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A.I.S WEIGHING SCALE

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Abstract

Various products that can detect the level of health of consumers are the craze of today's society. Many inventors have designed products that can track weight, height, and BMI. Previously, many inventors tried to make weights of various types. Recently some projects can measure weight and are displayed via mobile phones. However, it only focuses on weight. The purpose of this project study developed is to facilitate users, especially in schools and hospitals to take consumer measurements. This study has suggested a 4 in 1 weighing scale linked to smartphone applications. This project uses a 50Kg load cell mounted on a flat board. It is connected to Arduino, Bluetooth, and HX711. As the main driver, Arduino plays the role of connecting hardware to android smartphones to store data in google sheets through applications. Smartphone applications are used instead of recording using a pen. As a result, 4 items were successfully identified. Weight and height indicate tracking success with 99% accuracy. Furthermore, through its application, BMI can be measured automatically based on the weight and height of the user. At the same time, foot measurements can also be shown. All data will be sent and stored in google sheets for record purposes. It is not only convenient for users who face a lot of customers but also data storage methods can be solved. Recording time can also be saved. It is believed that this project can serve as a more economical and useful tool for various walks of life.

Key-word: - Design, Refrigeration & COP

1. Introduction

A Beam balance or Beam scale is a device to measure weight or mass. These are also known as mass scales, weight scales, mass balances, weight balances, or simply scales, balances, or balance scales. Body weighing machine which is sometimes referred to as a "health meter' or “bath scale' and more particularly to a novel and improved indicating means which can give not only the measured weight of the body but also the diet calories to be taken every day in order to proceed to the standard or ideal weight. Electronic weighing Scales for personal health care are widely used. A typical weighing Scale has a flat body including an electronic weighing circuit to measure and a display to indicate weight.

The first spring balance was brought into widespread use in the eighteenth century. In Bilston, England Richard Salter began making what is today known as a fisherman's scale which used a spring balance to measure weight. Next, the Salter brand was also the first company in England to marked bathroom scales. Modern home scales have evolved from these early industrial prototypes. Today, the scale is based on the same spring balance idea.

2. Problem Statement

Based on observations, it is difficult for us as consumers to find a product that can measure height, weight, and foot size in 1 product. Most require at least 2 tools for measurement. Problems get bigger when users have to use pen and paper to record measurement data. And it becomes a burden where users Need to use other tools such as a calculator to calculate BMI

3. Objective

The objective of this product is:

i. To produce 4 in 1 product which can measure height, weight, BMI, and feet size
ii. To reduce paper usage and data storage
iii. To calculate BMI automatically

4. Methodology

Figure 1 shows the block diagram of the input and output for our project by using Arduino Uno as a motherboard. Load cell as the input for HX711 to measure the weight. The ultrasonic sensor is required as input for height and foot size. By get the output from the device via Bluetooth module HC-05, the apps get the command output from Arduino Uno. Other than that, the output for weight also out at LCD I2C. The A.I.S is powered by a Li-Ion battery which can also need recharged

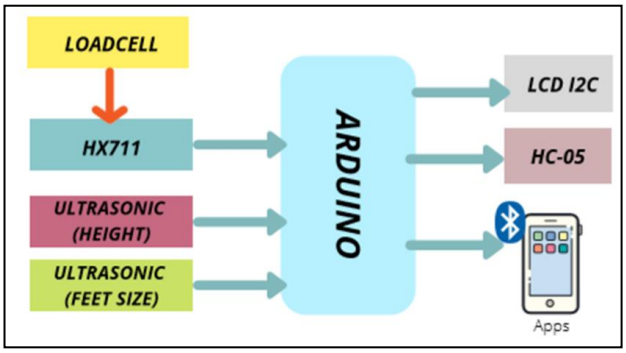


Figure 1 Block Diagram of the Project

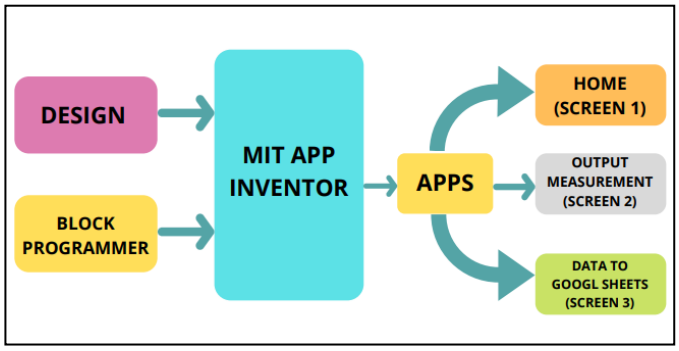


Figure 2 Block Diagram of the Apps

The project application is designed by using the MIT Apps Inventor application as shown in Figure 2. The operating system is Android and available in 19 languages. It begins with the website which is appinventor.mit.edu in Google chrome. MIT Apps Inventor provides 3 methods to users to use the apps which are file .apk, file .aia, and also the QR code scanner. The input is the design and the block diagram meanwhile the output will pop out with 3 screen which is home, output measurement, and data to Google Sheets as shown in Figure 4

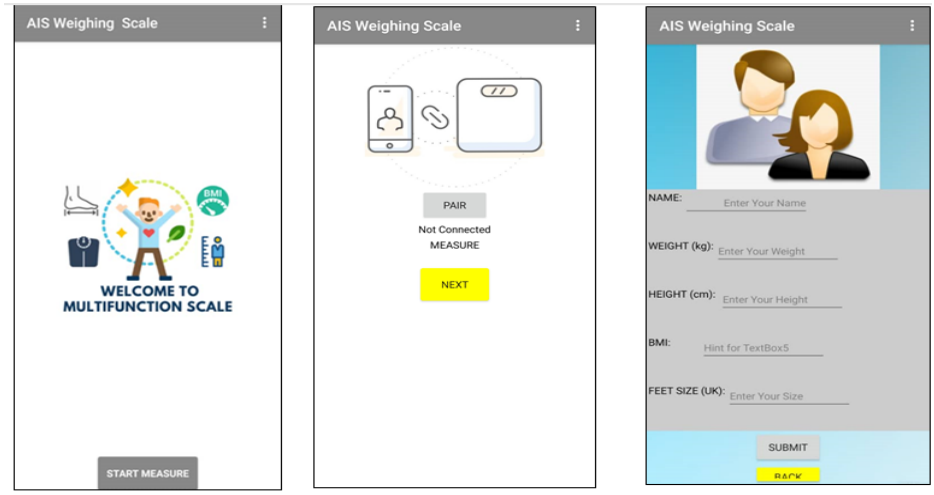


Figure 4 Screen at Apps A.I.S Weighing Scale

5. Result

Weight sections consist of 4 units of load cell 50kg that combine to accommodate the weight up to 180kg. This component working voltage of 2.6-5.5v and a working current of 1.5mA. The combination between 4 load cells will be connected to the hx711 load cell amplifier then to Arduino as a microcontroller. Table 1 shows the attempt of 1kg of flour with the data as output. The accuracy column is used to identify how it works accurately. The data analysis shows that the first attempt was far away from the actual mass of a packet of flour. That's because coding requires some calculations to measure any mass. Then, with each experiment, we minimized the calculation value in the encoding formula to reach 99%. Of course, we cannot get 100% accurate because of the many parallax errors such as surrounding parallax errors, twilight, and errors from components or circuits. From the observations, the improvement of the data achieves accuracy with each experiment. It is shown that we can overcome the problems by change the value of the formula in coding. Between attempts 8 and 9, there was a different unit of data from gram to kilogram, so there he changes a big value in the formula to get the value as small as data at attempt 9.

Table 1: Accuracy product based on no of attempt with actual data (1kg)

No of attempt	1	2	3	4	5	6	7	8	9	10	11	12	13
Data (grams)	10580	2589	1829	1376	1109	1054.78	1023.25	998.95	9900	1001	9900	1030	1000
Accuracy, % (± 0.05)	9.45	38.63	54.68	72.6	90.1	94.81	97.73	99.89	99	99	99	99.3	99.5

For height analysis, during the process, the ultrasonic sensor will read height by calculating the range of the user's head and ultrasonic subtract with 200. The reason subtracts 200 is because the sensor is 200 cm at the top from the floor. This testing is compared with data using measuring tape. Figure 5 shown that the functionality works pretty well and it align with actual data.

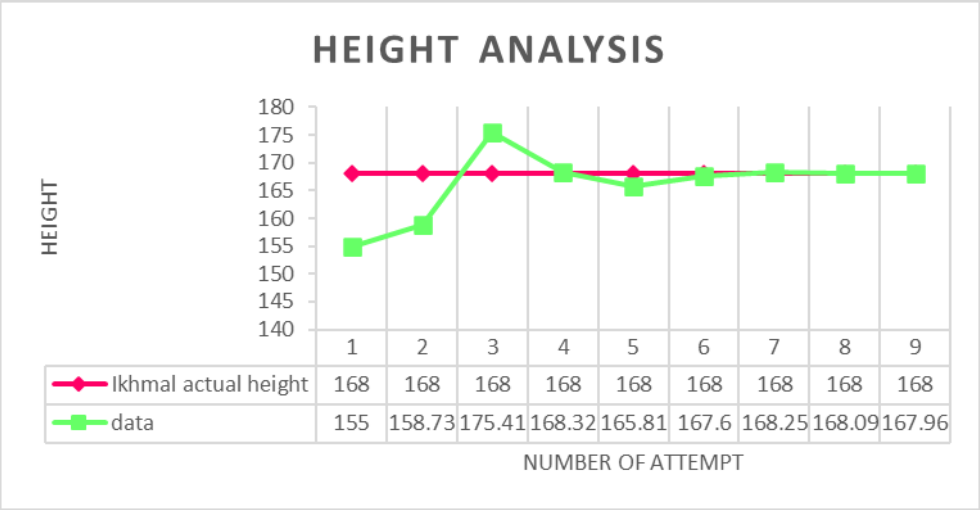
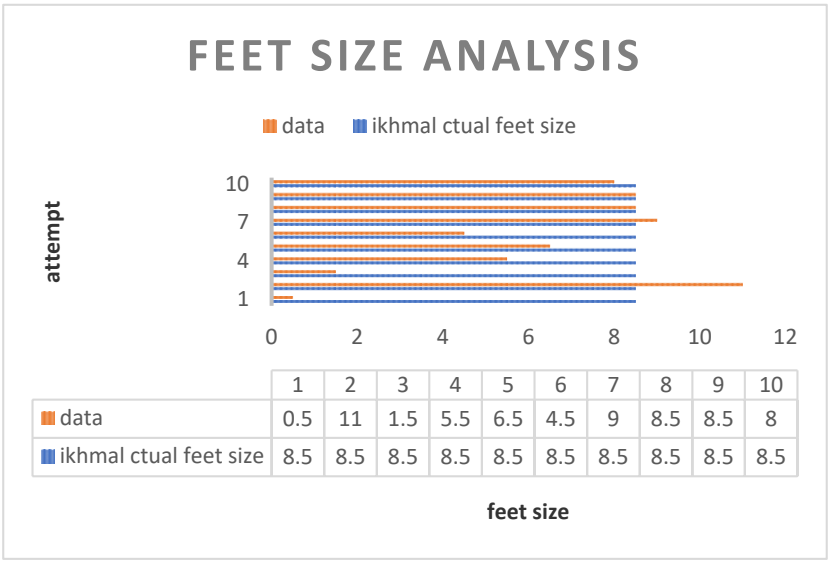


Figure 6 Height Analysis

For the feet size, an ultrasonic was used as sensor that translates from range toes with ultrasonic to global feet size in 'US'. Coding was holding a big role to make sure all feet size can be detected accurately. Furthermore, global feet size includes every group of fee size that can be total around 50 feet size. Also, the accuracy of the feet size is highly dependent on the placement of the ultrasonic sensor, so we need to make sure the sensor does not move and keeps static at its holder. Figure 7 explains the accuracy of the sensor to measure feet size compared with actual feet size.



	1	2	3	4	5	6	7	8	9	10
data	0.5	11	1.5	5.5	6.5	4.5	9	8.5	8.5	8
ikhmal ctual feet size	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5

Figure 7 Feet size data analysis

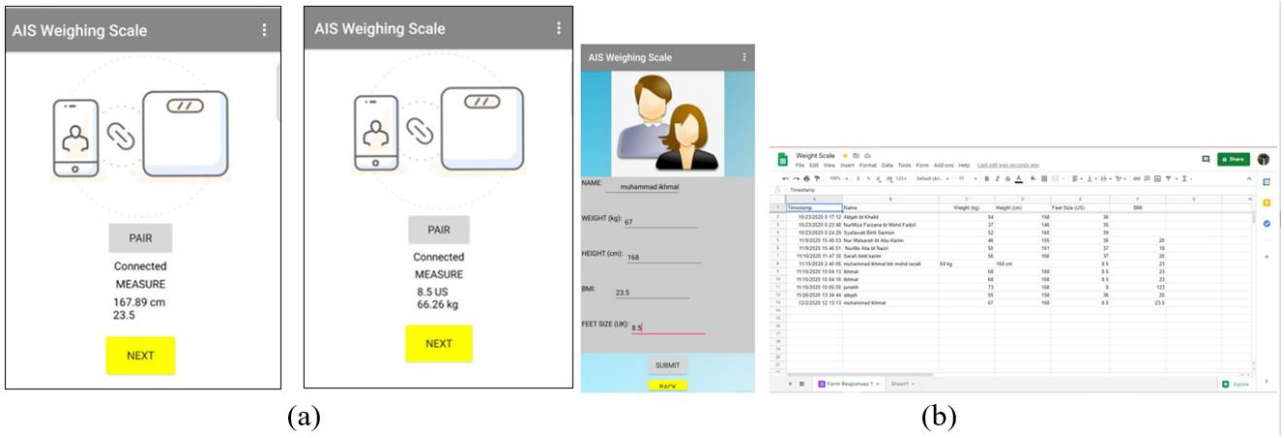


Figure 8: Data from (a) A.I.S Apps and (b) Google Sheets

In this project, 4 functions to measure weight, height, feet size, and calculate BMI as shown in Figure 8. Human weight is very important to take care of nowadays because the world is the majority full of an obese person. To develop a mechanical mechanism to combine all the functions into one device, we had used a different kind of material because to make it simple, quite thin, and quite light. The reason for using Arduino as a microcontroller is because it is easy to control, manage, and troubleshoot the component by coding in Arduino.

The MIT App Inventor is the right choice because the language is easy to understand and provides many features for the creator. It also free to use without requiring any payments. Besides that, MIT app Inventor provides an Android emulator for people who do not have Android devices to see the simulations.

6. Conclusion

The aim and objective of this project has been achieved. The prototype of A.I.S multifunction scale is still in good progress and the weight system can function successfully. To accomplish the first objective, to create a weighing scale that easy to access to the smartphone. Nowadays, a smartphone can do almost everything. Faster networking systems, attractive and powerful applications, and technology literate users are making these smartphones very powerful these days. Adopting smartphones due to their flexibility, more productive features, and better connectivity to the world in terms of internet. To achieve the second objective, to design a device that can monitor data monthly. Either way, it's smart to monitor user data flow, not only to make sure the old data safe but also to find out if the user needs to rethink your current data. Meanwhile, the third objective is to measure the weight, height, BMI, and feet size. The output will come out thru apps.

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