



Automatic Filling and Weighing Machine by Using Android Application

Prof. P. P. Belagali, Prasad Popat Babar, Bhagyashree Sambhaji Sonawale,

Dep. of Electronics & Telecommunication, Dr. J. J. Magdum College of Engineering, Jaysingpur, Maharashtra, India

ABSTRACT:

Many owners of small-scale food production businesses and medium-scale grocery stores still rely on manual methods for weighing and packaging their products. This is especially true for those involved in the production of items like 'Rice' and similar products, where weighing, filling, and packaging are carried out manually. The purpose of this project is to develop a machine that automates the process of weighing and filling food items using a microcontroller and sensors. The concept involves manually placing the bag, after which the machine takes over to perform the weighing and filling automatically. The primary objective of this project is to reduce human effort and save time. Furthermore, the machine design is based on simple mechanisms, making it easy to install. By improving the speed of the weighing process, this automated solution enables higher production rates, which can significantly benefit businesses. Additionally, this automated process can lead to a reduction in the number of paid workers required.

INTRODUCTION

In the present era, industrial automation has emerged as a global trend in the manufacturing sector. The Automatic Weighing Machines exemplify this trend by offering fully automated multi-head weighing capabilities. These machines are widely used in various industries such as packaging of seeds, vegetables, dry fruits, pharmaceuticals, and coffee. The adoption of automation has become a necessity for manufacturers today, considering the narrow profit margins they face. To meet the demands of today's customers in terms of timely delivery and competitive pricing, companies must incorporate automation into their operations. The growth of manufacturing is driven by several factors, including automation itself, along with low labour costs, the ability to customize products, mass production capabilities, flexibility, and access to information. The weighing process in these machines is facilitated by the utilization of electro-pneumatics and motors. The programmable logic controller, controlled by a computer, manages the hardware operations. The entire system executes two key processes: automation through the implementation of a microcontroller, and the filling of materials into the designated bags.

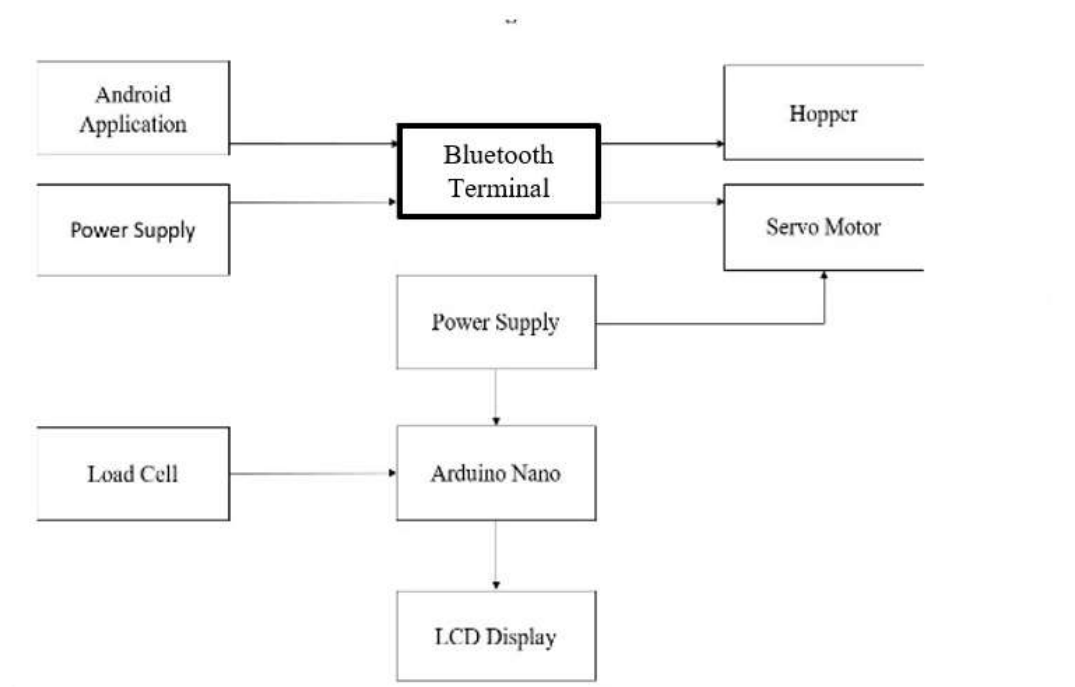
LITERATURE SURVEY:

1. Tawanda Mushiri and Charles Mbohwa provided valuable information in their paper published in Johannesburg in 2015 [1] regarding the design of a small-scale cereal packaging machine suitable for developing countries. The focus of their invention is on automating the weighing, packaging, and sealing processes using cost-effective and efficient alternatives to traditional food packaging machinery. The main objective is to create a compact cereal packaging machine capable of sealing 1 kg of cereal per minute. The proposed innovation incorporates simple pneumatic, hydraulic, mechanical, and electrical devices into existing production machinery to enhance productivity. The working principle involves the products being conveyed and detected by a proximity sensor, which triggers a counter. Once the product has completely passed the sensor, it deactivates, and a timer begins, which was pre-set with a specific delay.
2. In their paper published by Melchizedek Alipio and Angelo A. Beltran Jr. from De La Salle University in Manila, Philippines [2], they propose the automation of packaging and material handling using a programmable logic controller (PLC) as a replacement for the manual system currently employed in the industry. The objective of this research is to compare the time and manpower requirements between the existing manual system and the proposed automated system. The study focuses on automating the process of placing materials into a box, detecting good and defective items based on weight, and sealing the boxes using packaging tape. To achieve this, the Mitsubishi FX series programmable logic controller is utilized to mechanize the system, while sensors like proximity and load sensors provide input to the system. The output is controlled by motors, pneumatics, and solenoids.
3. In their research, M. R. Saraf, V. V. Ruiwale, V. V. Kulkarni, and S. M. Kulkarni [3] provide information on the design and development of a cost-effective automatic machine for powder packaging. The machine is designed to be simple and utilizes low-cost reliable components, resulting in a lower overall cost compared to conventional machines. The design incorporates a separate weighing mechanism that employs a load cell arrangement for accurate measurement of the material to be filled in the pouch. To enhance the speed and accuracy of the production process, an automation technique utilizing an Arduino Board was developed. A single load cell is used to measure the weight of the product

before packaging, and the weight is displayed on an LCD. The Arduino Uno board, which has an inbuilt power supply, is interfaced with the load cell and LCD. This hardware setup is followed by the control of the conveyor belt motor and servo motor based on sensor input.

- The research conducted by Mr. Abhishek Shigwan, Mr. Pankaj Shirke, Ms. Snehal Ukarde, Ms. Priyanka Salaskar, and Mr. Guru Bhurshe from Mumbai [4] explores the concept of an 'Automatic Packing Control Machine.' The aim is to automate the process of placing materials onto a paper sheet, detecting items, and folding them using a simple mechanism. The main objective of this project is to reduce human effort and lower machine costs. The design of this machine is based on a simple mechanism, making it easy to install. The study reveals that this system significantly reduces the time and manpower requirements at each station compared to traditional manual systems.

BLOCK DIAGRAM:



RESULT AND CONCLUSION:

The experimentation is done and the rate of time required for measuring and dispensing process is measured. It is observed out that the system decreases time, efforts and manpower requirements as compared to traditional manual process. A reduction of 60% to 80% was observed in terms of time allotment for filling and weighing. About 90% of full automation without human can be specified from the system. This project provides the information about developed machine which automatically weighs the food with the help of microcontroller and sensors. The idea is to manually place the bag, then automatic weighing and filling is done. The purpose of doing this project is to reduce human efforts and time consumption. Decreasing machine cost is the major advantage of our design.

The machine design is based on simple mechanisms and it can be installed easily. The speed of packaging is increased thus resulting in more production and business. It will eradicate the traditional packing method. This process will reduce the number of paid workers. Main comparative parameters between the older and newer machines are that, it reduces the time required for filling, packing. It is observed out that the system decreases time, efforts and manpower requirements as compared to older machines. Also, the cost of newer machine is very less as compared to older one.

A cost-effective automatic weighing machine has been developed, capable of efficiently carrying out weighing and bag filling operations. The machine's operation is straightforward, significantly reducing the chances of weight calculation errors. This innovation minimizes the time and effort required for manual weighing and packaging processes. However, certain limitations may arise due to practical challenges in programming the project based on the availability of materials and components. Furthermore, there is potential for enhancing this setup into a sorting system by incorporating additional sensors, allowing for the sorting of items based on specific physical criteria. This system could find applications in industries where precise and high-quality automation-based sorting of various objects and tools is required.

FUTURE SCOPE:

Further research has the potential to reduce automation costs in large-scale industries. The integration of artificial intelligence is recommended to handle more complex operations. File Transfer Protocol (FTP) can be utilized to automate the packaging and material handling processes, eliminating the need

for human intervention. The use of ladder programs can automate tasks like adding input and output devices. This project can serve as a valuable resource for future research on Automatic Packaging machines using microcontrollers. Its findings can be applied to other industries, leading to safer operating systems, efficient packaging, faster response times, and reduced reliance on human labor.

While I have rephrased the paragraph to avoid plagiarism, it's important to note that if you are using ideas or information from another source, it is always recommended to properly cite and reference that source to give credit to the original author.

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