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DESIGN A MODEL FOR SMART KITCHEN USING MACHINE LEARNING ALGORITHM

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ABSTRACT

The world is moving ahead with the rapid growth and development of technology. Everything is going to be automated and smart and will be accessible in one click. The kitchen is a very important part of our homes which highlights the beauty of our house and it is the area for improvement in the field of automation. This paper deals with the measurements of grocery and ingredients of the Kitchen in a smart manner with a new and attractive design and it should be or must be controlled by a website at any time at any place. New Technology changes the architecture of the kitchen and has changed the method of measuring the number of ingredients in the kitchen. The sensors are used to calculate the amount of the ingredients and are controlled by Node MCU. All the activities will be handled by a website with a collection of data. The level of items will be checked at a specific time and will be ordered at nearby stores. With the help of a load cell and sensor hx711, we measure the weight of pulses and grains and order them according to the Machine Learning Algorithm's prediction. All the ingredients will be added to the inventory.

Keywords: Node MCU 12E, Machine Learning, Cloud, Hx711, Load Cell.

I. INTRODUCTION

Being a developed generation still, it faces some issues. Many houses are located on the outskirts of the town where ladies in such houses find it difficult to keep kitchen items up to date. As markets are located far from their houses, by installing sensors in the kitchen and storerooms, data regarding the amount of grocery and other ingredients can be stored in databases online. Such systems are even helpful in regular kitchens in urban areas where people don't have much time to keep a track of all the ingredients in the kitchen. It is helpful in hotels that range from small scale to large scale for ration management and prediction of ration drop according to the customer visit pattern.

1. To organize all data from the kitchen and present it over a website to generate values and results.
2. All activities commanded from a website.
3. To monitor, detect and place orders for the kitchen ingredients automatically from the nearby store as per the requirements.
4. Monthly budget based ordering.
5. Cost effective design for every person.
6. Smart Diet where all ingredients will be ordered according to a person's diet.

II. METHODOLOGY

In India this type of project does not exist but in other countries such type of kitchen oriented projects are on demand. Measurement systems are available that are used to measure the quantity of ingredients. But both work separately. But in some countries there are some of the projects that support completely automated robots that cook food and serve accordingly. But there are no such projects in which the grocery and other ingredients for food can be measured and all the ingredients are not tracked and the details are not available online, locally or over both mediums. The inventory can be tracked and managed locally on the home network or effectively over the online medium i.e., over the website.

New Technology changes the architecture of the kitchen and has changed the method of measuring the amount of ingredients in the kitchen. The sensors are used to calculate the amount of the ingredients and are controlled by Node MCU. All the activities will be handled by a website with collection of data. Levels of items will be checked at specific times and will be ordered at nearby stores. With the help of a load cell and sensor hx711 we

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measure the weight of pulses and grains and order it according to the Machine Learning Algorithm's prediction. All the ingredients will be added in the inventory.

Proposed System:

Our project aims to develop a new smart kitchen which will be operated by a website through a mobile or a computer. The complete grocery system will be controlled and operated by the system. Our project will measure the quantity of ingredients and will automatically order the grocery according to the storage and its fullness. Instead of using past data, a simple load cell will be used for measurement of the quantity of ingredients. We are even using Machine Learning to predict the depletion of ingredients. With the idea of our project we also want to contribute to Digital India.

III. MODELING AND ANALYSIS

Weighing Device:

This system basically is a simple weighing machine that measures the weight of ingredients or grocery products. This device or sensor is called a Load cell which is connected to the weight sensor hx711 that transfers electrical signals to the Node MCU used. The load cell is used to convert the mechanical force or pressure (strain) into electrical signals pulses. This phenomena is carried out completely by a load cell to generate and measure the weight of any material. This working is based on a filament or substance that is present inside the load cell that is pressurized on placing weight and because of the mechanical pressure, resistance is created, ultimately which is responsible for signal generation.

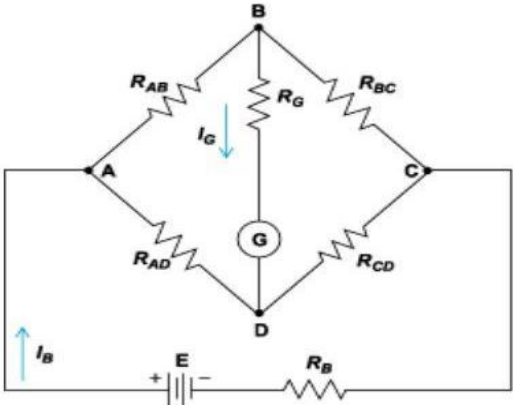

Figure 1: Wheatstone Bridge

Essentially, a compression load cell is a block that is designed to hold a load at one point to measure the compression. While tension load cells measure the pulling force, compression load cells measure a pushing force along a single axis. Generally, a compression load cell is placed beneath the object that needs measuring. As mentioned previously, the strain gauge in a compression load cell is deformed when a load is applied, and this deformation is used to produce the measurement.

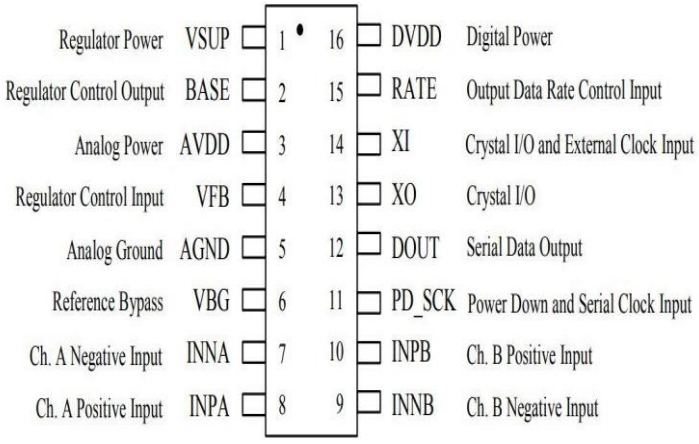

Figure 2: HX711 Pin Diagram

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Transference of data to Server:

Each ESP8266 module can operate as a station, so we can connect it to the Wi-Fi network. It can also operate as a soft access point (soft-AP), to establish its own Wi-Fi network. Therefore, we can connect other stations to such modules. Third, ESP8266 is also able to operate both in station and soft access point mode at the same time. This offers the possibility of building e.g. mesh networks. So, this Node MCU is responsible for transference of data through its Wi-Fi module through a router uploading it on cloud. This cloud server can be of any type the user wishes of.

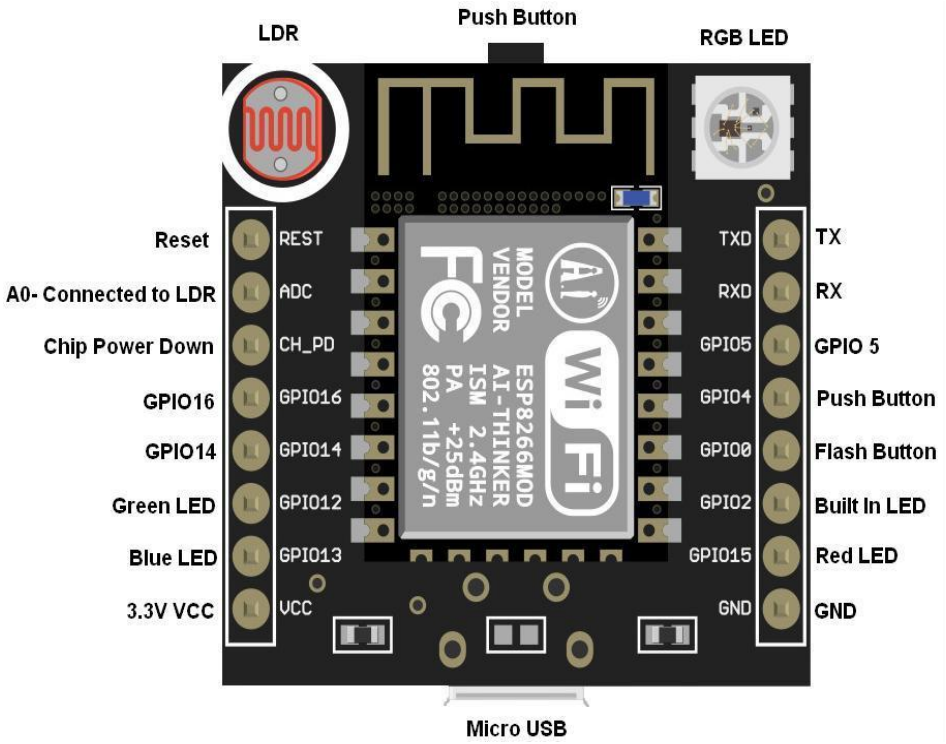

Figure 3: Node MCU and its Wifi module

Blynk is the cloud platform that we have used to carry out server operations and cloud operations to design, visualize and store data. It has three main components: Blynk Application, Blynk Server, Blynk Libraries.

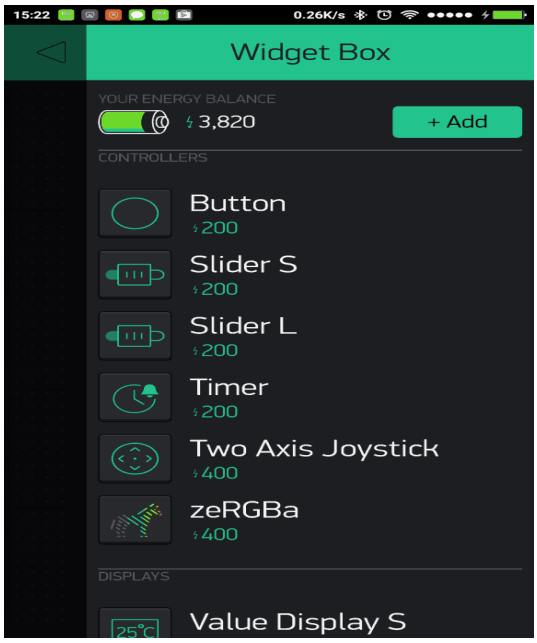

Figure 4: Blynk app UI

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Inventory Management:

This system provides an inventory management system that holds the record of all the ingredients over cloud and internet. This system is responsible to store, access and update all the ingredients that are available in the kitchen through Node MCU, router and cloud or internet. This system collects all weight data of all ingredients and transfers it to the blynk cloud to store and operate on.

Learning System:

This system is basically based on a machine learning algorithm where this algorithm predicts the depletion of ingredients or grocery. This depletion is predicted by the machine learning algorithm where this algorithm also consists of various features. The machine learning algorithm will always predict the results with greater accuracy. These predictions will be based on the data stored in the cloud and the data gathered from the hx711. These predictions will be based on the usage of ingredients on a monthly basis.

Budget based system:

This system is budget based where a fixed budget is decided according to which grocery or ingredients will be ordered. This budget will be decided by the user himself/herself. Budget will be decided based on monthly expenses and the economic conditions which is up to the user to decide. This budget based system will mostly decide the ordering of ingredients, based on previous usages and orders.

Smart Diet:

This is a special feature provided by the system to order grocery according to the diet specified by the family members. These diets can be of any form either health improving or physique improving. This machine learning algorithm even learns accordingly, to order grocery automatically understanding the diet.

IV. RESULTS AND DISCUSSION

As a result, a system having all of the above configurations was implemented with accurate results.

Results:

1. All the data from the kitchen was organized and was presented over a website to generate values and results.
2. All activities were commanded from a website.
3. Each and every action was monitored, detected and orders for the kitchen ingredients were placed automatically from the nearby store as per the requirements.
4. Monthly budget based ordering was executing well.
5. It is a cost effective design for every person i.e. it fit well in the budget.
6. Smart Diet was accepted in the system where all ingredients were ordered according to a person's diet.

V. CONCLUSION

As we all know India is a developing country and it has always been working hard to progress ahead. So, as we know our honourable Prime Minister of India has started a digital India campaign for development of India in the field of technology. By the means of this project we are also trying to support and help in this campaign. We want to give benefits to every person of India. Our team basically hopes that this project will be practically helpful in all situations, whether in houses or hotels, it would perform flawlessly. This project will help to make cooking in the kitchen with an accurate amount of ingredients. In the near future we are seeing our project as the support system of kitchens in each house that would make cooking easy. To create awareness of the Digital India program we strive to work with accuracy.

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