IOT Based Smart Weighing System

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Abstract: The "IOT Based Smart Weighing System" is of large scope project designed to make safety and effective operations. The system engages the services of various sensors and cloud connectivity to perform the parameters such as load weighing, air quality and fire hazards. Firstly, a load sensor is used to detect the weight of item to be placed. This sensor connected with an ESP8266 microcontroller which will transmit the data to Blynk cloud platform. In addition to this, the project also deals with air quality sensor to detect the harmful air quality levels such as Carbon monoxide or volatile organic compounds when it is detected a buzzer is triggered to alert and for create safe working environment. Furthermore, the system also had a fire detection sensor which is used to detect the abnormal increase in temperature or presence of smoke if it is detected it will activate the buzzer to alert the surroundings. Overall, this system approaches the safety and efficiency activity by using sensors and cloud connectivity to create secure environment.

Keywords: ESP8266/Node MCU microcontroller, Weighing load cell, MQ 135 Air quality/Gas detector, Flame sensor, Arduino IDE.

1.INTRODUCTION

In present era of developing technology and industrial landscape this weighing system serves a crucial role. As a demand of efficient operation to continuous grow, by ensuring safety operation to make these challenge. The new technologies want to develop advance system.

The 'IOT Band Smart weighing system" project presents a significant management of sensors, microcontrollers and cloud based platforms which all are connected to microcontroller which is the brain of our project and all are get connected to make a single model which performs the operations are continuously weighing the loading by using load cell, fire detection by using fire sensor , air quality detector by using gas sensor and all this real-time data can be accessed by using Blynk cloud platform by using this there is no distance limit we can transfer the data where ever required and it helps to make the protective decision-making to maintain the private personal data and increasing the operational efficiency

The main part of the project is monitoring system by using load cell which is mainly deployed throughout the process of detect and monitor the weight of item placed by pressure that occur from the teams which over placed on the load cell it will calculate the weight of that item. By connecting this load cell to ESP8266 microcontroller the sensor gathers the data on load distribution & transmit it to the cloud Blynk platform, this real-time data can access with accurate value it prevents overloading and minimize the space utilisation for enhanced efficiency.

In addition to load monitoring, the system incorporates the air quality sensor to continuously monitor the air within the given surrounding environment. This sensor is placed to detect the various harmful gases which will effect on workers by various disease in order to avoid this by setting particular range of gas in gas sensor, when detected gas is exceeds the range than it considers that detected gas is harmful gas and it activates the buzzer to alert, finally this enables the workers to take immediate corrective action such as ventilation adjustment or evacuation procedure, to avoid the risks and ensure a safe working environment.

Furthermore, the system is also equipped with fire detection sensor to avoid the fire hazards and to avoid the risk and damages in industrial rapidly in industrial area. These sensors is detect the rapidly increase in temperature or the presence of smoke, the onset of a fire after detecting the temperature raising the system activates the buzzer to alert the workers and initiates the emergency to get out and extinguish the fire. By providing early alert to prevent loss of machineries, ensure the safety of workers.

Overall, the system represents an approach to management, combining technology, microcontroller Integration and cloud-based technology to enhance the safeguard protocols and operational efficiency. By monitoring this key parameter

such as load cell, gas sensor and fire sensor the system empowers manager to make right decision to avoid risk and process in real time, to overcome the complex logistic centre, the implementation of advance and smart monitoring system like this will plays an important role in both safety and efficiency operations ad in modern technology era.

2. BLOCK DIAGRAM

Block diagram of the project is shown in fig.1. It consists of the following
1. Back End which includes, Air quality sensor, Fire sensor, Load cell, Buzzer, Power supply etc.
2. Arduino ESP8266 Microcontroller as heart of the system
3. Blynk cloud as a cloud server
4. Front end which includes html page or mobile device having Blynk cloud as application which includes weight accessor, uploader for the cloud over WIFI.
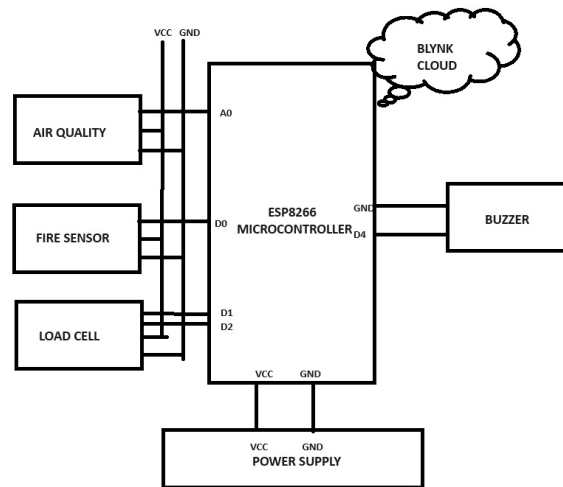

Fig 1: Block diagram

In this system, air quality sensor will check whether there is a presence of any harmful gases like carbon monoxide, fire sensor will detect the fire accidents and triggers an alarm for insisting the personnel about the fire accident, the load cell is also a device we use here to check the weights of the objects based on the resistance change, and about the power supply, and the buzzer will put on after the triggering happen from the system. And the Blynk cloud will be connected to this Wi-Fi module to get access about the data collected from the system. This data then monitored arbitrarily using mobile device or laptop by using Blynk cloud application.

3. WORKING METHODOLOGY

Above system will work as follows: In the IOT based electronic weighing scale system there will be a systematic approach which incorporate microcontroller systems, advanced sensor technologies and also some of the cloud-based platform which is providing comprehensive monitoring of the critical parameters within the warehouse environment. Ensuring the safety is one among the crucial role that this system is playing so far and also it optimizes the operational efficiency and facilitating a real time decision making. optimizing operational efficiency, and facilitating real-time decision-making.

Load Monitoring Component:
The load sensors have been utilized by load monitoring component and has been placed throughout the system to measure continuously the weights of items placed on the system areas. The data of weights has been collected using ESP8266 microcontroller, and it will be communicated to the Blynk cloud platform. The transmission of data to Blynk cloud will happen after the data acquisition about the load distribution. On using the wireless fidelity that is WIFI the system can access data and transmit to the Blynk cloud. To monitor low levels, prevent overloading, and optimizes the space utilization has been done under real-time by warehouse managers. The accidental structured damages can be detected by this system and triggers alerts if the load exceeds the average load or any threshold load.

Air Quality Monitoring Component:

The technology has been improved and this air monitoring component is capable of measuring various parameters such as gases, volatile organic components and particulate matter which may be present under the warehouse where our system has been employed.

The ESP8266 microcontroller access the data and the sensors will continuously monitor the environment air. The Blynk clous platform will get acquisitor of data perform analysis and visualization based on the processing of the sensor data. The systems will provide alerts will be triggered by alarm when the monitoring system will detect harmful air in the environment.

And we can ensure safety and safe working environment by adjusting ventilation and implementing evacuation procedures.

Fire Detection Component:

The fire detection has sensors which has been designed to detect any temperature if their us any presence of fire or any smoke under real time and provides information about fire accident that has been happened. The ESP8266 microcontroller has been placed strategically to do it. It sends signals based on the outputs from the sensors and alerts and emergency protocols. the Blynk cloud platform gets the information about the fire accident and will be communicated to the warehouse personnel and also the system will be employed with automatic fire extinguishing the system. And alerts about the fire accident.

Overall, the robust design methodology integrates advanced sensor technology which has been employed by our system enhances the safety security and other advantages for the personnel. and there will be more capabilities and cloud-based platforms will provide comprehensive monitoring of the load distribution. air quality standards will be undertaken and more implemented to enhance safety for warehouses. The real – time data acquisition will be under taken on continues monitoring under the critical parameters and it facilitates real-time alerts and interventions, this system enhances safety, optimizes efficiency and secures working environment for warehouse personnels

4.COMPONENTS REQUIRED

4.1 MQ 135 (Air Quality Sensor):

Fig 2: Air quality sensor

The MQ 135 sensor is used to detect Ammonia, Sulphide, Benzene steam and also some of the harmful gases in the environment from the desired distance. It has a lower conductivity in clean air, low cost and suitable for different uses such as harmful gases detection and smoke detection. It has some of the features including fast response to the stimulus and also the fast recovery.

4.2 Fire Sensor:

Fig 3: Fire sensor

LDR The fire sensor is used to detect fire or wavelength of the light source within 760nm-1100nm also useful for smaller fire detection at the distance of 80cm. One of the main feature of the fire sensor is greater the fire, faster the test distance and it is built in potentiometer for sensitivity control, generally used for fire alarm purpose and it triggers the buzzer when it detects the fire accident or gas leakage.

4.3 Weighing Load-cell sensor:

Fig 4: Load cell

The electrical signals up to 1kg of forces can be converted from weights to electrical signals, the load cell what we have deployed here has the capability of measuring the resistance that is electrical resistance where that change is proportional to the strain applied to the load cell. This aluminium alloy is used here to make it capable of accessing the capacity of 1kg weight.

4.3 ESP8266 Microcontroller:

Fig 5: Microcontroller

The main advantage of using this ESP8266 microcontroller is has self-contained Wi-Fi networking function it is helpful to create the project based on Wi-Fi and it also has the built in USB to serial chip and level converter circuit so we can easily upload the code and connect the developed circuit and main features are open source, low cast programmable, and more efficient.

5. RESULTS AND CONCLUSION

The Conclude, the IOT Based Smart Weighing Machine such a big progression in managing weighing system. It can be monitoring critical parameters like load distributes, air quantity, and fire hazards. Via advanced sensory technologically, micro control systems, and cloud-based platform, the system enhance safety, optimizes operation and support real-time decision-making.

By continually monitoring load distribution, system prevents overload, optimize space use, and assurance storage infrastructure integrity. Also, real-time monitoring on air quality allows proactive interventions for reducing health risks and keep work environment safety for team. Additionally, fire detecting capabilities of system provide early warning signals and enable rapid responses actions to avoid damages and ensure business continuity.

Some advantages of the Smart Weighing System are as Safety upgrading and operational efficiency, remote dispatching of a concern, timely notification alerts, and assurance techniques compliance. Although these solutions come with some short-term issues like initial purchase costs, proper maintenance, technical system complexity, making a valuable asset for warehouse, manufacturing facilities and other particular area.

In summary, the Weighing Monitoring System units a new standard for weighing control, providing a method to safety and performance via advanced monitoring and records-pushed selection-making. As weighing continue to adapt into complex logistics hubs, the implementation of such systems will play a vital function in making sure the safety of personnel, shielding belongings, and optimizing operations inside the present-day business landscape.

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