and to unexpected catastrophic failures. One way to remove human exposure from these types of situations is to instrument an oil refinery with a wireless sensor network , which attaches a wireless sensor on every gauge and valve. Hence, maintenance of the network and reliably collecting

We, therefore, resort to a different approach that aims to augment how the human operators interface with the physical world. A mobile robotic platform is a rational analog to a physical human - it can move through an environment either autonomously or through tele-operation while sensing its surroundings with an array of sensors. However, further constraints are applied when introducing physical systems into an oil and gas environment.

All devices deployed must meet the

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specified standards set by the industry. A detailed explanation of these standards applied to a mobile robot are stated below. In our interdisciplinary project that aims to automate oil and gas processes using a mobile robot, a mobile robot capable of both tele-operation and autonomous control.

I. RELATED WORK

There are different techniques used in indoor localization and some of them have been referenced in this section. In addition, several solutions are provided based on wireless technologies, such as Bluetooth, ZigBee, signals of cellular towers, and RFID. The related works can be categorized into two subsections. Indoor localization can be defined as any system that provides the exact location of objects (a personal item) in a closed structure, such as supermarkets, hospitals, universities, airports and subways. Indoor location system has become very popular in recent years. Therefore, many systems and technologies have been proposed to get the user and device localization based into Object. The object can be a mobile phone, keys with attached microcontrollers a keychain, a wallet with embedded microcontroller or microcontroller in a child pocket, among others. One of the existing solutions for indoor localization was provided in to discuss various indoor localization systems that are proposed in the literature and show challenges, such as accuracy of the localization systems. While the authors introduced an extensive study of many indoor localization techniques, such as the Angle of Arrival (AoA), Flight Time (ToF), Return Time of Flight (RTOF), the Received Signal Strength (RSS), Ultra-wide band (UWB), Radio Frequency Identification of Device (RFID), Bluetooth and Systems. The study looks at the localization and positioning of people users and their devices. For wireless indoor location, various wireless technologies are used. One of the existing research work based on Wi-Fi was indoor triangulation system. This system uses its own Wi-Fi nodes to measure the location of several Wi-Fi devices within the indoor area. The solution provided is required for its own Wi-Fi node infrastructure. Localization accuracy was defined by its location and its concentration. The next notable example of Wi-Fi localization systems is based on several radio beacons. These beacons may be access points for wireless LANs, fixed Bluetooth stations and GSM towers. They used all protocols, which resulted in the unique or semi-unique identification number for beacons. By using this identifier, the lab system detects the indoor position of the user. The applications of indoor localization have improved the sensing ability to detect the current state of mobile devices. The application was introduced for smartphones and it includes offline and online levels of fingerprinting. The authors have created an application that describes the Wi-Fi trilateration method for internal positioning using Android based mobile devices. This was done by receiving a signal strength measurement group that improves localization accuracy. Finally, in the authors presented the latest developed systems or solutions and their algorithms for wireless localization on indoor application. In this survey, the author presented existing wireless solutions for indoor positioning and sought to classify different methods and systems.

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III.PROPOSED METHODOLOGY

The proposed framework is produced utilizing Arduino. Arduino may be a digital computer which might created and adjusted completely different ways it permits us to run different projects and moreover bolster distinctive peripherals that are two ways in which it permits us to run different projects and moreover bolster numerous peripherals which are to be utilized in our framework Sensors are introduced on the point to detect the temperature, humidity and gas. Once the levels cross their level it will send an alarm. This data is seen on the mobile and laptops by connecting the WiFi.

IV. SYSTEM DESIGN FOR INDOOR ROBOT LOCALIZATION USING WiFi SIGNAL

The fig1 gives the brief description about the prototype. And also explain about the smart techniques that are used here.

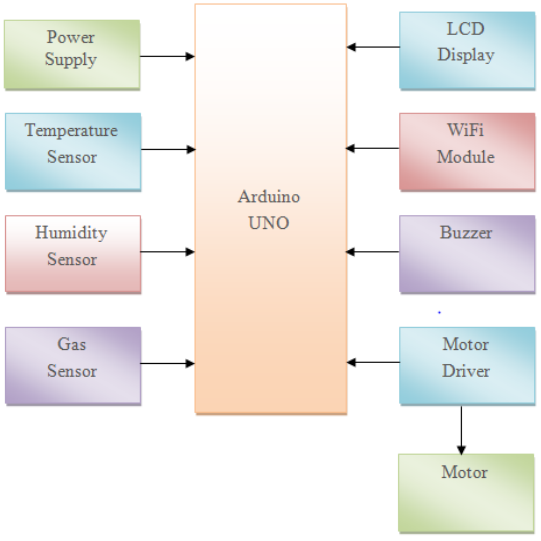

Fig 1 block diagram

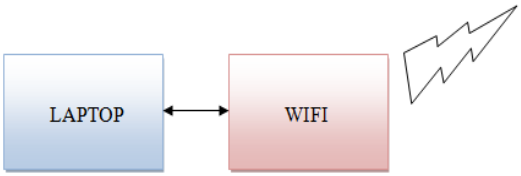

Fig 2 Monitoring section

V.OPERATIONS OF MODULES

1.ARDUINO UNO:

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website.

Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases.

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The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The Uno also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

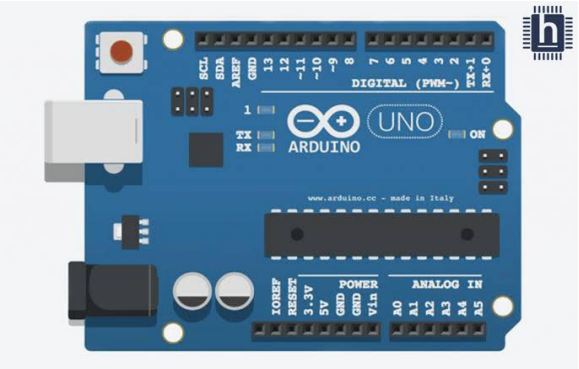

Fig 3 Arduino

2. SENSORS:

- DHT11 is a single wire digital humidity and temperature sensor, which provides humidity and temperature values serially with one-wire protocol. DHT11 sensor provides relative humidity value in percentage (20 to 90% RH) and temperature values in degree Celsius (0 to 50 °C).
- DHT11 sensor uses resistive humidity measurement component, and NTC temperature measurement component.

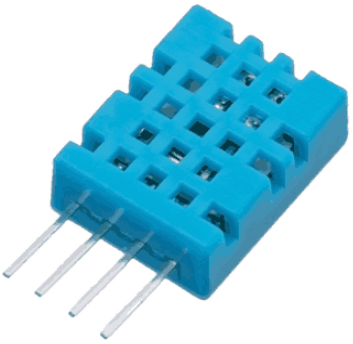

Fig 4 humidity sensor

Table 1 Communication with Microcontroller

Pin No.	Pin Name	Pin Description
1	VCC	Power supply 3.3 to 5.5 Volt DC
2	DATA	Digital output pin
3	NC	Not in use
4	GND	Ground

3.GAS SENSOR:

This is a simple-to-use liquefied petroleum gas (LPG) sensor, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. The MQ-6 can detect gas concentrations anywhere from 200 to 10000ppm.

Fig 5 MQ2 Sensor

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This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to ADC. This sensor comes in a package similar to our MQ-3 alcohol sensor, and can be used with the breakout board below.

Table2 Different Types Of Sensors

S.NO	Sensor	DETECTION OF GAS
1	MQ2	Methane, Butane, Propane, LPG, Smoke
2	MQ3	Alcohol, Grain Alcohol, Smoke
3	MQ4	Methane, Fuel and Alkane Series
4	MQ5	H2,LPG,CH4,CO ,Alcohol
5	MQ6	ISO-butane, Fuel and LNG
6	MQ7	Carbon monoxide
7	MQ8	Hydrogen
8	MQ9	LPG, CO,CH4.

Features of MQ5 Sensor:

1. Small affect ability to liquor, smoke.
2. Fast Reaction
3. Stable and long life
4. Simple drive circuit.

A buzzer or beeper is an audio signalling device. which may be mechanical, electromechanical, or piezoelectric (piezo for short).

Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.Buzzers can be categorized as active buzzers and passive ones (See the following picture).

Fig 6 buzzer

Passive:

A latent signal transmits a tone when a voltage is connected crosswise over it. It additionally requires a particular flag to produce an assortment of tones. The passive buzzer is significantly less difficult to utilize, so these are secured here.

Active:

A functioning ringer can be associated simply like an LED. However, as they are somewhat more vigorous, you won't require a resistor to secure them.

LCD:

In recent years the LCD is finding widespread use replacing LED s (seven-segment LED s or other multi-segment LED s).This is due to the following reasons:

1. The declining prices of LCDs.
2. The ability to display numbers, characters and graphics. This is in contrast to LED which is limited to numbers and a few characters.
3. Incorporation of a refreshing controller into the LCD, there by relieving the CPU of the task of refreshing the LCD.

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In the case of LED s, they must be refreshed by the CPU to keep on displaying the data.

4. Ease of programming for characters and graphics.

VI.SYSTEM DESIGN SOFTWARE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

1. ARDUINO IDE:

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

2. FLOW CHART:

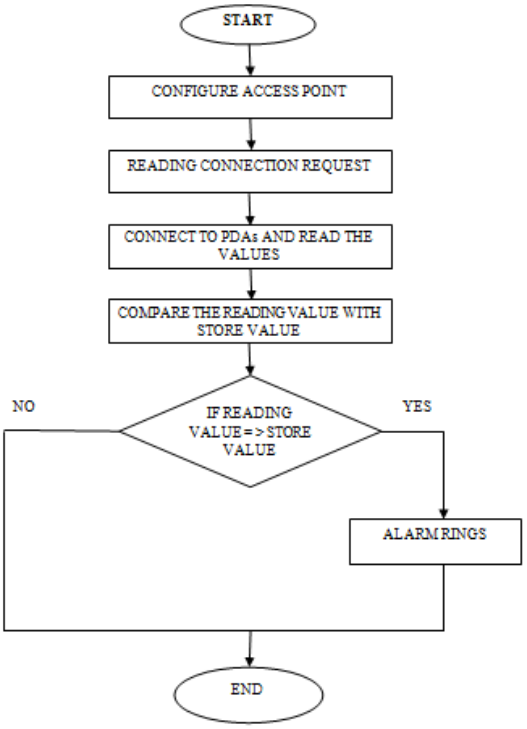

Fig 7 Flowchart

ADVANTAGES:

- Continuous monitoring
- Works in hazard environment
- Sense the environment
- Increased safety
- Easy to maintain
- Cost effective

APPLICATIONS:

- Monitoring the industries
- Perfect checking of pipe refineries
- Leakage detections
- Oil refining industries Underground coal mines.

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VII. RESULT

The output result is shown in the below figure

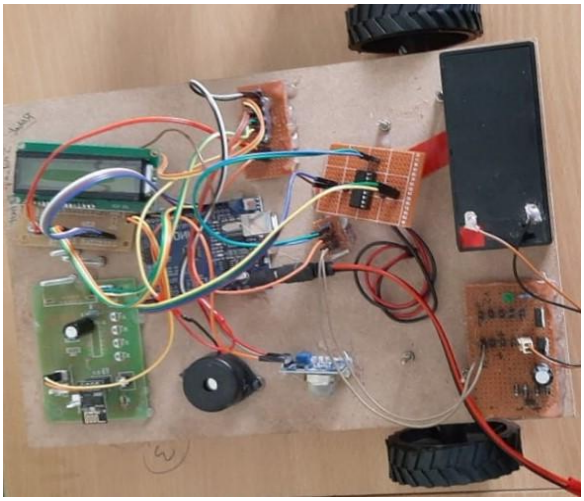

Fig 8 Indoor Robot Localization Using WiFi signal

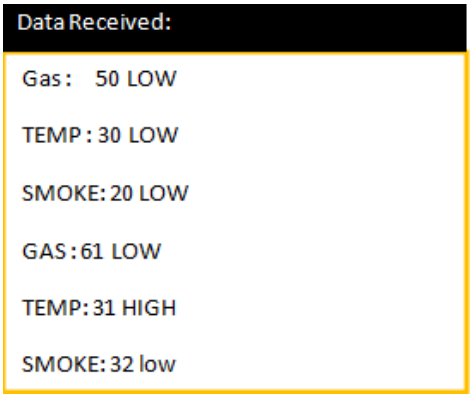

Fig 9 Output

VIII.CONCLUSION

In this the Wi-Fi signal strength-based object detection and tracking system in the indoor environment was proposed. The proposed system used the WiFi signal strength read from the distributed access points to evaluate the position of the required object. The location is assigned using the MAC address of the smartphone of each user involved. The strength of reading WiFi signals from an access point referred to the location of such a device. The smartphone device is connected to the nearest access point based on the WiFi signal strength, and it disconnected from the far points. The obtained results showed the accurate performance of the proposed system in terms of allocating objects.

IX.FUTURE SCOPE

In Future Indoor Robot Localization using WiFi signal can improve the performance of positioning system by using algorithms. The accuracy of the position system may be still improved by the appropriate deployment and proper number of fixed wireless receivers. The experimental model could be developed to vary the accuracy of different positioning system. This work can be extended to the development of Disaster Recovery Systems to save the lives of people during earthquakes, train accidents and tsunamis. It could also be used to protect the humans when they are under water.

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BIBILOGRAPHY

- Raymond J. Smith (2003). "Wi- Fi Home Networking". New York, NY. McGraw-Hill
- Houda Laboid, Hossam Afifi, Costantino De Santis (2007). "Wi-Fi TM, Bluetooth TM, ZigBee TM and WiMax TM".
- Pavan.C, Dr. B. Sivakumar "Wi-Fi ROBOT FOR VIDEO MONITORING & SURVEILLANCE SYSTEM" International Journal of Scientific & Engineering Research Volume 3, Issue 8, August-2012.
- M. A. Mazidi. "PIC Microcontroller and embedded systems". ISBN 978-81-317-1675-5 Second edition 2009.
- Pavan. C, Dr. B. Sivakumar: Wi-Fi ROBOT FOR VIDEO MONITORING & SURVEILLANCE SYSTEM International Journal of Scientific & Engineering Research Volume 3, Issue 8, August-2012 1 ISSN 2229-5518
- National conference on Machine Intelligence Research and Advancement (NCMIRA, 12)