

Eggshell Fertilizer Machine with Notification

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Abstract

Sustainable development in agriculture and yield improvement of crops can be achieved through scientific management of land productivity. The use of chemical fertilizer provides immediate availability of nutrients. But, over a long period of time, continuous use of chemical fertilizer leads to instability in yield, unhealthy soil and environmental pollution. This Eggshell Fertilizer with Notification product is operation input voltage 12VDC. This product uses Node MCU ESP8266 as microcontroller. This system is using Arduino IDE application for coding in C++ language. Eggshell Fertilizer with Notification are used to process the eggshell wastage into an small pieces without use user's hand to make an organic fertilizer. The application of this system, user only need to put the eggshell wastage into the machine and tap the touch sensor to start the fertilization processes. After the process is done, user will receive a notification through Telegram Bots Application. The user will receive the notification everywhere or anytime via mobile phone with internet. For commercial use, the innovation of this system is invented to make it easier for user to recycle their wastages without making any environment pollution. So, this project is carried out in order to help in the improvement of crop yield and the fertility of soil with an option to monitor it using smartphone.

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Key-word: - Eggshell Fertilizer, Telegram Bots Application

1. Introduction

Nowadays, the oil palm industry is one of the best sources of agricultural waste that can be converted to organic fertilizer. Calcium, magnesium, and Sulphur are essential plant nutrients. On the other hand, plants require these nutrients in larger quantities than the “micronutrients” such as boron and molybdenum. Out of all oil palm waste, eggshell is looking as the best competitor to the chemical fertilizer in term of effectiveness on increasing the crop yield. So, this project is carried out in order to help in the improvement of crop yield and the fertility of soil with an option monitor it using smartphones.

Many gardeners find that eggshells help prevent blossom end rot in tomato plants. People use crushed eggshells add calcium to the soil when they decompose, which helps plants grow healthy and strong. The calcium found eggshells can help control the acidity in soil. Eggshells contain calcium, magnesium, phosphorous, and potassium. They also contain a small amount of sodium—not enough to harm plants. When people moving plants, which is got from the nursery into pots, people need consider adding some crushed eggshell into potting soil. It can save the water boiled the eggs in. So, people need to let it cool, then use it to water the plants. The calcium from the cooking eggs would have infused the water, making it extra nourishing for plants. Consider adding a few tablespoons of coffee grounds into the soil as well. This will add nitrogen, potassium, phosphorus, and other minerals beneficial to plants. Too many benefits when use eggshell as a fertilizer. It became more technologies when this product developed a machine to crush and a notification from the system when it's done to crush.

1.2 Problem Statement

Politeknik Port Dickson (PPD) generated organic wastes every day. Eggshell were one of the organic wastes generated in PPD. In PPD, these organics wastes are contributed by the Cafés and Canteen. Therefore, it is preferable to process this waste into more valuable products to limit the disposal of wastes to the landfill. Besides, increasing worries on the usage of chemical fertilizers in industry towards environment means that the industry needs to turn the focus to organic fertilizer. Hence it also provides alternative to the chemical fertilizer.

Organic waste is generated daily which can be collected from household, Restaurants and hotels. Organic waste is mainly found to be useful in the agriculture field. Organic waste becomes one of the main sources for nutrition for agriculture field. Sweet lime can improve soil immunity due to its acidic nature also it provides porosity in the soil which help to grow good bacteria which helpful in agriculture process. Eggshell can improve the stiffness of soil and provide good resistance to erosion.

1.3 Objectives

- i. To build a machine to process the eggshell wastage.
- ii. To generate eggshell wastage into highly nutritious fertilizer by using the machine.
- iii. To use Telegram Bot technology to notify user

1.4 Scope

The limitation for this project is this system can be control by one user per product to prevent from any problems that might occur. One application can control only one machine.

- i. Product dimension (2 feet height, 2 feet length and 1 feet width)
- ii. Voltage product (12V-nodemcu, 240v –heater, 240v -blender)
- iii. Telegram apps must install at mobile phone
- iv. Quantity in one-time process is five eggshells (Gred A)

1.5 Significance of Project

This project can help farmers produce high quality of fertilizers with high nutrient by just using a recycled excessive wastage like eggshells. It is important for the farmers to own a product like this because it could significantly help them reduce their daily excessive wastage from their job by recycling and reusing them. Next, it is important to the farmers and scientists because it is cheap fertilizer machine which can reduce their expenses from buying a new fertilizer. Furthermore, it is easier for the users to monitor it by using the application that will be build. They can monitor the amount of fertilizers left, turning on and off the machines and many more by just using their smartphones. Last of all, this project will benefit in many ways such as, a healthier and cleaner environment in polytechnic area.

2. Literature Review

In this chapter will describe about fact finding that had searched. There are a lot of research about fertilizer. It is also will review with the same fact of Eggshell Fertilizer Machine by using IOT.

2.1 Previous Research

2.1.1 Machine Crusher Waste Material

Previous research finding about the machine crusher waste material is been explained about design of a Plastic Bottle Crusher which would help to crush the used Plastic bottles and would thereby help in waste management and disposal. This project aims to design a portable Plastic Bottle crusher that could be installed anywhere and would aid crush of used bottles. Plastic waste is silent threat to the environment and their disposal is a serious issue for waste managers. Now a day society does not have any alternative to plastic products like plastic bags, plastic bottles, and plastic sheets etc. In spite of all efforts made to limit its use but unfortunately its utility is increasing day by day. To circumvent this issue many efforts were made in the past to reuse the plastic waste but no significant results were achieved They have conducted comprehensive study based on large number of experiments and tests in order to determine the feasibility of reusing plastic sand as partial replacement of fine aggregate in concrete.

2.1.2 Alternative to Chemical Fertilizer

Previous research finding about the bone meal is made from the ground bones of animals, and is a byproduct of the meat processing industry. It an excellent source of phosphorous and calcium, that is ideal for fertilizing bulbs and trees and shrubs in soils with a pH below 7.0. Phosphorous tends to move slowly in the soil, so bone meal is often best applied at the bottom of planting holes, where it is near the plant roots. To fertilize established plants, scatter bone meal around the plant and work it into the soil. Apply bone meal at a rate of 1/4 cup per square foot of soil when fertilizing perennials or individual plants, 1/2 cup for every 12 to 18 inches of height or 1/2 inch of trunk diameter when fertilizing trees and shrubs, and 1/2 cup per square foot of soil when fertilizing bulbs. The study presents the partial replacement of fine aggregate in concrete by using plastic fine aggregate obtained from the crushing of waste plastic bags. Plastic bags waste was heated followed by cooling of liquid waste which was then cooled and crushed to obtained plastic sand having finesse modulus. Fertilizers enrich your soil with nitrogen, phosphorous and potassium; the three primary nutrients necessary for plant growth. Chemical or synthetic fertilizers are manufactured using man-made materials, and may not be ideal for home gardeners hoping to use a natural approach. There are several alternatives to chemical fertilizers available at most garden centres and greenhouses that use natural materials to enrich the soil.

3. Methodology

The project hardware is using Switch Button and NodeMCU ESP8266 as a main component. Other than that, the product is using plywood as their casing and connect it using screw and nuts. The project software is using Arduino IDE software as a platform to upload the code into NodeMCU ESP 8266 which is main microcontroller of the product. The code is using C++ language. Additionally, the product also used Blynk application software as a controller. Project Design and Overview are 2 feet height, 1.5 width, 1.5 feet length and its rectangle in shape.

3.1 Block Diagram

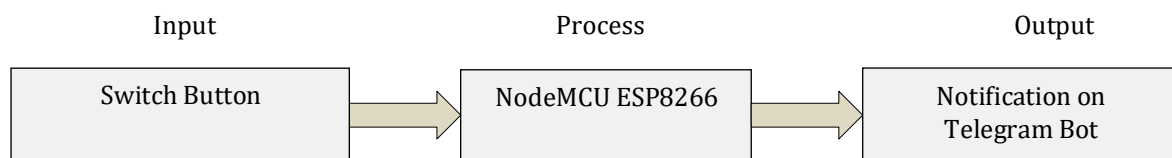


Figure 1 Block Diagram of Eggshell Fertilizer Machine with Notification

The input of this project is a switch button. The switch button function is to ON the machine. Microcontroller use in this machine operation is NodeMCU ESP8266 which is suitable for Wi-Fi connection. The output is display the notification on the Telegram Bot. So with this notification, user get the status 'Your Eggshell Fertilizer is Done' working of that machine.

3.2 Circuit Schematic

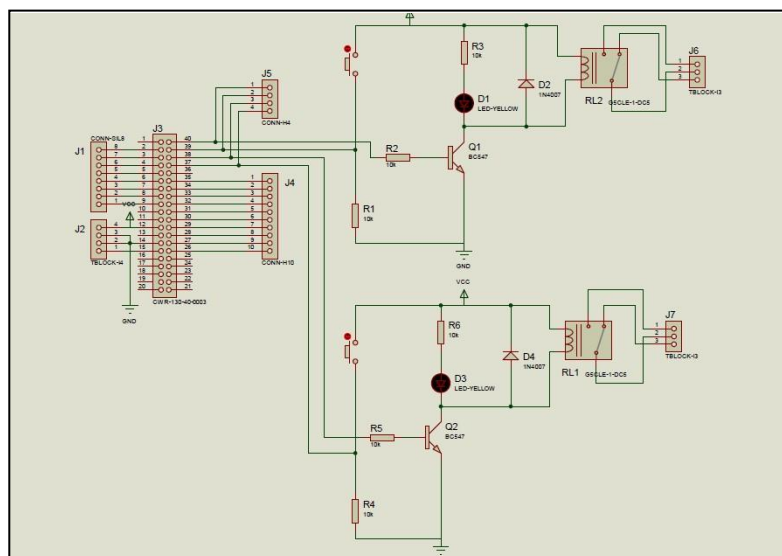


Figure 2 Circuit Schematic

3.3 Flowchart

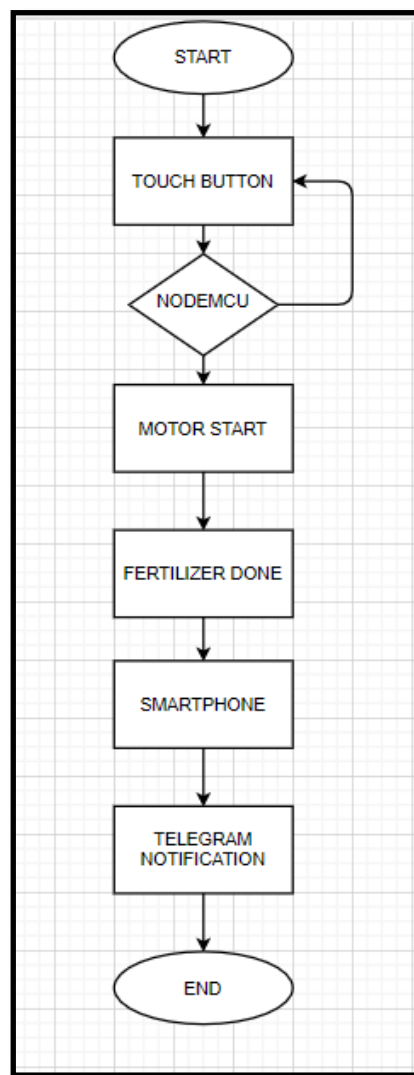


Figure 3 Flowchart of the overall process

User can insert their excessive wastage of eggshell to be recycled as a fertilizer. Users only need to put the eggshells into the grinder and the machines will crush the eggshell. Before that, the water will boil in 20 seconds and after that the grinder will blend the eggshell in 20 seconds. Next, user need to install Telegram application on their phone. The notification “Your Eggshell Fertilizer is done” will display to the telegram bot application after the eggshell finish blend.

3.5 Prototype Layout



Figure 4 Front View



Figure 5 Side View

3.6 Cost Estimation

Table 1 Cost Estimation

NO	NAME	UNIT	PRICE (RM)
1.	Arduino Uno	1	105.00
2.	AC Hot Bulb	1	15.00
3.	LCD Display	1	15.00
4.	Relay 1 Channel	1	9.00
5.	Keypad 3x4	1	25.00
6.	Solenoid 12V	1	35.00
7.	Steel 1 Meter	5	25.00
TOTAL			229.00

4. Result and Discussion

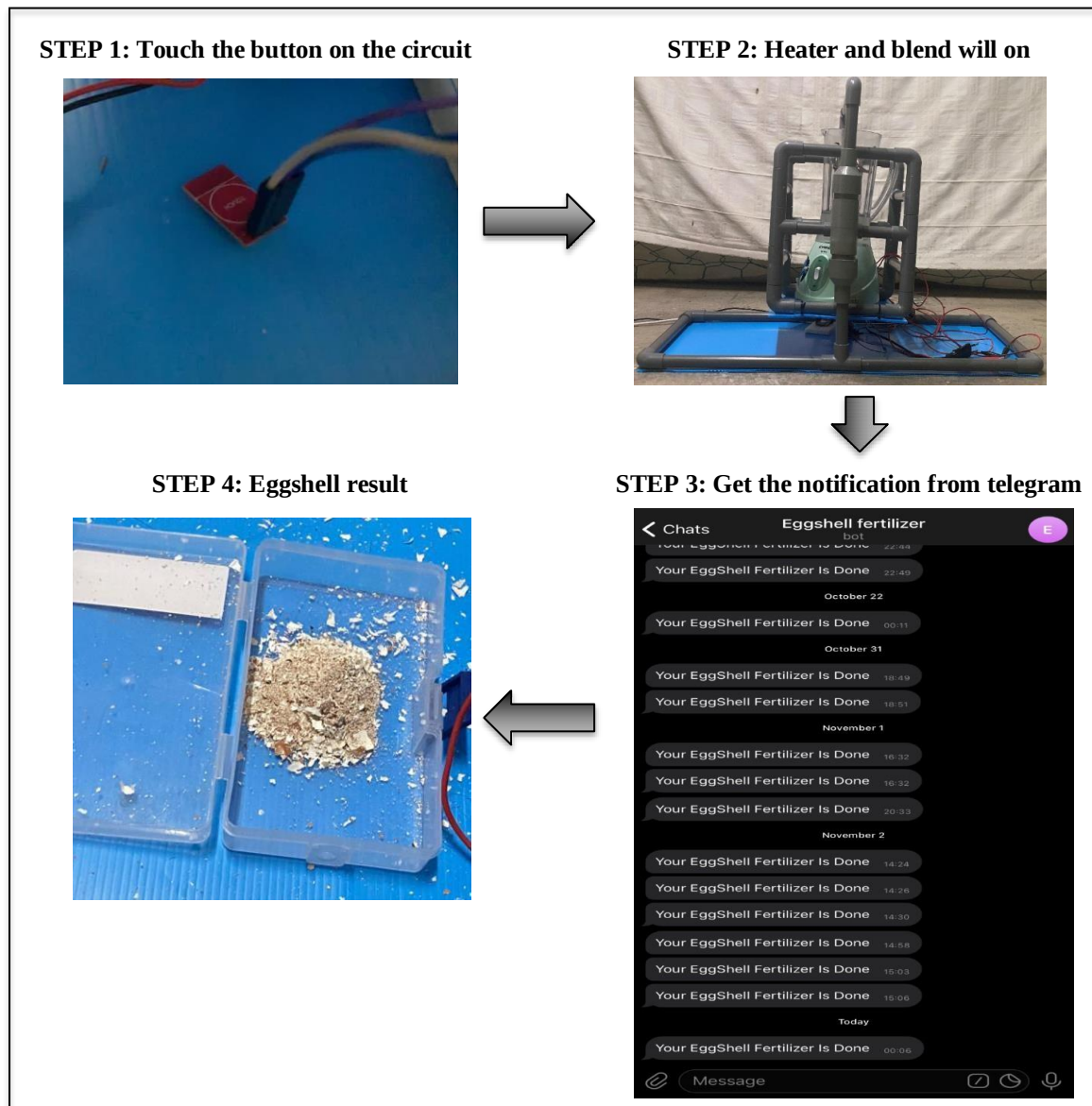


Figure 6 Result of Product

4.1 Advantages of Product

- i. Easy to use
- ii. Flexible
- iii. Low cost
- iv. Save energy and use small amount of current

4.2 Impact of product

The impact of product to the community is it can save energy because user can get notification when the machine already finish the task. So user can switch off the machine immediately. This application also user friendly because everybody can use Telegram bot. Just install Telegram Apps and use Telegram Bot function. It also can save user time because without this machine, user need to boiled the eggshell by manually and crush the eggshell by hands. But with this machine, boiling water and crush the eggshell easy to implement. This product develop as environment friendly and easy to maintenance.

4.3 Significance of Product

- i. Helps user to reduce the excessive wastage in surroundings.
- ii. Helps user to producing high quality fertilizer to be used by local gardeners.
- iii. User can use this product because this is the pure fertilizer with Sulphur, Calcium and Magnesium essential plant nutrients.

5. Conclusion

This product has successfully function and can commercialize to the community because it easier to use, suitable to be used by gardeners or people who work on the agriculture industries. This project will help them produce a cheaper and healthier fertilizer. This project also gives benefits to other people such as reduce the excessive wastage in polytechnic area and saving the money from buying a chemical fertilizer. In the nutshell, we can conclude that the person that should buy this fertilizer machine is gardeners or people who work on the agriculture industries it's because this project will help them produce a cheaper and healthier fertilizer. Furthermore, this project will not only benefit the users, but also will give benefits to other people. Many advantages that we can get from this project such as lessen the excessive wastage in polytechnic area and saving the money from buying a chemical fertilizer. It is also easy to handle and can be monitored anywhere from user's smartphone.

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