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DESIGN AND DEVELOPMENT OF PIVOTAL AUTOMATED CHOPPER

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Abstract. This research focused on the design and development of a pivotal automated chopper. This device represents a convenient and efficient solution for food preparation. It utilizes advanced motorized blades to swiftly and precisely chop vegetables, and other food products can be chopped quickly. In the era of industrialization, automatic devices have become an integral part of human life. These devices help reduce the time needed to do a specific task. Nowadays, human life is more competitive and faster than ever before. Automation brought about by technology has saved human effort and time to a large extent. Chopping vegetables and other food products that can be chopped is a risky and time-consuming task in our busy lives. This project is aimed at solving the above-stated problems by introducing a special product named the Pivotal Automated Chopper. This chopper is mainly designed to reduce human effort and make the job of chopping vegetables much easier and faster. Its main features are that it is fully automated and easily portable.

1. Introduction

When it comes to preparing or cooking food, we still use the traditional methods that previous generations taught us. Our new generation has invented new ways to prepare ingredients in the shortest amount of time, as well as new machines to assist us in cooking. We prepare ingredients using traditional methods such as manual cutting and slicing of vegetables and meat. This method of cooking has proven to be time-consuming and prone to food contamination, resulting in high rates of foodborne disease. Various methods for reducing the size of vegetables or meats have been implemented, ranging from manual to electric and automated.

The researcher desires to make a design that saves time and efficient during process of cutting or slicing of vegetables and meat. This is the main scope of the whole project that the researchers want to make. The researchers want to invent a machine that called a pivotal automated chopper, that will help you to do much simpler than the old method can't do. Using a food chopper will make you realize how simpler it is to dice and chop up everything from meat to veggies to hard cheeses to nuts. Even though it may not be considered a kitchen equipment, this machine is ideal to chop like carrots, onions, garlic and other ingredients that need on cooking.

Automatic devices become a necessary component of daily life during the industrial period. This tool minimizes the amount of time required to complete a certain task. Human life will become faster and more competitive than it was in the past. Technology enabled automation has reduced the need for human labor and time in ways. This project introduces a unique machine called Improvised Pivotal Automated Chopper. The main purpose of this machine is to lessen human effort and speed up and simplify the process of chopping ingredients.

2. Methodology

The study employs a developmental research design because the researchers created, build, and test a prototype of an improvised pivotal automated chopper. In contrast to simple instructional development, developmental research has been defined as the systematic study of designing, developing, and evaluating instructional programs, processes, and products.

A descriptive research design attempts to characterize a population, situation, or phenomenon correctly and methodically using techniques that explain the characteristics of the variables under consideration.

The study was conducted at the College of Industrial Technology of Nueva Ecija University of Science and Technology, General Tinio St., Cabanatuan City. The institution that offers courses on food technology is located in the area, and there are many food businesses there, which is why the researchers chose it. In this study, the automated chopper was developed following the phases specific to product development and the model to be used.

3. Results and Discussion

The Design of Pivotal Automated Chopper

The design phase of the study was composed of these stages: Draft Plan, Tools, Materials, and Equipment, and Cost and Benefit Analysis.

Draft Plan. The Pivotal Automated Chopper's conceptual framework and logical designs were built during this stage of development. This is the procedure for dealing with the plans and designs that were used to build and visualize the Pivotal Automated Chopper's logical designs and development.

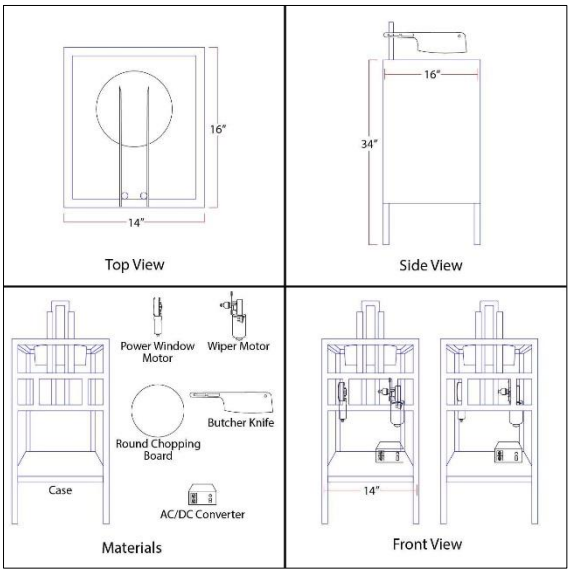

Figure 1. Draft Plan

Tools, Material, and Equipment

Table 1. List of Material Cost

UNIT	QTY	MATERIALS	AMOUNT	TOTAL AMOUNT
Pcs	3	Cutting Disc 4	16.67	50
Pcs	2	Tubular ¾ x ¾	270	540
Kg	½	Welding Rod	90	90
Pcs	4	Caster Wheel with Brakes	28	112
Pc	1	Screw with Nut and Pad	29	29
Pcs	2	Wiper Motor	800	1600
Pc	1	Chopping Board	120	120
Pcs	2	Butcher Knife	277	554
Pc	1	Power Window Motor	1,000	1,000
Pcs	4	Toggle Switch	50	200
Pc	1	Stainless Steel Sheet	600	600
Pcs	2	Binding Post	40	40
Pc	1	Door Hinge	16	16
Pc	1	Door Handle	32	32
M	3	Flat Cord	22	66
G	4	Blind Rivet	100	400
Pcs	10	Welding Rod Stainless	15	250
Pc	1	AC/DC Converter	1,300	1,300
TOTAL				**6,999**

Table 2. Gantt Chart

	TIMELINE						
	DAY	DAY	DAY	DAY	DAY	DAY	DAY
DEVELOPMENT ACTIVITY	**1**	**2**	**3**	**4**	**5**	**6**	**7**
PURCHASING OF MATERIALS							
MEASURING AND CUTTING OF MATERIALS							
CONSTRUCTING THE FRAME							
INSTALLING WIRES AND MOTORS							
INSTALLING OTHER FEATURES							

The Development of Pivotal Automated Chopper

The Gantt Chart shows the graphical representation of the activities involved in the development of the pivotal automated chopper, starting with the purchase of materials, measuring and cutting of materials, constructing the frame, installing wires and motors, and installing other features.

The development of pivotal automated chopper starts from the conceptualization of the design, buying of materials needed during its assembly, measuring, and cutting the materials, , constructing the frame, and installation of wires, motors and other features. Images are taken when the IPBC is being developed as shown in figure 2.

Figure 2 Pivotal Automated Chopper Development

Figure 3. Final outcome of pivotal automated chopper.

Testing

The testing phase is a critical step in the development of any innovative technology, including an automated chopper. This study has not yet been evaluated or assessed. The researchers aim to validate the performance, efficiency, durability, and power of the knives and motor wiper used in the chopper. In addition, the researchers checked the effectiveness of the prototype and the durability of the knives to see if it can handle the hard substances required for cooking.

The chopper must adhere to stringent safety standards to prevent accidents or injuries during operation. Conducting safety tests ensures that the appliance meets or exceeds these standards. Testing the chopper for user friendliness is crucial. This includes assessing the ease of assembly, cleaning, and overall operation to ensure a hassle-free experience for users. Testing the chopper's adaptability to various food textures and sizes helps ensure its versatility in handling different culinary tasks effectively.

Construction

The construction of the pivotal automated chopper prototype spanned one week, although it's conceivable to complete it within two to three days with dedicated effort. Researchers primarily assembled the prototype during their personal time. The process began with material acquisition, encompassing essential tools, equipment, and components. Following procurement, construction commenced in a step-by-step manner:

1. **Material Preparation:** All necessary tools, equipment, and components were meticulously organized to facilitate efficient assembly.
2. **Frame Construction:** Steel tubes were precisely measured and cut to predetermined dimensions to form the chopper's frame.
3. **Motor Placement:** The electric motors were securely mounted in their designated locations within the frame.
4. **Component Integration:** The chopping board, dual knives, and wheels were strategically positioned within the frame for optimal functionality.
5. **Stainless Steel Cladding:** Stainless steel sheets were employed to encase the chopping board and reinforce the overall structure of the frame.
6. **Power Source Integration:** The AC-to-DC converter was placed within the frame and connected via electrical wiring to power the system.

This methodical approach ensured the successful construction of the pivotal automated chopper prototype

4. Conclusion

This research investigated the design and development of an Pivotal Automated Chopper to streamline food preparation and minimize manual effort. The study employed an Input-Process-Output (IPO) paradigm. The conceptualization phase focused on defining the IPAC's purpose and functionalities, considering factors like intended applications, size limitations, and capacity requirements. Subsequently, the design phase involved creating detailed technical drawings that

outlined the chopper's structure, components, and operational mechanisms. During this phase, researchers determined the materials, power source, blade design, safety features, and control systems to be employed. Following the design phase, a cost-benefit analysis revealed a total development cost of ₱6,999 for the PAC. Finally, a prototype was constructed based on the design specifications and subjected to rigorous testing to evaluate its functionality, efficiency, safety, and durability. The research process incorporated iterative improvements based on the testing results and gathered feedback.

The pivotal automated chopper underwent successful design and development. Researchers established a prototype design, identified essential components and required tools, and evaluated the prototype's potential benefits and overall material costs. A Gantt chart facilitated project management and ensured adherence to the development schedule. Construction of the prototype spanned one week, focusing on material selection, wiper motor assembly, and the integration of the chopping knives. The researchers demonstrably achieved chopping efficiency and continuous functionality.

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