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Wifi Based Smart Car For Toxic Gas Monitoring

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Abstract: *Providing complete monitoring on the presence of various toxic gases in large scale petrochemical plants is critical, since the leakage of these can cause serious effects on the production activities and safety of first line workers. Safe production environment can enhance the productivity and keep high profits of enterprises. In this project, we present a newly developed mobile car with WIFI based wireless communication to smartly monitor and track the presence of various toxic gases. With the current system, which consist of stationary gas leakage detecting modules fitted at different parts of the industry, can only monitor leakage of gas at a particular region only. It also creates an issue that to extend the range of monitoring of gas leakage number of such modules needs to be more and hence the cost is more. These limitations can be overcome if the gas leakage detecting module is mobile in nature. The instinct of mobility allows observing unpredictable events, e.g., toxic gas leakage, which cannot be detected by static sensor nodes in finite areas. Incorporation of mobile and static mechanisms provides more large spatial coverage. To solve these issues of limited area of coverage, we propose a basically intelligent real time mechanism. For real time toxic gas monitoring in industrial environment, we can use mobile gas sensing nodes along with static sensor nodes. Those mobile sensing nodes can be realized in a mobile car.*
Keywords: *WIFI based communication, smart car and gas sensing modules.*

I. Introduction

The existing toxic gases monitoring system consists of two parts: static cable connected sensor nodes and hand-held sensing devices of first line workers. These devices sense the presence of the gas and gives out a corresponding indication. When a static cable connected sensor nodes senses the presence of a gas it sends information to the control station about the leakage of gas. By receiving this information at the control station experienced workers will go to the corresponding area to check the leaking point. Normally, these workers will judge the toxic gas leaking source based on the direction of concentration change, wind direction, and professional experience. However, this kind of monitoring mechanism is limited by finite workers' working time and specific areas. We can see that there are several obvious disadvantages in traditional monitoring mechanism, the important one among them is the low efficiency of monitoring work that is only workers with enough real working experience are enable to make right forecast and judgment also they are limited monitoring areas: some regions in industrial plants are remote and hard-to-reach, even prohibited access to workers. Another problem with the current system is sensing data gathered by hand-held devices cannot be stored, processed, analyzed, shared and used for knowledge discovery.

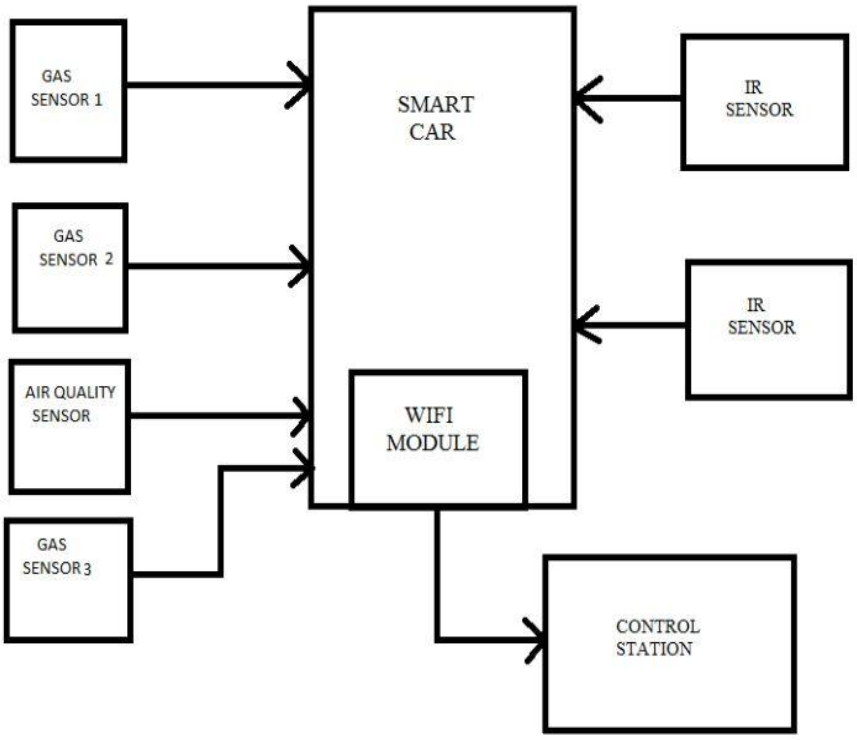
Health of workers may be threatened when measuring in potential dangerous region and also a number of wired sensors required for monitoring a large area and hence the cost of this method is more. Based on the innovated monitoring patterns and our existing on-line gas monitoring in oil and gas industry, we developed WIFI-based smart monitoring car with mobility and intelligence. This module can remedy the various disadvantages or challenges faced by the existing system by replacing the current wired sensors with sensor modules connected to a smart car, which avoids the obstacle and communicates with the control station through WIFI.

II. DESIGN TARGETS

The obvious goal is to design a gas monitoring system which is efficient and more reliable than the current toxic gas monitoring system using static sensor nodes. A smart car is to be designed to give mobility to the system, which should generate enough power to transport the sensor modules and WIFI based communication devices to various parts of the industry. The required gas sensors are carbon monoxide sensor, butane sensor, air quality detector, humidity sensor. The smart car is a random moving, obstacle avoiding car. For this we can employ two IR sensors at either side of the frond end of the smart car. The IR sensors will give output high when they face an obstacle. So the output of IR sensor is programmed to change the direction of rotation of the motor and thereby change the course of the smart car. Two DC motors are provided for the

mobility of the smart car. The gas sensors are analog type and should be connected to the analog pins of the processor. Aurdino UNO is used to program the inputs to get the desired output.

III. Block Diagram



IV. Components Used

- 12V DC Motor
- Processor :
- Co2 sensor
- Co sensor
- H2 sensor
- air quality sensor
- butane sensor
- methane sensor
- WIFI module
- IR Sensors

V. Working Of Smart Car

The smart car is controlled using two IR sensors which are placed at either end of the smart car. The output of the sensor is digital signal. It provides a high signal when an obstacle is placed at the front of the IR sensor. The smart car while working as a path follower, follows a white line which indicates the desired path for the movement of car. Two IR sensors are mounted at either side of front end of the car. The sensor sends a logical high whenever it faces a white line so a logic high output from any one of the sensor indicates that the Car is moving away from the desired path so necessary adjustments are done with the working of motors. The logic high is obtained from the sensor mounted at left front end. The supply to the motor at the left end is interrupted and motor at right end is kept run and pushes the car into the required position. If logic high is obtained from the sensor mounted at right front end. The supply to the motor at the right end is interrupted and the motor at left end is kept running and pushes the car into the required position.

While the smart car is working in random motion mode the path followed by the car is depend upon the value of output of iris sensor an iris sensor gives out an analog voltage which is corresponding to distance of obstacle from the sensor. The iris sensor is mounted on the top of the car and is rotating .It controls the motor operation in such a way that car runs in a direction towards minimum voltage that is the position which has no obstacles .Thus the smart car always avoid the obstacles and keeps on running through the field.

VI. Working Of Toxic Gas Sensing Unit

The toxic gas sensors air quality detector and humidity sensor are connected to the various pins of processor. The input voltages at different pins are used to identify the gas which is present and a warning signal is sent to various communication devices that are connected to the same WIFI to which this sensing unit is connected.

VII. Conclusion

Monitoring of toxic gas inside a industry is very important concerned to the safety of the workers. fixed sensors are now employed at various gas leakage prone areas, but this is not always effective. This project offers a better monitoring system which keep on track different gases at different areas of the industry. But one of the major drawbacks in attempts to supply power for a large time, and for full day monitoring battery of the car need to be replaced or charged.

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