International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 06 | June 2020 www.irjet.net p-ISSN: 2395-0072

DESIGNING A LOW-COST STOCK MONITORING SYSTEM IN SUPER MARKETS

Harshith Akkenapelly [1], NavyaSri Akkenapelly [2]

[1]*Student, Department of ECE, Sreenidhi Institute of Science and Technology, Hyderabad, India*
[2]*Student, Department of ECE, Guru Nanak Institute of Science and Technology, Hyderabad, India*

Abstract - *As we all know how annoying it would be to see our required product goes out of stock in the grocery stores. On the other hand, it would be a hectic work for the warehouse operators to continuously monitor the commodities and replenish them. If not, then they may loose many of the customers failing to buy even though the product is still available. In order to solve this, we have designed a cost-effective stock monitoring system; so that the night fillers can effortlessly monitor the stock of each rack in the store at anytime and from anywhere without attending to the workplace. This reduces the manual work of the shelf stackers or the stock departments and can easily monitor and act accordingly from their place. The Product described below is the cost-effective compared to other alarming systems for the grocery stores.*

Key Words: WeMosD1 mini, Hx711 Weight Sensor, ThingSpeak, Microcontroller, Smart Monitoring, Measurement with Precision.

1. INTRODUCTION

Generally, in the supermarkets it is known how commodities get finished instantaneously due to a large scale of consumers. It will be a restless work for the management team to continuously go to the place and check whether the stock is full or Emptied. The current prevailing alarming systems is annoying and couldn't get a clear estimation of each racks accurately, and in fact cannot get updates to warehouse located. This smart system is capable of precision measuring of the stock; so that the exact amount of stock present is notified and the live feed values from the racks can be monitored. So that it would be easy to the warehouse works to look after the stock efficiently and replenish from the depository with the data provided from the app.

So, this smart system can continuously monitor stock present in the shelf by calculating its weight and get updated in the app over the Internet.

2. WORKING

In this System; the HX711-The weight measuring sensor is connected to the load cell. The load cell works on the principle of 'strain resistance'. The load cell has a variable strain resistor which changes resistance according to the physical strain produced in it due to load present on it. Here HX711 module act as a strain converter or a weight amplifier to give accurate readings of the weight. The loadcell should be placed below the specific rack and calculates its weight continuously or at certain periods specified by the warehouse. In this system the WeMos d1 mini is chosen for its compatibility and its inbuilt ESP8266- Wi-Fi module mounted on it which makes it a better choice for the project. The data received from the load cell is stored and updated in the app through broadband connectivity. The microcontroller continuously monitor's the stock for given period of time and updates the information in the app.

3. DESIGN AND ESTIMATION

The connections and set up of the whole system is shown below.

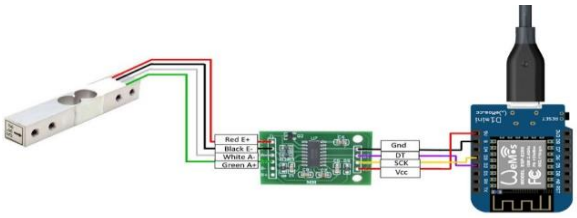

Fig1 Microcontroller and Hx711 interface with Loadcell

The VCC and GND pin of the HX711 module will be connected to the 5v and GND pins of the microcontroller WeMos d1 mini. The remaining two pins DT and SCK are the data pins from the HX711 to the microcontroller with DT connected to D2 pin and SCK to the D3 pin. The load cell consists of 4 terminals which are nodes of the Wheatstone bridge configuration system of the load cell. These terminals are connected to the respective E+,E-,A- and A+ of the module. The strain resistance from the load cell will be amplified and get converted into voltage values in by HX711 and the information is sent to the microcontroller. As the microcontroller is inbuilt mounted with the ESP8266 WIFI chip, it will pass the information to the Thingspeak server.

4. COMPONENTS

4.1. WeMos D1 Mini

WeMos D1 Mini is a mini Wi-Fi device based on ESP8266 chip. This device is a very compact solution for Prototyping small smart objects linked to the World Wide Web. The WeMos D1 Mini features 4MB of flash memory, 80MHz of system clock, around 50k of usable RAM and an on-chip Wi-fi Transceiver. It has 11 Digital pins and 1 Analog pin with an ADC converter in it. It operates in a low voltage of 3.3V, even though the input voltage may vary from around 7V to 12V.It works with a clock speed of around 160Mhz so that you can imagine how fast the data process and can update in the servers.It comes with inbuilt I2C pin by which serial communication can be established easily.

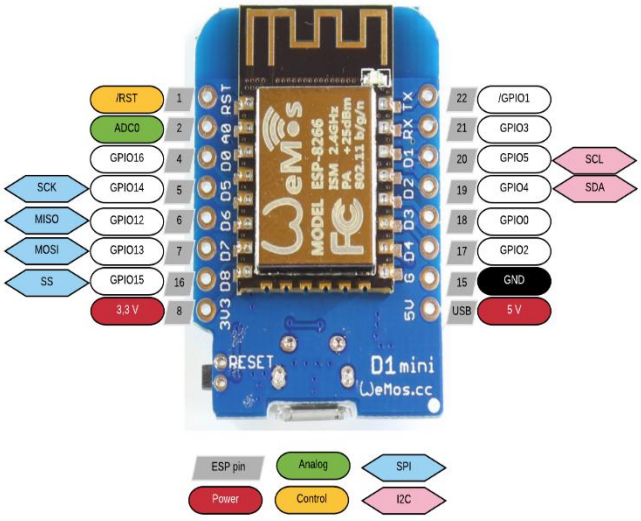

Fig2 WeMosD1 mini pinout

4.2. Hx711 Amplifier

HX711 is a precision 24 bit analog to digital converter (ADC) designed for measuring weights and industrial control applications to interface directly with a bridge sensor. Its features include On-chip active low noise PGA with selectable gain of 32, 64 and 128, Selectable 10SPS or 80SPS output data rate and On-chip oscillator requiring no external component with optional external crystal.

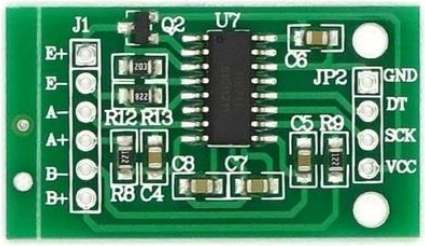

Fig3 Hx711 Module

4.3 Loadcell

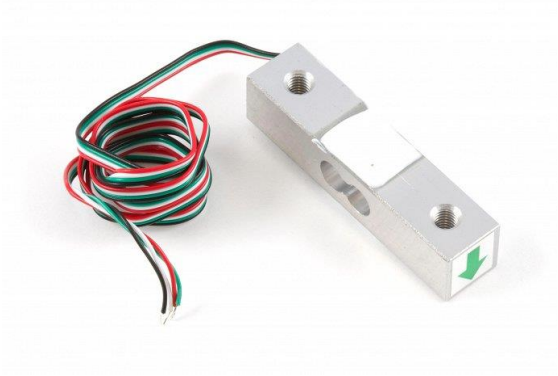

Fig4 LoadCell

A Loadcell is a kind of transducer that converts pressure ,strain, torque energy into electrical signals which can be measured and standardized .As the force on it increases its strain increases which results in the proportional increase in the electrical signals.It consists of an internal wheat stone bridge configurations of resistors as a strain gauge.as the strain increases the resistance value changes and hence the output voltage (electrical signals) changes proportional to the force applied.it consists of four terminals red, white ,black and green that are connected to the four nodes of wheat stone bridge structure present inside the loadcell.

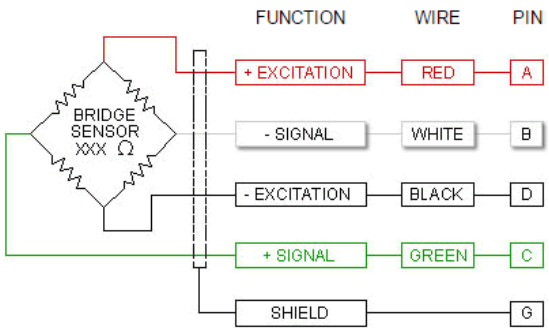

Fig5 Internal configuration of LoadCell

5. RESULTS

Thus, now the Wi-Fi module will be connected to the Thingspeak server and the microcontroller sends the API keys to the network so that we can visualize that information. As in the forms below

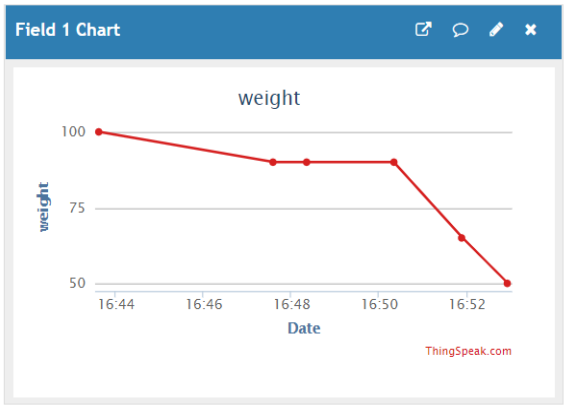

Fig6 Graphical interface of data in ThingSpeak web page

Fig7 Graphical interface of data in a mobile app

6. CONCLUSION

Thus, the above system is an Efficient stock monitoring system which easily reduces the manual power of workers in super markets and a supporting hand for the stock analysis team.

7.REFERENCES

[1] A. Ramaa, K.N. Subramanya, T.M. Rangaswamy **Impact of warehouse inventory management system in a supply chain** Int. J. Comput. Appl., 54 (6) (2012) (0975-8887)

[2] Felix T.S. Chan, H.K. Chan (2011), Improving the productivity of order picking of a manual-pick and multilevel rack distribution warehouse through the implementation of class-based storage, Expert Systems with Applications, Vol. 38(3), pages 2686–2700

[3] S.Angel Raphella, S.Gomathi Nathan and G.Chitra, "Inventory Management- A Case Study", International Journal of Emerging Research in Management &Technology, ISSN: 2278-9359, Vol.3 (3) June 2014, pp.94-102.

[4] M. Rouse," What is inventory management? - Definition from WhatIs.com", Search ERP, 2017. [Online]. Available:http://searcherp.techtarget.com/definition/inventory-management. [Accessed: 17- Jan- 2018].

[5] "Integrations and Apps for Online Inventory Management.SoftwareTradeGecko". www.tradegecko.com. Retrieved2015-11-24.

[6] T. S. Gunawan, et al., "Performance Evaluation of Smart Home System using Internet of Things," International Journal of Electrical and Computer Engineering (IJECE), vol. 8, no. 1, pp. 400-411, 2018.