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Auto Weighing Machine

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Disclaimer

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Abstract

To make it easier for legumes sellers to automate the process of filling the recommended weight from customers. Such that if the customer needs 500g from a specific legumes type our machine will go and fill the recommended weight automatically without need any help from seller. We use a hardware components such that Arduino mega microcontroller ,hx711 weighing sensor, 4*4 Keypad and RFID, the customer will enter the card to RFID to buy then the weight and type he needs will be entered through keypad and the machine will fill this weight automatically and then the remaining total weight from this type after being decreased by the weight the customer recommend will be stored in admin database, also the customer points(money) in the card will be decreased by the price of this weight and also stored in admin database and admin has a full access to this information through an application . The results was wonderful in general, but as I know any hardware project will contain some error margin.

Chapter 1

Introduction

1.1 Problem Statement:

Before the idea of our machine hypermarkets need an employee who's responsible of filling legumes for the customer manually based on the weight they recommend , this process is traditional and takes time from employee to reach exactly to the recommended weight and also hypermarkets owners need to hire an employee to do this and this will cost those owners to pay salary to this employee as we see these days hypermarkets are hiring employee to fill nuts and legumes to customers.

1.2 Objective:

The objective is to solve the problem we talk about, our machine will make this automatically without need to an employee to do this the customer will serve himself alone by entering his card to buy and the weight he needs. This machine will save money for the owners of this markets of hiring employee to do the process we talk about. We hope our machine being widely known between those owners and take the advantage of saving money and time from it.

1.3 Scope of the work & importance of your work:

This machine is dedicated to hypermarkets that contains a section for selling legumes or nuts , hypermarkets owners will take an economic advantage as we said previously of hiring an employee and paying salary to this employee and also the owners of those markets have a full access to all information on it using an application plus admin can update any information through that application such that if he needs to update the price of any type he can update it from home such that he don't need to go and tell employees for the new price.

Chapter 2

Constraints, Standards/ Codes and Earlier course work

2.1 Constraints:

We have mainly two exhaustive challenges the first one is how to make balance scale to make weighing sensor(hx711) weighing objects correctly and how to make a frame for this sensor to set objects and weighing them as any commercial balance scale, the second challenge is how to make a runner to put balance scale on it to move balance scale under the specified type , but we thanks god we overcome these problems.

2.2 Standards/ Codes:

We use Arduino IDE to write code for Arduino and NodeMcu , PhpStorm , Xampp server, Mysql database in order to make web application plus it's backend part (PHP).

2.3 Earlier course work:

We learn how to link NodeMcu with web application and it's database and also how to send data between NodeMcu and Arduino , how to use RFID like a visa card to buy through it and to balance hx711 sensor by adjusting it's calibration factor.

Chapter 3

Literature Review:

Some components we used they have been used in previous projects but we take the advantage of hx711 balance sensor to make auto weighing by moving it from position to another and also we have database to communicate and give information to Arduino to work among them and we also have a web application which gives admin ability to see all information about users and machine in general.

Chapter 4

Methodology:

4.1 Implementation

1- Weighing machine

The hardware components we used hx711 balance sensor ,three servo motors, stepper motor, two IR sensors, road motions, NodeMcu, keypad , LCD and RFID, we put three bottles(types), we use hx711 balance sensor to make auto weighing for different types of legumes by take the advantage to move from position to another(from type to type) using stepper motor with road motions , taking advantage from servo motors by controlling them when they must stop opening and closing process when reaching recommended weight and finally we take advantage of IR sensor to detect if there is a jar or not before start filling to avoid filling legumes out of jar, so it will not move if there is no jar , the second IR sensor we used it to detect the start point because any position we need to move balance scale under it we moved it from start point and after reaching the recommended weight we also move it again to the start point, the user enter his card which contains his points (money) throughout RFID and then he enter the weight and type he needs throughout keypad. we have admin database & web application this application will give the admin the ability to charge any card for users and also keep tracking of remaining weight from each type and the ability to make updates such that price or weight of specific type this database gives the expandability to our project since the new card stored in the database , if he need to make the machine larger by adding more bottles he can easily do this and he can by this database add these new types to the database and keep tracking them as the previous ones , so anything Arduino needs to do it must communicate with this database to take information from it such that if the user has enough money to buy, if the weight that remains from this type is enough or not comparing with recommended weight and the price/100g for each type and all of these steps will be understandable for user since any step we do we show the user what we do but in high level(print some words on LCD such as wait...) and all of these things done automatically the only thing we need from user is to put his card on RFID and enter the weight he needs.



Figure 4.1.1: Weighing machine

Components used :

1- Arduino Mega 2560 :



Figure 4.1.2: Arduino Mega 2560

2- RC522 Rfid module:

used to make selling process.



Figure 4.1.3: RC522 RFID module

3- RFID card:

use RFID like a visa card to buy

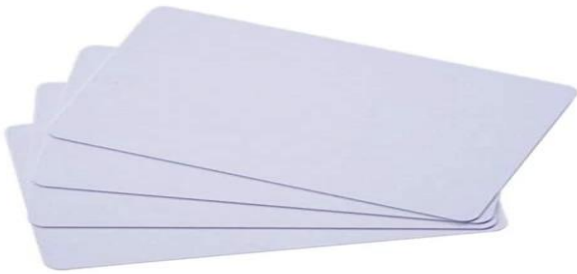


Figure 4.1.4: RFID card

4- HX711 Module Load Cell :

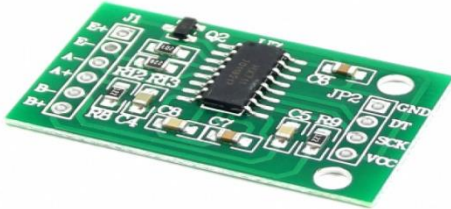


Figure 4.1.5: HX711 Module Load Cell

5- weight sensor:

used to make balance scale which has been used to detect current weight.

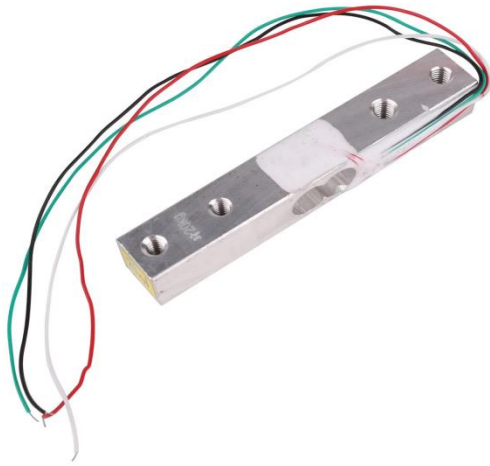


Figure 4.1.6: weight sensor

6- IR sensor:

IR sensor to detect if there is a jar or not before start filling to avoid filling legumes out of jar
The second IR sensor we used it to detect the start point.



Figure 4.1.7: IR sensor

7- 16*4 LCD:

Shows the user what he do (print some words on LCD such as Enter the Weight).



Figure 4.1.8: 16*4 LCD

8- Stepper Motor :

used to make runner which has been used to move balance scale from position to another.

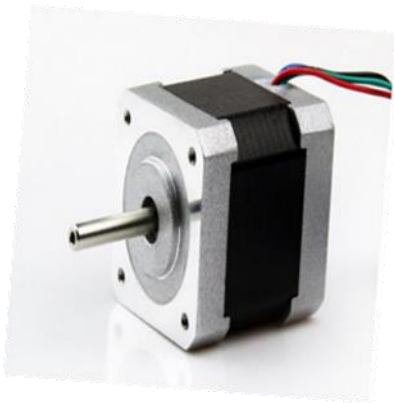


Figure 4.1.9: Stepper Motor

9 -A4988 Stepper Driver :

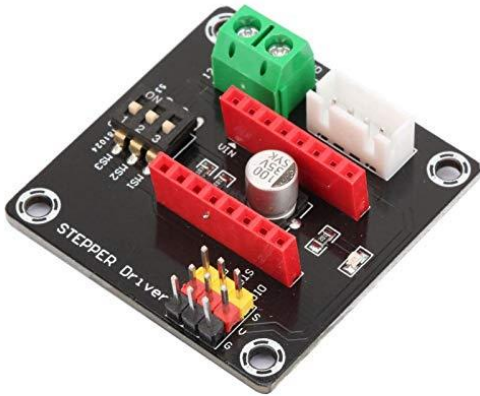


Figure 4.1.10: A4988 Stepper Driver

10- NodeMCU :

Use to help arduino to communicate with the database

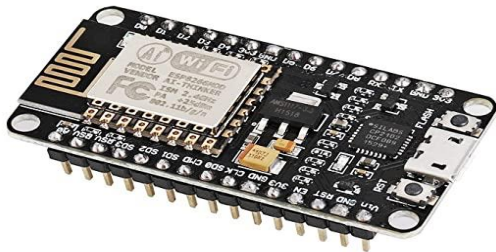


Figure 4.1.11: NodeMCU

11- Buzzer :



Figure 4.1.12: 5v buzzer

12- Servo motor:

use servo motors by controlling them when they must stop opening and closing process when reaching recommended weight.



Figure 4.1.13: Servo motor- MG 996R

13- Key pad :

Used to enter weight and type



Figure 4.1.14: Key pad

14- 12Volt Power Supply:



Figure 4.1.15: 12Volt Power Supply

15- road motions:

A runner to put balance scale on it to move balance scale under the specified type



Figure 4.1.16: road motions

16- Web server :

we have admin database & web application this application will give the admin the ability to charge any card for users .

Weghing machine admin page

Charge/Register User CardSales DataSales Register/UpdateUsers Cards data

Charge\Register Users Form

Price

Save

Figure 4.1.17: Web server

The ability to make updates such that price or weight of specific type this database

Weghing machine admin page

Charge/Register User CardSales DataSales Register/UpdateUsers Cards data

Sales Form

Name

Price\100g

Wiegth\Kg

Update

Save

Chapter 5

Results and Analysis:

The idea was taken from the hypermarkets owners because they want economic solution to reduce the number of employees ,so we told them about this idea to make something more effective from economic side and to reduce time needed for this process, and we provide an extendibility to this machine by adding a database plus RFID cards to use like visa cards.

Chapter 6

Discussion:

In this project we have been made a new idea is how to make automatic weighing for legumes without need any help from anyone by using a quick and easy way to be used by customers or users just by enter his card , recommended weight and type of legumes he need and all of thing done automatically, this solution could be effective from economic side and it's also an easy way and more accurate way to fill to the customer the recommended weight from the traditional way to fill it manually.

Chapter 7

Conclusions and Recommendation:

We were able to make a new machine which contains a database , so we make a new hardware-software project which contains a balance scale, this balance scale has been used in a new way by taking the readings of the balance scale to control the servo motors when they must stop opening in this way we made the idea of auto weighing for legumes, for future we would like to add GSM to send messages to the admin if the admin don' t need to check or track the machine using web application and also to make the machine frame more friendly.

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