Robot System For Temperature Monitoring

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ABSTRACT

The proposed robot systems explore and collect the temperature changes continuously in the environment. The data acquired through the robot is send to paired device through Bluetooth. Data communication takes place through Bluetooth wireless communication. A microcontroller PIC16F877A is used in the system to control robot while the system hardware and the software part of embedded controller were implemented using EAGLE.

Keyword: - *microcontroller, critically controlled, DC motor, motor drive, line follower, wireless sensor network.*

1. INTRODUCTION

Many industrial gases and chemical compounds are invisible to the naked eye. Yet companies transport, measure and transform these ingredients every day. They use a range of instruments to monitor these assets, throughout the refinery and chemical processing plant and back to the storage tanks, pipes and railcars. This System enables its users to scan thousands of components per shift and spot small gas leaks from a safe distance. Here, a wireless camera you to spot methane and other gas leaks quickly and easily. Capable of rapidly scanning large areas, this highly specialized wireless camera delivers real time images of gas leaks. Its benefits that are becoming known in the industry as Smart Leak Detection because it can scan a broader area, more rapidly and in areas that are difficult to reach with contact measurement instruments. Due to the limitation of manpower and the fixed camera positions, using navigation is different from the traditional detecting system. This project is a remote controlled detection which can move manually to a wider range and record the monitored image. A wireless camera is also mounted on the proposed robot transmit them back to the controlling station via radio receiver system. In industrial machine face temperature problems will result in hazardous accidents. In order to avoid these we have developed robot system for temperature monitoring.

2. LITERATURE SURVEY

Now-a-days the major safety problems faced by the petrochemicals or nuclear power plant industry are that they lack precise and accurate sensing and monitoring industrial environment parameters. At present, in industries

sensing and monitoring system are present but they have lots of disadvantages or drawbacks which are of major concern. Thus in critical control industrial environment is required, any small variation in the temperature in any part of the industry has to be monitored and sensed. Many industrial and chemical compounds are invisible to the naked eyes. Yet companies transport, measure and transform these ingredients every day. These use a range of instruments to monitor these assets, throughout the refinery and chemical processing plant and back to storage tanks and pipes .This system enables its user to scan thousands of components per shift and spot small gas leaks from a safe distance. Multi robots explore and monitor industrial environment continuously and control critically controlled parameter frequently whether there is leakage of any flammable gas resent or any temperature variation by continuously monitoring the area using line follower. A line follower robot is an electronic system that can detect and follow the line drawn on the floor. A line follower consists of infrared proximity detector wired around a standard reflective opto-sensor(IC).IC contains an infrared LED and a phototransistor. The LED emit invisible infrared light on the track and photo transistor works as a receiver. Generally, the line is specified a predefined path that can be either visible like a black line on the white surface with a high concentrated color .Data communication is done through Bluetooth. A microcontroller PIC16F887A is used to control robot.

3. PROPOSED SYSTEM

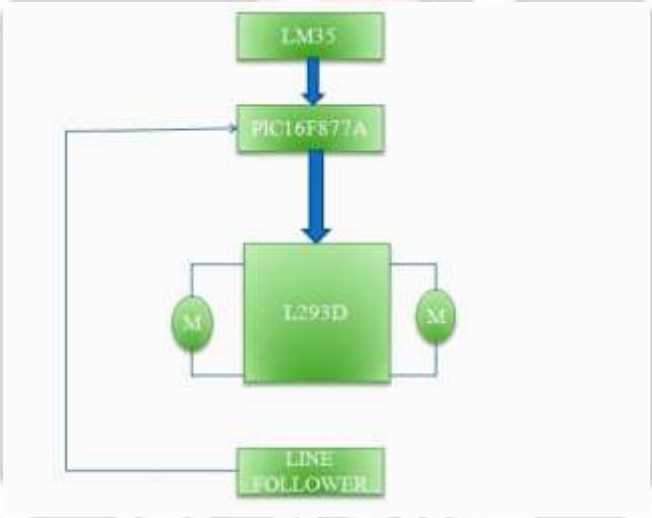

Fig-1: System Architecture

Environmental Temperature measurement mechanism is most common and there are number of techniques available for it. Microprocessor based temperature sensing methodology has been adopted in this project.

In the proposed system, we have used three modules namely temperature sensor, microcontroller and fan. First module is sensor which is the sensing element of environmental temperature, then the output from the sensor is given to the microprocessor. Microprocessor does the processing and gives the signal to the fan and accordingly fan turns on when temperature goes beyond the particular range.

Hardware used for implementations:

A .Temperature Sensor-

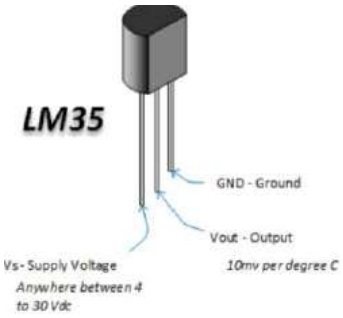

Fig-2: LM35 (Temperature sensor)

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling.

The LM35 device does not require external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to 150°C temperature range. Lower cost is assured by trimming and calibration at the wafer level. The low-output impedance, linear output and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy. The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60 μA from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 is rated to operate over -55 to 150 degree Celsius temperature range.

B. Bluetooth Module-

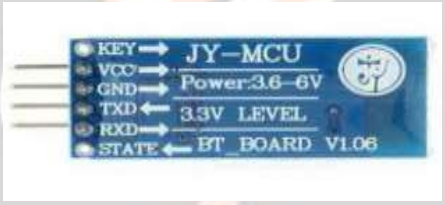

Fig-3: HC-05(bluetooth module)

Bluetooth is a wireless communication technology used for exchange of data over short distances. It is found in many devices ranging from mobile phones and computers. Bluetooth is a combination of both hardware and software. The Bluetooth module is available in three classes

• Class 3 range up to 1 meter or 3 feet.

• Class 2 range of 10 meters or 33 feet.

• Class 1 range of 100 meters or 300 feet.

The most commonly used is Class 2.

HC-05 **:** HC-05 is a class 2 Bluetooth module with Serial Port Profile (SPP). It can be configure either as master or salve. It is a replacement for wired serial connection.

HC-05 Specification: technology

• Bluetooth Protocol: Bluetooth Specification v2.0 + EDR

• Frequency: 2.4 GHz ISM band

• Profiles: Bluetooth Serial Port

• Working Temperature: -20 to + 75 centigrade

• Power of emitting: 3 dBm

The pins on the module are:

• Vcc – Power supply for the module.

• GND – Ground of the module.

• TX – Transmitter of Bluetooth module.

• RX – Receiver of the module.

C. Motor Drive-

L293D is a typical motor diver or motor drive IC which allows DC motor to drive on either direction.L293D is 16 pin IC which can control a set of two DC motors simultaneously in any direction. It works on the concept of H-bridge. H-bridge allows the voltage to be flow in either direction. As you know voltage needs to change its direction for being able to rotate the motor in clockwise and anticlockwise direction.

Specifications:

• 600ma output current capability per channel.

• 1.2a peak output current (non repetitive) per channel.

• enable facility.

• Over temperature protection.

• Logical "0" input voltage up to 1.5 v.

• Internal clamp diodes

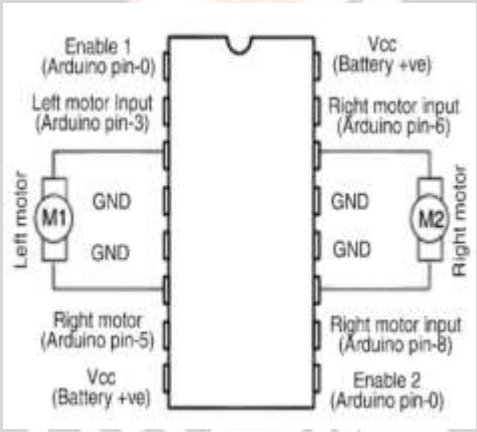

Fig-4: motor drive

D. Line Follower-

The line following robot sensor or surface scanner for robots is stamp-sized, short range(5-10mm) infrared proximity detector wired around a standard reflective opto-sensor.

Basic operation: The basic operations of the line follower are as follows: 1. Capture line position with optical sensors mounted at front end of the robot. For this a combination of IR LED's and Photo Transistor called an optocoupler is used. The line sensing process requires high resolution and high robustness. 2. Steer robot to track the line with any steering mechanism. To achieve this we use two motors governing wheels motion.

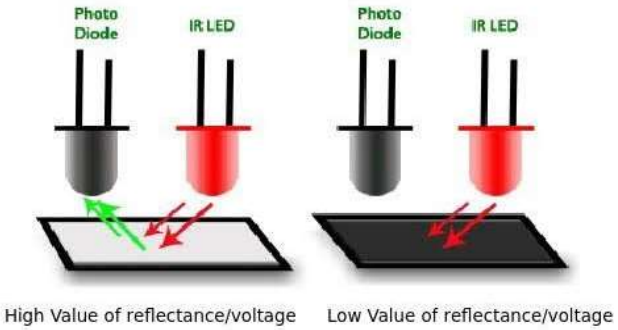

Fig-5: Line follower

We have made use of three IR sensors which will reflect light when they come across a white surface. When the sensor is on the line it will give a digital output of 1. At the times when it is not on the line it is giving an output of 0. For linear motion, the middle sensor is on the white line it will return a 1(high) signal, and the left and right sensor give low (0) output. When the robot goes a little out of the line, one of the left or right sensors will come on the white line along with the middle sensor. For a right turn, the middle sensor will return a 1(high), the left sensor will return a 0(high) and the right sensor will return a 1(low).

4. OPERATION

The proposed robot system moves along path provided around the particular area or machine to be protected. The movement of the robot system is guided by line follower. A line follower system can detect and follow line drawn on the floor. Generally line is specified predefined path that can be either black line or white surface. It has pair of sensors (LED/LDR) and work on simple "align robot on centre of line algorithm".

The sensor part consists of three set of LED/LDR pair. These LED/LDR pair detects black line on white surface on which robot is supposed to roam. These pair of sensors is used to assess the orientation of line follower robot in x-y plane. The output of the sensor circuit taken and given to the comparator circuit of the microcontroller

The job of comparator circuit is to convert analog voltage of the sensor into digital format for microcontroller to read. The task of the microcontroller is to control left and right motor according to feedback signal given by the comparator. So that robot remains on the correct path. The of the motor driver circuit is to drive the motor according to the output signal from microcontroller. Our motor drive circuit is L293D. L293D is a typical motor diver or motor drive IC which allow to drive DC motor on either direction. L293D is 16 pin IC which can control a set of two motor simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge motor driver integrated circuit.

5. FUTURE SCOPE

These robots can be used as automated equipment carriers industries replacing traditional conveyer belts. This robot can also be used as automatic cars running on roads with embedded magnets. Domestic applications: these can also be used at homes for domestic purposes like floor cleaning etc. These can be used in public places like shopping malls, museums, etc. to provide path guidance.

Wireless communication between local site and these mobile robots can also be achieved by ZigBee(1.5km) and GSM for long range communication. Camera can also be mounted on robot to monitor the surrounding operating area of the system. Various other parameters of the system can also be detected and monitored like Gas leakage, smoke, metal detection etc. using particular type of sensor. Multi robot system can be used for real time monitoring of large areas.

This system should be tested in wide variety and field conditions, i.e. the robot system should work in many different environments and with many different cable configurations.

6. CONCLUSION

The proposed system based on line follower would automatically sense and monitor the temperature in the industrial surrounding. this system not only can save man power but also ensure the operation of navigation and exploring being well performed.

REFERENCES

[1] Dinu Mathew, "Multi Robot Exploration System For Industrial Environment Parameter Analyzing Labview", international journal of engineering research and technology (IJERT), ISSN: 2278-0181, Vol.2, Issue 4, april-2013.

[2] Ahmed M. Derbas, Kasim M. Al-Aubidy, Mohammed M. Ali, and Abdallah W. Al-Mutairi," Multi Robot System For Real Time Sensing and Monitoring", 15th International Workshop on Research and Education in Mechatronics (REM), Elgouna, Egypt, September 9-11, 2014.

[3] S. Akash, Bibek Kabi, Mr. S. Karthick, "Implementing a Line Tracing Robot as an Effective Sensor and Closed Loop System", International Journal of Recent Trends in Engineering, Vol.2, No.7, November 2007.

[4] Deepak Punetha, Neeraj Kumar, Vartika Mehta," Development and Application of Line Following Robot Based Health Care Management System", International General of Advance Research in Computer Engineering Technology (IJARCET), vol.2, Issue 8, August-2013.