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Paper Authors

*** M.MOUNIKA, S.ARUNA, I.RAJASEKHAR.**

* Dept of ECE, Shri Shiridi Sai Institute of Science & Engineering.

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WIRELESS BASED INTELLI INDUSTRIAL SECURITY ROBOT

M.MOUNIKA[1], S.ARUNA[2], I.RAJASEKHAR[3]

[1]PG Scholar, Dept of ECE, Shri Shiridi Sai Institute of Science & Engineering, AP, India

[2]Assistant Professor, Dept of ECE, Shri Shiridi Sai Institute of Science & Engineering, AP, India

[3]Professor & HOD, Dept of ECE, Shri Shiridi Sai Institute of Science & Engineering, AP, India

ABSTRACT: In the current context of increased surveillance and security, more sophisticatedly advanced and technologically innovative surveillance systems are needed. This proposed system presents the development of a prototype of robot for gas leak detection and localization in large industrial facilities. The thought came up with a system that's able to perform scrutiny tasks in industrial facilities while not having to access unsafe areas directly - and while not requiring any human presence. The robot may be used for routine inspections of facilities or for targeted inspections of specific system components. The freelance quality of the system was enforced with varied navigation sensors and therefore the choice of manual intervention via device at any time. The development of innovative monitoring processes that make the most of state-of-the-art measuring and automation technology as well as robotics promises improvement in the reliability, efficiency and cost-effectiveness of inspections. At identical time, it relieves technical personnel of monotonous, long and effortful tasks. The proposed system will provide the sms alerts with location information when the sensor values crosses threshold levels. The proposed system also equipped with web cam for capturing scene and send email to authorized person.

INTRODUCTION

Embedded systems are finding increasing application not only in domestic application but also in areas of industrial automation, automobiles, power electronic, and defense and space equipments. 8051 are the modern building blocks for many embedded systems. The available 8-bit versions manufactured by Intel, Motorola, Philips, Atmel, etc., They are available in the market with various configurations for different applications. A robot is an apparently human automation, intelligent and obedient but impersonal machine. Basically, a robot is a machine designed to do a human job that is tedious, slow or hazardous. It is only relatively recently that robots have started to employ a degree of Artificial Intelligence (AI) in their work - many robots required human operators, or precise guidance throughout their missions. Slowly, robots are becoming more and more autonomous. This project is to design and develop an intelligence robot by using an 8 bit microcontroller. In our project the robot is designed to move automatically. The robot acts according to the command given by the program. It will move all the direction like forward, reverse, right and left. The video and audio are monitored at the control unit. For transmitting audio and video, RF camera has been used. In this prototype project we design in such a way that this robot can be moved anywhere. This project is very much useful in the places where a human cannot go in to the

places like ground canals, Smoke oriented caves, etc., and this project is very much useful in such situations. Wireless Sensor Network (WSN) technology together with mobile robots can be used to detect several variables in the environment [6]. Each mobile robot can be considered as individual node in the network which can monitor its local region and communicate through a wireless channel with other nodes to collaboratively produce a high-level representation of the environment's states. By using such a network, large areas can be monitored to detect intruders with low cost. Demonstrated a remote supervisory control architecture which combines computer network and an autonomous mobile robot is constructed. A general purpose computer with internet access is required to command the mobile robot in a remote location through Internet. Proposed an autonomous mobile robot system. Equipped with appropriate sensors and operation devices to substitute hard and unhealthy human work inside green houses. Axaccia et al.[5] proposed a service robot for health monitoring and localized chemical, drugs and fertilizers dispensing to plants in greenhouses.

LITERATURE SURVEY

Natural gas is an important source of energy in the world. If we look the composition of natural gas, it consists of about *94% methane* which gives high energy on combustion. Being the cheap source of energy, the industrial and power sectors of the world majorly depends on natural gas usage. Number of textiles, fertilizer and processing industries are running on Natural Gas. Most of the Independent Power Plants (IPP"s) are working on Natural gas and significance of *Compressed Natural Gas (CNG)* in transport clearly implies that Natural Gases is a great blessing for third world countries in accomplishing their energy needs.

However it is a matter of fact that natural gas is highly flammable, odorless and colorless gas and can lead to great disaster even if its concentration in atmosphere is only *300ppm*. With naked eyes and conventional instruments its leakage is undetectable. In industries and power plants there are number of positions and locations where leakage is expected [4], [5], and history evident the number of such disasters occurred due to improper control and monitoring of such leakages.

This project for the industrial application of such a type of robotic system that is new, economical & environmentally sustainable, that has never been made or implemented in the industries. There are number of static nonmoving sensors and devices present in the industries that are having capability of leakage of any dangerous gases but there are no such mobile patrolling detection system, that is made capable for patrolling around the field and electronically detecting the flammable gases with the help of *stannic oxide(SnO2)*sensor the concentration of leaking gasses that are prone to explosion and environmental deterioration particularly methane gas, it also includes wireless 2 axis tracking camera for the detection of the point of leakage or excessive concentration obtained and ultrasonic range sensors are used for the obstacle detection in case of any.

The gas sensor, camera, robot motors, and xbee transmission modules are all [9], preprogrammed using a popular microcontroller arduino that is programmed using external computers with arduino

programming. This microcontroller works on 5V PWM signals with 3906Hz frequency.

This robot uses two 12V DC motors connect on each wheel, the construction of the robot is such that it steers on its body center with 360 degrees rotation on its central axis that are programmed, the gas sensor as shown in (Fig.8) gives analog real time output [10], that is wirelessly transmitted by using transmitter *xbee* 60mW [11],module having the range of around 1.5km to the receiver xbee module that is connected on the arduino microcontroller input pins that will process the input signals that are of gas sensors and will give the output of it in *PPMs* that can be processed further with *MatLab* or *Lab VIEW* algorithm to obtain graphical results as shown in (Fig.10) and practical results are shown in (Fig.12,13,14 & 15) also the other way of process is by using seven segment LED to be mounted on the robot or can be used on the receiver station and arduino program is to be used to process the signals and the concentration found in PPM is shown in the numerical form on seven segment LED *1=100PPM* as shown in (Fig.9) result is shown in (Fig.15), 5V piezo Buzzer and Seven segments single digit LED that shows the concentration of leaking gas in proportion. The Displayed number shows the proportion of concentration of flammable gas in air which is programmed through Arduino.

The wireless camera is mounted on the two 180o *servo motors* that are also programmed to move the camera in 2 axis (vertical and horizontal) to have the view of terrain, signals are transmitted to the receiver of the camera and USB video device is used to have the wireless transmission of camera on screen. Ultrasonic

PROPOSED SYSYTEM

Video based robot functions mainly include:

1) Gas Detection. It can detect the Gas on both sides of fixed route, but also detect the Gas automatically in the area without fixed route. When a gas is detected the stop.

2) Temperature Detection.

It can detect the temperature on both sides of fixed route, but also detect the temperature automatically in the area without fixed route. When a temperature is detected the stop.

3) Obstacle Avoidance.

The Ultrasonic sensors are used for obstacle avoidance and distance detection.

It can send gas information wirelessly to remote terminal in real time. Remote terminal's functions mainly include: 1) Receiving the gas data sent from robot in real time 2) Displaying gas information, and saving record in real time.

The block diagram shows the working mechanism of the robot. In the first step sensors processing the data and gives the digital output.

In the second step the micro controller receives the data from the corresponding sensors and monitors the value of each sensor. If there is any unusual change occurs such as variation in gas sensor value, sudden increase in temperature value from the temperature sensor, and life detection sensor, it will inform to the base station

In a similar fashion the mining people can give direction to the robot to do some specific task by proper task selection key pressing. The navigation can be controlled by giving the instructions

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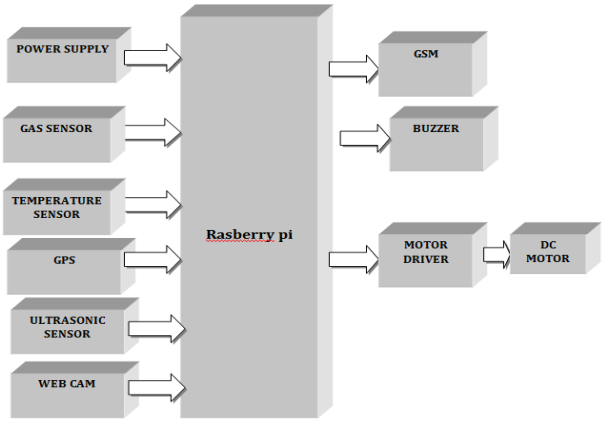
BLOCK DIAGRAM:



BLOCK DIAGRAM DESCRIPTION AND WORKING:

Raspberry Pi processor:

In the Proposed ALPR system we used the Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage.

Fig.2 Raspberry pi processor

b. USB camera

A webcam or USB camera is a video camera that feeds its image in real time to a computer or computer network. Unlike an IP camera which uses a direct connection using ethernet or Wi-Fi, a USB camera is generally connected by a USB cable, FireWire cable, or similar cable. The common use as a video camera for the World Wide Web gave the webcam its name. Other popular uses include security surveillance, computer vision, video broadcasting, and for recording social videos. Webcams are known for their low manufacturing cost and flexibility, making them the lowest cost form of video telephony. They have also become a source of security and privacy issues, as some built-in webcams can be remotely activated via spyware.

Fig4. USB camera

c. DC motor:

This motor is used to produce the electrical energy to mechanical energy, and very typically through the interaction of magnetic field and current carrying conductors. The reverse process can produce electrical energy to mechanical energy accomplished by an alternator. Basically the DC motors have two features one is rotating part that is called armature and the stationary part that includes coils of wire called the field coils.

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Fig.5. DC motor

d.GSM

in the proposed system the GSM modem is used to send the alerts related to gas detection to the authorized persons.

RESULT:

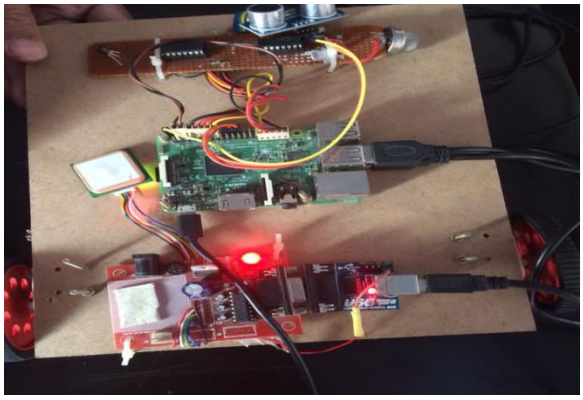

Fig 6 Kit Result

CONCLUSSION AND FUTURE SCOPE

The prototype of the robot was made as shown in (Fig.4) and it was made to work in several contaminated environment and the real-time results were obtained wirelessly up till the range. This intelligent sensing & surveillance robot can be implemented in several industries especially chemical and oil/gas industries giving the real-time values of the concentration of flammable gases to the ground station which can help in disaster prevention while increasing the level of monitoring and safety measures of the industry. Scope for further modifications and changes for extensive applications is present. It can also be advanced by developing software so as to bring at par with this computer age.

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