

Industrial Emergency Response and Disaster Management Wristband

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ABSTRACT

Industrial emergency response and disaster management wristband is a real-time cure for any type of industrial calamity caused due to sensor failure. This paper is about a microcontroller-based wireless wristband that can switch on or switch off devices by tripping off power coming to that device. This system is a combination of software and hardware. Nowadays all electrical devices in Industry controlled manually, but in the industry, there are so many electrical devices. Some of the industrial calamities happened because employees were not having control of machines or any other controlling tool so lots of time were wasted to reach sensor failure information to the control room and as a result, the small industrial accident turned into an industrial disaster. Also, To control all electrical devices we need a lot of "MANPOWER" and if manpower increases maintenance cost also increases which is one of the drawbacks of industries. So to avoid such type of drawback we should need some WIRELESS controlling systems. One of the wireless communication systems is RF (Radiofrequency) communication system, we are using RF communication because with the help of IR transmitter there is a problem of directivity and range of working, that problem is eliminated with RF transmission. RF has better directivity and frequency range.

Keywords: Industrial calamity, Sensor failure, RF communication, Wireless wristband.

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I. INTRODUCTION

Industries contribute a lot to the upliftment of poor, creation of employment, changes in socio-economic fronts, which contribute on the whole to the improvement of the economic situation of a Country. So, in every country, every industry takes so many efforts in their industrial emergency response and disaster management plans. But even if there are many industrial emergency plans, a lot of industrial disasters happen every year. Industrial accidents are severe mishaps that result in injuries to people and damage to property or the environment. For example, The Chernobyl disaster. It was caused by a nuclear accident. The Chernobyl Nuclear Power Plant in Ukraine exploded, creating what many consider the worst nuclear disaster the world has ever seen. Types of industrial accidents vary from one place to the next, but most are a result of unsafe conditions and unsafe acts. Every country takes so many efforts on prevention and not on cure. So, to reduce the onsite and offsite effects of any

sudden accident before it gets out of hands, we are developing industrial emergency response and disaster management wristband which will be used as cure for any emergency.

Our project can be used in mechanical industries or in industries where we cannot use sensors. For example, Boilers. The project aims to develop and build an industrial emergency response and disaster management wristband for an effective response to an emergency, for effective medical treatment and assistance for workers.

We are using RF communication Technology in our project.

In our project, there are two important parts:

The final device works on multiple transmission and single reception technology.

(1) Transmission:

Our project can accommodate multiple transmitters. For now, we are making three transmitters. These transmitters are nothing but our bands which every employee can wear as per industrial requirement. These transmitters are used to

send the emergency information to the control room so that necessary actions to be taken to avoid any hazards.

(2) Reception:

In our project, there is only one receiver circuit which will be placed in the industries' control room. Whenever an employee(transmitter) sends data to a receiver that action will be accomplished. After completing the necessary action our system will indicate the emergency and performed actions immediately via speakers and display.

We are going to make a universal control wristband which every worker in the industry can wear and can use for emergency machine power control in case of sensor failure, for any medical emergency like if any worker is undergoing any health issue then worker or his co-worker can press the key on a band which in turn inform industry doctor and doctor can assist worker through the band as our band is interactive. This band can be used for multiple controlling actions

II. LITERATURE SURVEY AND IT'S SUMMARY

[1] PAPER 1:

IoT based smart emergency response system for fire hazards

PUBLISHED ON:

2017 3rd International Conference on Applied and Theoretical Computing and Communication Technology (iCATccT)

AUTHORS:

Subbachary Yerroju and Ravi Kishore Kodali

PRODUCT SURVEY:

i] This paper proposed an emergency response system for fire hazards which is designed using IoT standardized structure. [1]

ii]The sensors detect the hazard and alerts the local emergency rescue organizations like fire departments and police by sending the hazard location to the cloud-service through which all are connected.[1]

DEMERITS:

1. Researchers have focused principally on very gradual cure for any industrial disasters and not on its immediate cure.

[2] PAPER 2:

Real Time Collaborative Processing for Event Detection and Monitoring for Disaster Management in IoT Environment

PUBLISHED ON:

2019 10th International Conference on Computing, Communication and Networking Technologies (ICCCNT).

AUTHORS:

Aarju Goyal, Kaushal Meena, Karthik Kini, Parth Parmar, Mukesh Zaveri

PRODUCT SURVEY:

i] This paper proposed an approach for quick response from the disaster relief centres in case of a disaster without manual call for help in real time dynamic monitoring and

analysis of the environment of a disaster-prone area using Internet of Things (IoT).[2]

DEMERITS:

1. Researchers have focused principally on very gradual cure for any industrial disasters and not on its immediate cure.

[3] PAPER 3:

Wireless Auto Power Trip system for Liquefied Petroleum Gas Leakage to improve Safety in Domestic usage.

PUBLISHED ON:

International Research Journal of Engineering and Technology (IRJET). Volume: 04 Issue: 03. Mar -2017

AUTHORS:

Rati Ranjan Sabat, Subham keshari, Sai Prajna Panda & Sagar Suman

PRODUCT SURVEY:

This paper proposed a system that once the gas leak detected depending on the level of gas immediately the systems will trip of the power supply to avoid explosion and its hazardous result.[3]

DEMERITS:

1. System does not give solution for any sensor failure.

[4] PAPER 4:

Monitoring and Fault Detection System for power transmission using GSM technology.

PUBLISHED ON:

08 August 2017 International Conference Wireless Networks

AUTHORS:

Okokpujie Kennedy, Amuta Elizabeth, Okonigene Robert, Samuel John

PRODUCT SURVEY:

This research paper was achieved as the system designed was able to detect transmission fault. The occurrence of faults was displayed and the message was sent through the GSM network over to the utility mobile phone.[4]

DEMERITS:

1. Applicable only as a detector and indicator/alarming device.

[5] PAPER 5:

Efficacious L.P.G. Leakage Detector and Auto Shut-Off System Using Arduino Uno ATmega328

PUBLISHED ON:

10 October 2017 International Journal of Innovative Research in Science, Engineering and Technology.

AUTHORS:

Abhishek Gupta

PRODUCT SURVEY:

This paper proposed a prototype by detecting low and high gas leakage levels and auto shut-off the gas supply and alert the user by providing an audible alarm warning signal.[5]

DEMERITS:

1. Applicable only as a detector and indicator/alarming device.
2. System does not give a solution for any sensor failure.

SUMMARY OF LITERATURE SURVEY:

From the literature survey, it is observed that

- [1] Researchers have focused principally on a very gradual cure for any industrial disasters and not on its immediate cure.
- [2] None of the system can allow the employee to cure any sudden calamity on its own before it turns into a hazardous disaster.
- [3] None of the systems focuses on a cure in case of sensor failure.
- [4] Current emergency plans do not allow the employee to control power on their own.

III. HARDWARE IMPLEMENTATION

The above-mentioned industrial emergency response and disaster management wristband comprise two sections: Transmitting module and Receiving module. The transmitting module sends the encoded data after channel and action to be performed button selection to the receiver. Receiver then decode that data and will perform the action as per requirement

A. Transmitter Section

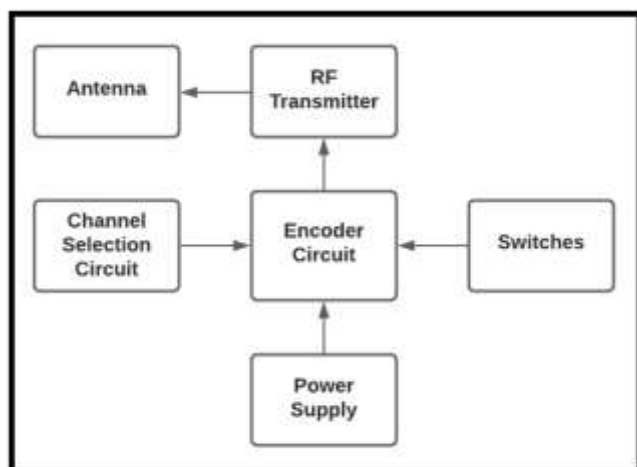


Fig.1. Block Diagram of Transmitter module

Transmitter Circuit(multiple):

RF Transmitter: RF transmitter used to generate and transmit frequency.

Antenna: Frequency generated by the RF transmitter will be further transmitted to the antenna and depending on that the length of the antenna will be calculated.

Channel selection circuit: We are going to use two channels to select them we are using the channel selection circuit.

Switches: There are four types of switches in our band. Switches will be used to trigger a feature as per requirement.

Encoder Circuit: After selection of channel and switch they will have their own logic. So, in the encoder this both logics will get combine and further get encoded. And this encoded data will be transmitted to the receiver circuit through antenna.

Power supply: To run this transmitter circuit we are using power supply which will be a 6V rechargeable battery.

B. Receiver Section

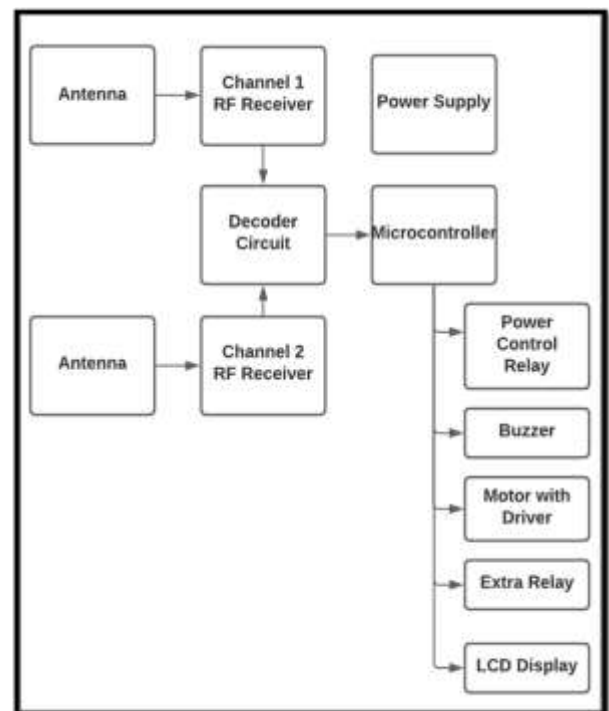


Fig.2. Block Diagram of Receiver module

Receiver Circuit (Single):

RF Receiver (Channel 1/Factor A & Channel 2/Factor B): After the selection of channel 1 which is factor A in our project RF receiver will receive this data through the antenna. The Same will be followed for RF receiver channel 2.

Decoder Circuit: The Decoder circuit will decode the data which include channel number and the switch to be trigger.

Microcontroller: The decoded data from decoder circuit will further be received by the microcontroller. It will read whether it is channel 1 or channel 2 and accordingly from the selected channel it will trigger the respective switch (Power control relay/Buzzer/Motor with driver/ Extra relay).

Power supply: For receiver circuit, we are going to make AC power supply.

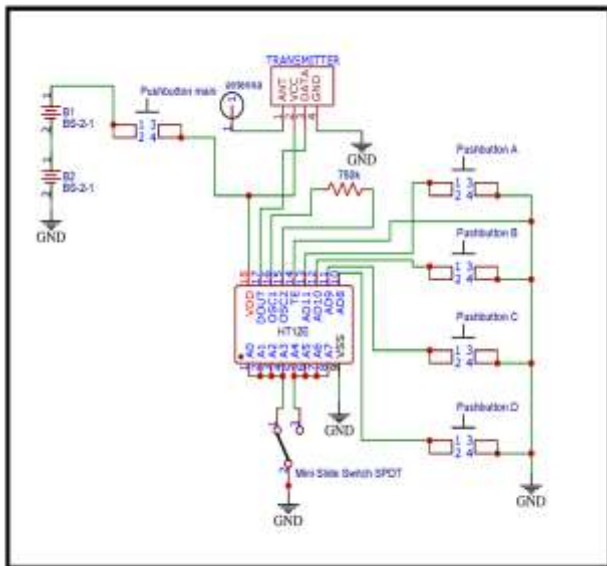


Fig.3. Circuit Diagram of Transmitter module

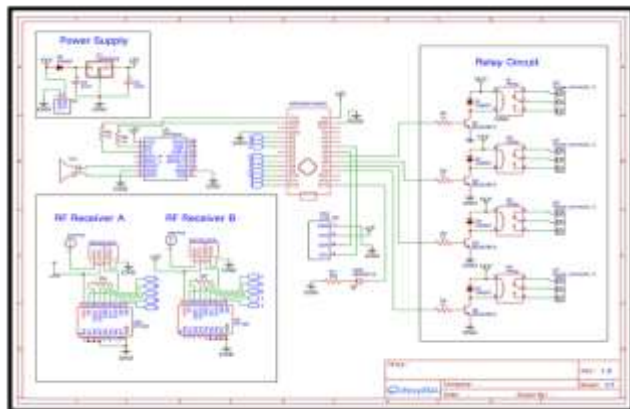


Fig.4 Circuit Diagram of Receiver module

IV. CONCLUSION

Thus, we have seen how this project is going to work. We have developed this project as a cure if any type of industrial emergency occurs it will be able to cure it in a short time. This wristband is easy to use and pocket friendly which anyone can afford and this project need less maintenance and the battery life of the wristband is also large. In this project we have also used a speaker to alert the workers, to indicate to them what the problem is and will help to reduce or cure it as soon as possible. We have used LCD which will be able to display the sector in which the problem has occurred. This project can also be used in companies which face the problem of sensor failure. The range of the wristband is 100 meters and it can be extended to a larger distance by increasing the height of the antenna.

The controlling circuit is built from RF transmitter and RF receiver modules which are operating at a certain frequency along with an encoder and a decoder with few passive components. Multiple devices can be controlled by using different receiver with different addressing modes using a single remote.

V. FUTURE SCOPE

In future, we can make it IOT based wristband when the emergency like a medical emergency will occur it will automatically send an SMS to a hospital that there is a need

for doctors and an ambulance. For example, if there is a fire emergency it will send an SMS to the fire department and will tell them about the problem and will be able to solve the problem faster.

In future we can also add it in google map like nowadays traffic is indicated in google maps likewise it will indicate people to stay away from that place if any gas leakage or fire hazards occur which can be harmful to people.

VI. ACKNOWLEDGEMENT

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