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# **EXTENDED ABSTRACT BOOK**

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# Design and Fabrication of a Potato Peeling Machine

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**Abstract**— Since most peeling is now done by hand, which is very convenient for housewives, skin removal is still a vital unit of activity in potato processing. The idea of fully automatic potato peeling equipment is the main objective of this project. The initiative focuses on small and medium potatoes, portable machines, and affordable manufacturing costs. It is intended for housewives and small businesses such as hawkers. The rotating disc, the peeling blade, and the drive connection to turn the rotating disc with the motor shaft are all included in the essential components of the machine. The protrusions on the inner surface of the rotating disc cause the potato to operate into the peeling blade as it rotates. During the process, a little water is needed to wash the potatoes and facilitate the peeling process. As a result, this machine can reduce the time and labour required to process potatoes.

**Keywords**—Small and Medium potatoes, Potato peeler, Portable, Affordable.

## I. INTRODUCTION

The task of peeling potatoes is a commonplace activity in the catering industry, restaurant kitchens, and domestic households. However, the manual peeling of large quantities of potatoes is a labor-intensive and time-consuming endeavor, posing challenges to small business owners and homemakers alike. Furthermore, the conventional method of using knives for peeling not only consumes substantial time and energy but also entails inherent safety risks. This research project aims to address these challenges by conceptualizing, designing, and constructing a portable, automated potato peeling machine, with a primary focus on enhancing efficiency and user safety.

The existing market offerings fall short in meeting the demands of consumers, particularly homemakers and small-scale enterprises, as they necessitate extensive manpower and protracted processing durations. The core issue at hand pertains to the substantial expenditure of energy and time associated with potato peeling, particularly when dealing with substantial quantities, compounded by the safety concerns inherent to traditional knife-based peeling practices. The principal objectives of this research endeavour encompass a) The conceptualization and design of a portable, automated potato peeling machine capable of significantly reducing the requirement for manual labour during the potato peeling process and b) The fabrication of a potato peeling machine equipped with robust safety features to ensure user protection during its operation.




The significance of this study lies in its potential to ameliorate the labour-intensive nature of potato peeling by introducing automation into the process. This technological innovation not only minimizes the reliance on human effort but also affords considerable time savings for consumers, particularly homemakers who can concurrently attend to other household chores while the potatoes are being peeled. Moreover, the incorporation of advanced safety controls in the machine eliminates the need for users to resort to potentially hazardous knife-based methods, thereby substantially reducing the risk of injuries during the peeling process.

## II. MATERIALS

### A. Benchmarking/Comparison with Available Products

Various potato peeling products are available in the market, including manual peelers, electric fruit and vegetable peelers, and fully automated potato peeling machines. Table 1 provides an overview of the available potato peeling products, which encompass manual peelers, electric fruit and vegetable peelers, and fully automated potato peeling machines.

Table 1: Overview of available potato peeling products.

Types	Manual Peeler Device	Electric Potato Peeler	Automatic Peeler Machine
Size	4.9cm x 14.9cm	14cm x 14cm x 29cm	69cm x 43cm x 86cm
Price	RM 2- RM 10	RM 150 – RM 300	RM 900 – RM 3000
Weight	0.2-0.4 kg	0.8 kg	>50 kg
Output	-	-	150 kg/h
Voltage	-	DC 6V	220 V
Advantage	- Comfortable touchfeeling and lightweight. - Non-stick bladesurface. - Easy to clean	- Cleans easily with a damp, sudsy cloth. - More hygienic than manual peeling.	- Easy operation and cleaning - Low energy consumption - Suitable for various vegetables and fruits
Disadvantage	Sharp blades are exposed.	Peel only one potato at one time.	- Expensive and Not portable
Diagram			

### B. Sustainability and Ergonomic Considerations

Sustainability is characterized by the ability to maintain or support a process over time. As engineers, it is imperative that we comprehend the interconnections between reuse, recycling, and the impact of carbon emissions. Developing an environmentally friendly machine necessitates the application of all relevant requirements to the final product. This entails considering numerous factors, including the choice of metal, size, basic torque or stability calculations, and component selection, among others.

The utilization of non-motorized mechanical aids has been associated with decreased labour efficiency and the loss of working hours. This phenomenon is primarily attributed to the challenges associated with managing large, non-motorized equipment, which leads to quicker onset of fatigue. Our study posits that optimizing workplace conditions and reducing ergonomic stress can substantially enhance both efficiency and safety within the work environment.

The principal objective of this study is to design and fabricate an automatic potato peeling machine aimed at improving work efficiency and occupational safety and health. In the context of peeling potatoes in substantial quantities, we have developed designs and procedures through a collaborative approach to identify concerns and propose actionable solutions.

### C. Bill of Materials (BOM)

Materials for this machine's construction were chosen based on their availability, stability, stiffness, toughness, and ease of fabrication. Engineering characteristics are considered during the design and construction of machines, including potato peeling pressure, torsional moment, design force, and screw torque. Figure 1 shows the BOM for the product.

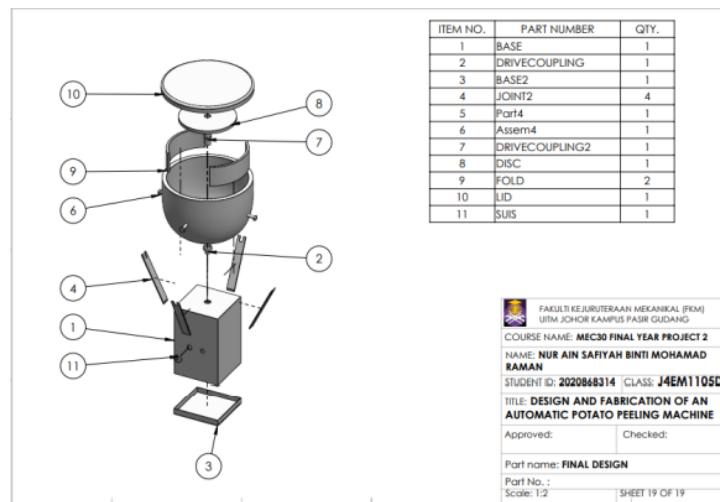


Figure 1: BOM for the product.

### III. METHODS

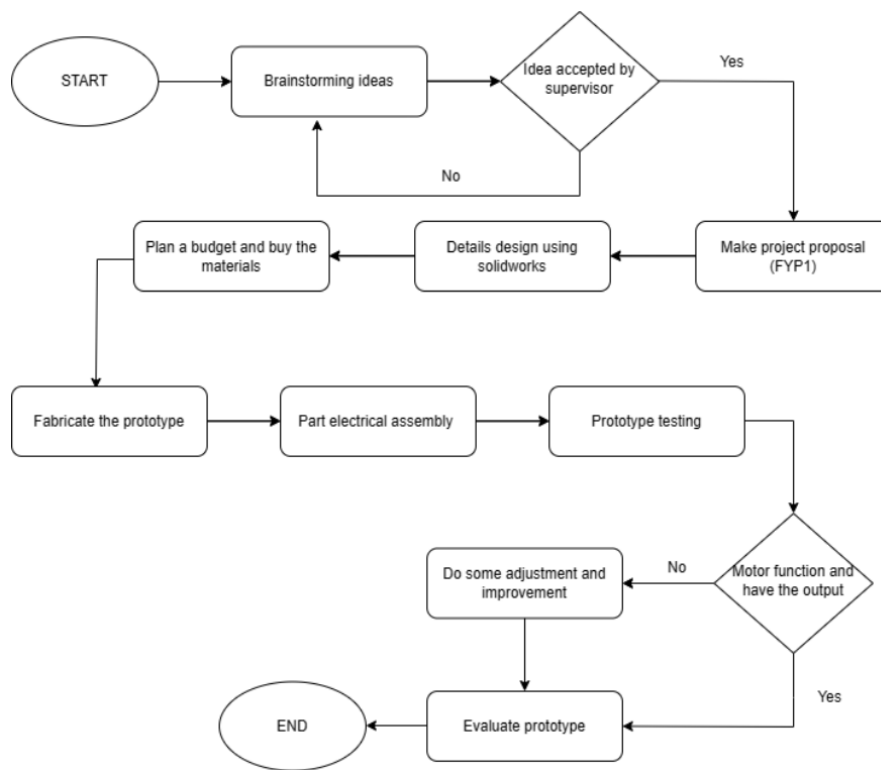


Figure 2: Overall project flowchart.

From Figure 2, there are few phases involved in completing this project. This flowchart simply shows how the project has progressed. Firstly, brainstorming the idea. Participants are encouraged to think independently when using the brainstorming technique to generate ideas and exchange information to address a particular commercial or technical problem. To design and construct mechanical, electrical, and software components, Solid Works 2019 was used to design the device for this project in its whole and in its full dimensions. Best-in-class design tools for sketching, modelling, and assembly were also necessary for the project. Solid Works offers a comprehensive collection of solutions that include all these features and more. Next, calculate the amount of money needed to complete the project. The total budget considers the price of materials, electrical components and more. The prototype was built using welding and a few other tools. Metal inert Gas (MIG) and Tungsten Inert Gas (TIG) welding are both used. Additionally, a hand grinder is used to cut stainless steel plate into the rotating disc and motor housing.

### IV. RESULTS

The material for the mixing bowl, paring knife and rotating disc is stainless steel because it is cheap, durable, and rust-proof ideal for kitchen utensils. The motor housing is made of metal because it can withstand high loads and is durable. A plastic cover is used to reduce noise and prevent the potatoes from falling out during the peeling process. The power source needs to be plugged

in to turn on the motor, the shaft will rotate thus turning the rotating disc. Table 2 below shows the final specification of the prototype.

Table 2: Final specification of the prototype.

Types	Specification
Power	AC Motor 800W
Speed	10000-13000 rpm
Capacity of Potato	0.6 kg
Basic function	Peel
Bowl Material	Stainless Steel
Switch Control	1 (ON), 0 (OFF)
Peeler Blades	2 Stainless Steel

## V. CONCLUSIONS

In conclusion, the first project objective has been successfully realized. The prototype was meticulously designed using Solidworks in accordance with the specified criteria, primarily aimed at reducing the need for manual labour during the potato peeling process. Additionally, the prototype has proven to significantly enhance efficiency where it successfully peels potatoes in under one minute, eliminating the requirement for human intervention.

Moving on to the second objective, it has been attained through the creation of a potato peeling device that prioritizes user safety. This innovation mitigates potential accidents, particularly by safeguarding users' hands and fingers. Notably, the design of this prototype incorporates a peeler blade in a secure, non-exposed area, ensuring enhanced safety. Consequently, this machine offers substantial benefits to both homemakers and individual sellers, enabling them to peel potatoes with utmost safety and eliminating the risk of accidents.

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