

Smart Industrialization Automation and To Track Delivery Vehicles with Help of GPS

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Abstract— As the number of industries in any given region keeps increasing year by year due to the increase in the needs by the people and hence smart industrialization automation can be used. Here the air quality in the industry and the number of products manufactured in the industry is monitored using the gas detectors (to detect toxic or tangent gasses) and IR sensors (to count the number of products manufactured), where there will be no need of labors. Also to see the estimated time of arrival of the delivery vehicles, GPS is used to obtain the real time latitude, longitude and estimated time of arrival of the delivery vehicle to the industry of the delivery vehicle is seen through the APP which can created using Android Studio, this GPS is integrated to the Raspberry Pi. In case of fire accidents in the industry, it can be detected using the flame sensors which is present in the industry and integrated to the Raspberry Pi and LCD screen, later where fire sprinklers are activated.

Keywords— Gas Detectors; Sensors (Infrared Rays); GPS (Global Positioning System); Flame sensor; LCD (Liquid Crystal Display); APP (Application).

I. INTRODUCTION

Due to increase in the population year by year there is an increase for the needs by the people, which leads to development and establishment of more and more industries. Earlier the purpose of automation was to increase productivity, and to reduce the cost associated with human operators. When the word industry comes up words like big, large and huge comes to our mind. Where monitoring the whole industry single handedly is not an easy task, it requires a lot of workers to check the working of the device, working environment of the industry, and to track the package. Hence to reduce human efforts this experimental setup can be used. This setup can be used in Small-Scale Industries (rubber industry, steel industry etc).

In this paper the following factors are discussed:

- 1) To check the quality of air in the industry.
- 2) To check the number of products manufactured.
- 3) To detect fire in the industry.
- 4) To track the delivery vehicle.

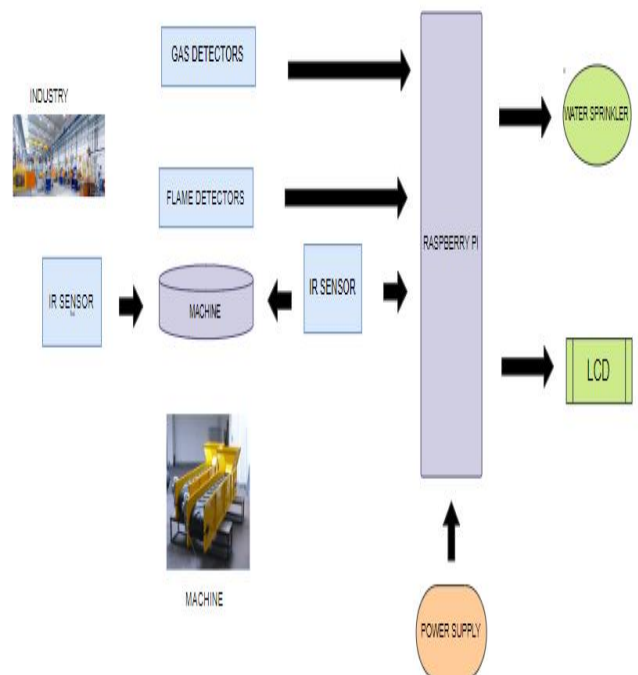


Fig 1. Block Diagram of Smart Industrial Automation

- 1) To check the quality of air in the industry: The working atmosphere of the industry plays a key role because even if a small percent of toxic gas is present in the work place it might cause health issues to people supervising the industry and also to the people staying nearby to the industries, hence the quality of the air in the industry is monitored using Gas detectors which is integrated to the Raspberry Pi and to the LCD, which in fact also reduces the routine air quality check by humans in the industry.
- 2) To check the number of products manufactured: To check the quantity of the products manufactured in industries requires a lot of labors, , to reduce the number of labors 2 IR sensors are place at the sides of the machines where the products passes between the IR sensors and integrated to the

Raspberry Pi and LCD screen. Where labors for this task in industries can be avoided.

- 3) To Detect Fire in the industry: Fire accident is mainly caused due to some malfunction of machines, to detect this fire use Flame sensors which is integrated to the Raspberry Pi. Once the fire is detected the water sprinklers are activated to reduce the amount of fire.

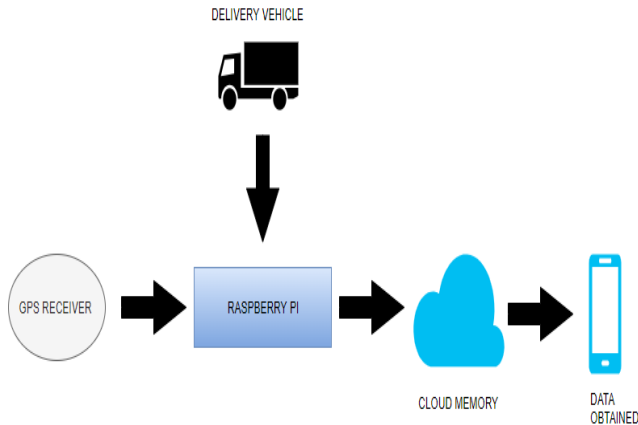


Fig 2. Block diagram of vehicle tracking system

- 4) To track the delivery vehicles: The delivery vehicles real time latitude and longitude can be obtained by integrating GPS (Global Positioning System) with the Raspberry Pi in the delivery vehicle, then saving the obtained value in the cloud memory and later displaying the latitude and longitude to the user through an APP which can be developed using Android Studio. Using this method during theft of the vehicle it can be found using its latitude and longitude obtained.

II. METHODOLOGY

The following steps can be used to build the proposed system:

- 1) The Raspberry Pi is a single-board computer with ARM processor [approx. 700MHz], with 256 to 512 MB RAM memory and also with an extra slot for Memory card. Setup and configure the Raspberry Pi by placing it on a non metal surface, connect the USB mouse and keyboard to the Raspberry Pi and later connect the 5V adapter power supply to the Pi and setup the Raspbian OS.



Fig 3. Raspberry Pi Board

- 1) A Flame sensor activates when it encounters radiation, which human eyes sees it as a yellow red flame and smoke. Once the Raspberry Pi is configured, connect the Flame detectors to the Raspberry Pi GPIO pins and power supply to the flame sensor is given to the flame sensor by raspberry pi. A flame detector is used over a heat detector and a smoke detector because it is responds fast and more accurately. When the flame detectors encounter a radiation and heat from a point, the flame sensor gets active and sends the message to the Raspberry Pi, and later the Raspberry Pi displays the same info on the LCD and also activates the water sprinklers to reduce the amount of fire in the industry.

- 2) Gas detectors are used to detect inflammable gases and also toxic gases leaked due to some malfunction of the machine, where these gases might cause health issues to the people working and living around the industry. A gas detector is connected to the to the GPIO pins of the Raspberry Pi, and power is supplied to the gas detector from the raspberry pi. When the gas is detected by the gas detector, it sends the message to the raspberry Pi and the Raspberry Pi will show the message on the LCD display, using this method labors for air quality check up on regular basis can be avoided.[4] A MQ-2 Gas sensor can be used.

- 3) To check the quantity of products passing through the machine can be seen using the 2 IR sensors present at the sides of the machine,[2] where TSOP1736 can be used which is driven by BC557 transistor for biasing and later sent to the Raspberry Pi. IR sensor TSOP1736 is said to have a photo detection response of 36 KHz.

- 4) GPS (Global Positioning System) receivers are used to obtain the real time latitude and longitude of the vehicle by connecting the GPS to the GPIO pins of the Raspberry Pi with TTL (Transistor Transistor Logic) and the power supply to the GPS is obtained from Raspberry Pi which is 3.3V, the latitude and longitude of the delivery vehicle are obtained and stored in the cloud and later shown on the APP developed by Android Studio, where the incharge of the delivery team can access the APP and get the real time value and also the estimated time of arrival of the delivery vehicle.

III. FLOW CHART

From the below flow chart we can see that the Raspberry Pi is the centre body for all the functions to get activated. There are two cases as follows:

Case 1: When the gas is detected by the gas detector then the message YES is sent to Raspberry Pi, later the message is displayed on the LCD screen. If there is no gas detected then no message will be sent to the Raspberry Pi.

Case 2: When the flame is detected by the flame detector then the message YES is sent to Raspberry Pi, later the message is displayed on the LCD screen. If there is no flame detected then no message will be sent to the Raspberry Pi.

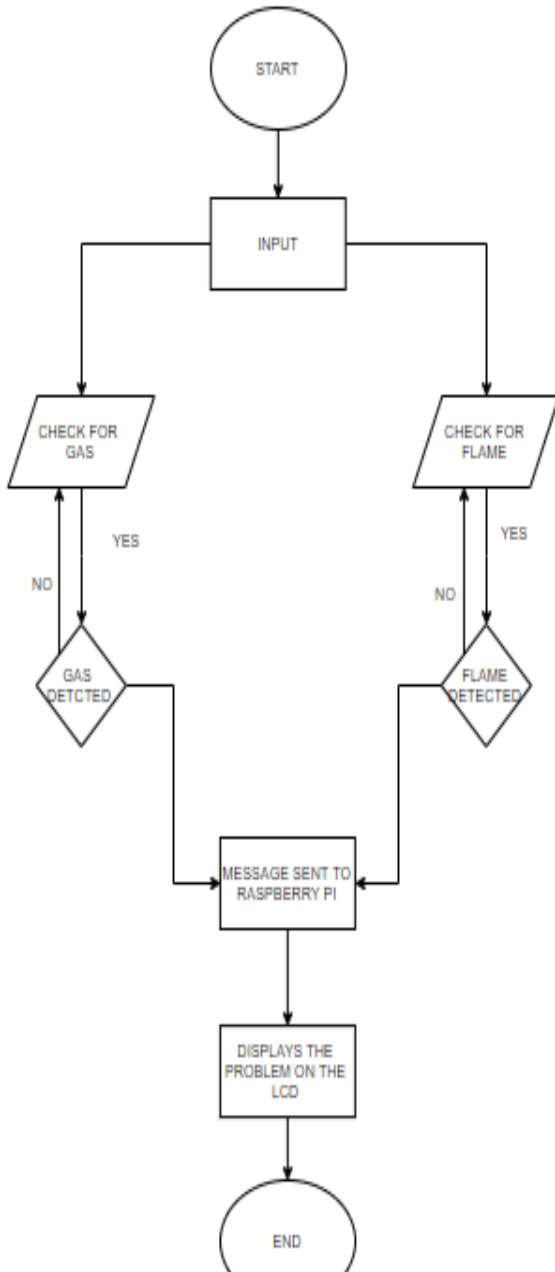


Fig 4. Flow chart to check flame and air quality using Flame and Gas Detectors

The below flow chart shows to check the quantity of products manufactured by a machine, where two cases are considered:
 Case 1: If the product passes through the IR sensors present in sides of the machine then message YES is sent to Raspberry Pi and later COUNT = 1 is displayed on the LCD screen.
 Case 2: If the products passes through the IR sensors present in sides of the machine then message NO is sent to Raspberry Pi and later COUNT = 0 is displayed on the LCD screen.

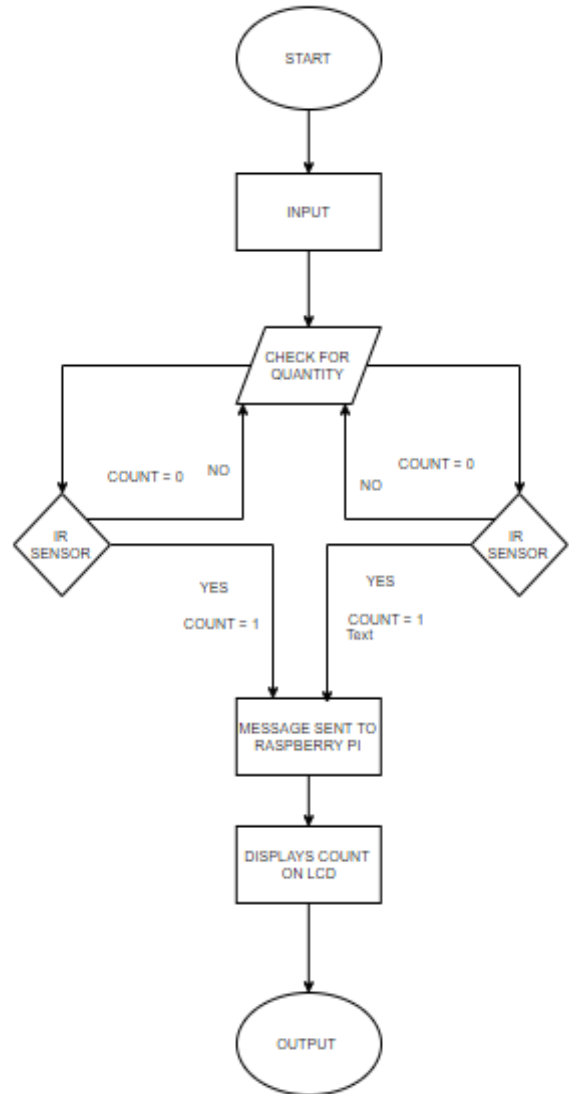


Fig 5: Flow Chart to check the quantity of products manufactured using IR Sensors

IV. APPLICATIONS

The above system can be used in various other fields as well, few of them are:

- 1) The Flame detection process can be used in Fire Engine Station, to detect fire nearby their locality.
- 2) The Vehicle tracking system can be used for School buses, where bus theft and hijacking can be avoided.
- 3) The Gas detectors can be used in hospitals, to keep the environment hygienic.
- 4) The quantity counter with IR sensors can be used to count the number of people entering and leaving a place.
- 5) The Flame detection process can be used in schools.

CONCLUSION

When the industrialization took place in North-Eastern countries the demand for labours increased, using smart industrialization human effort in industries can be avoided, for instance labours can be avoided to check the air quality in the industry, to check for fire accidents and also labours to count the number of products manufactured can be avoided. As the number of industries grew year by year due increase in

the population transportation of the products needed to take place by road through delivery vehicles, where these delivery trucks were hijacked and hence to avoid such situations the tracking system using GPS (Global Positioning System) can be used where the real time latitude, longitude and estimated time of arrival of the delivery vehicle can be seen through APP developed using Android studio. Hence using Smart Industrial Automation human efforts can be avoided.

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