



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH


IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 5, May 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.512

 9940 572 462

 6381 907 438

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Construction Site Safety using Internet of Things

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ABSTRACT: As construction industry is one of the largest sector of India, number of accidents are high and increasing over the time. Thus to reduce accidents on sites is crucial aspect of any construction firm. As cities growing rapidly confines spaces are increasing such that very less space is available for any construction project in cities. As internet of things playing important in many fields, here is study carried on using IoT in construction sector to reduce accidents and increase safety and healthy working environment at construction sites.

KEYWORDS: Construction, Safety, Internet of Things, Accidents.

I. INTRODUCTION

Construction sector is 2nd largest sector in India as per economy. In the present scenario, the Indian housing industry is sort of large and sophisticated involving latest technology also as man power. On a par with the event of housing industry, drawbacks in terms of safety and health aspects also are witnessed. The Indian construction labour force is 7.5% of the entire world labour force and it contributes to 16.4% of fatal global occupational accidents. In the housing industry the likelihood of a fatality is five times more likely than during a manufacturing industry, whereas the danger of a serious injury is 2 and a half times higher. India has the world's highest accident rate among construction workers, consistent with a recent study by the International Labour Organization (ILO) that cite done survey by an area aid group showing that 165 out of every 1,000 workers are injured on the job. Construction workers aren't the sole sufferers of accidents but also the general public including children are affected. These accidents diminish the image of the development industry, and as a result there's shortage of skilled labour. Lack of communication among the varied departments involved and lack of proper inspections are the main reasons for accidents occurring at a construction site. As mention earlier the development industry is very risky occupation. For taking precaution from hazardous situations comprised thanks to vibrations, any gas leakage or fire or increase in water level thanks to rainfall or by the other means the proposed system is to be developed. the shortage of prediction and identification of accidents and hazard leads to losing the gear of progress of works. the rise number of fatalities, injuries & hazard at construction site identifies the understanding critical problem associated with safety. Though labor safety laws are available, the various accidents happening at construction sites are continuing. Management commitment towards health and safety of the workers is additionally lagging. Thus, we've to proposed system to guard construction workers and stop accident. we've to propose a design for autonomous system that monitors, localizers and warns site laborers who available within zone.

II. LITERATURE REVIEW

[1] Seung Ho Kim, Han Guk Ryu and Chang Soon Kang.etal.[1] In this paper IoT based prototype for the proposed system has been developed using a beacon technology, smartphone application, and sensors, Zigbee, Wi-Fi, and LTE to monitor field workers and outsiders approaching the hazard zones at all times.

[2] R.Y.M. Li.etal. [2] In this chapter, first an introduction to the Internet of Things is provided. This is followed by a study on the popularity of the IoT in different countries and cities—undertaken with the help of big data provided by Google. After this, the results of an interview concerning real-life applications of IoT in Australia and the proposed IoT application of IoT to road repair works will be presented.

[3] Noorbasha Johnsaida, Lakkisetty V. Rahul, Tadi Shalini.etal.[3] this paper suggests an Internet of Things (IoT)-based intelligent fire emergency response system that can control directional guidance intelligently according to the time and location of a disaster and the design of an integrated control system using wireless sensor networks to address the problems with existing fire emergency response systems in times of fire or building collapse.



[4]Kishwer Abdul Khaliq, Omer Chughtai,Abdullah Shahwani, Amir Qayyum and Jürgen Panneketal.[4]The prime goals of the proposed work were attained with the complete design of an emergencyresponse system and with the successful implementation of a TestBed, which carried out the intended communication using VANET presented real-time statistics of an emergency response system along with the disaster statistics of an affected area.

[5]D. Podgorski, K. Majchrzycka, A.Dąbrowska, Grzegorz Gralewicz and MałgorzataOkrasaetal.[5]In this paper, A proposed framework is based on a new paradigm of OSH risk management that consist in real time risk assessment, and the capacity to monitor risk level of each worker individually. A rationale for context-based reasoning in Smart Working Environment SWE, and a respective model of the SWE-dedicated CPS are also proposed

[6]Hong Zhang,Xuzhong Yan, Heng Li, Rui Jin and HongFengetal.[6],This study aims to address these problems by implementing real-time alarming, monitoring, and locating for NHU in construction based on sensor, mobile, web, and cloud techniques. A smart hard-hat system is developed using an Internet ofThings (IoT)-based architecture. The systemperformance is evaluated in a laboratory test and validated in a field application.

III. METHODOLOGY

Number of construction sites were visited across Nashik city. Interaction with project manager as well as safety manager done especially on the topic of safety and what is current scenario of their sites in terms of safety. Following is overall data obtained.

Number of sites visited in Nashik City	10
Total Number of accidents (Injuries/Death of workers) Recorded at all sites in last year.	26
Number of sites have adequate safety environment and have PPE's available.	6
Number of sites which have any IoT based system installed.	0
Number of sites interested to adopt such IoT based system.	3

As seen from table not a single site had Internet of things-based system.

Then a prototype of internet of things based system consisting of Raspberry Pi 3+ model with python code and various sensors which were identified as per construction difficulties.

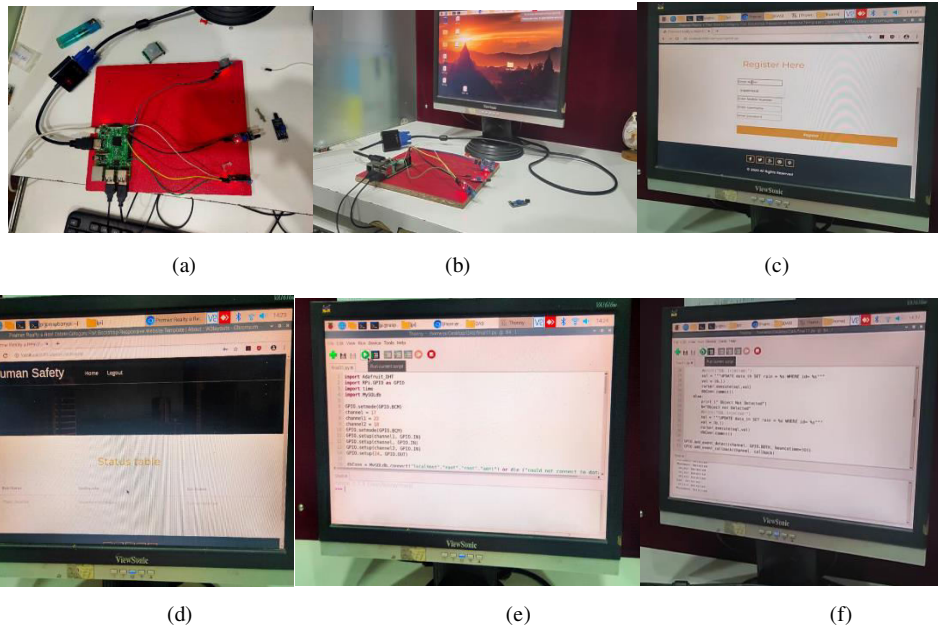
Mainly two sensors were taken and model is developed.

- 1.Rain Sensor
2. ObjectDetection sensor

IV. MODEL CONFIGURATION

Figures shows the steps which are executed to develop models based on Internet Of things system

- (a)Setting Up Raspberry Pi with sensors- Raspberry Pi which is the common computing device used for the system, both Rain and object detection sensor connected to it.
- (b)Connection Raspberry Pi with Monitor- Whole Raspberry Pi setup is connected to monitor.
- (c) Registration and log in process takes place through browser in Raspberry Pi.
- (d)Status Table appears- status table i.e. dashboard of user interface open up after above process. In which both parameter of sensors results appears
- (e)Running of python code.
- (f)Testing of various parameters with sensors- After testing of sensors with respect to each element on the dashboard 'Detected' message appears then appropriate actions will be taken to secure site from hazard conditions.



VI. CONCLUSION

We have implemented an automatic rain and object detection sensor system beneficial on construction sites such as underground construction, on vehicles to avoid collision with object detection sensor etc. There are number of circumstances on which such type of system will be useful to avoid accidents and ultimately loss of life and money.

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DOI:10.15680/IJIRSET.2021.1005106

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