

# Fabrication of Bio-Battery for Home Automation

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**Abstract:** A battery is an electrical device which is used to alter the chemical energy to electrical energy. Batteries are classified into different types based on the application and these are used in several electrical as well as electronic devices. An electrical battery includes certain chemicals like compounds of mercury, lead etc. and the lead of a battery is extremely dangerous in nature and is not environment-friendly. Apart from these, there is a chance for chemical leakage as well as the explosion of the battery in certain cases. In this paper to overcome the problem of chemical leakage and explosion of battery, a Bio-battery is fabricated which reduces the impact of these chemicals in turn reduces the harm to the environment which gives a great advantage to humans. The objective of the paper is to highlight fabrication of an eco friendly battery based on bio chemical energy production and to build IOT based home automation system using bio batteries.

**Keywords:** Electrical battery, Bio-battery, Home automation, IOT.

## I. INTRODUCTION

Bio batteries are devices for storing electricity that are used in various applications. This battery can be operated with organic compounds, which are available in the form of glucose, which are used in the human body. When digesting the human body, enzymes break down electrons and glucose protons. By using enzymes to break down glucose, this battery receives energy directly from glucose. This battery then saves energy for future use.

Home automation is an increasingly popular field every day because of its great superiority. Home automation can be achieved only by connecting electrical devices to the Internet or in cloud storage. The cloud computing platform helps connect with things around everyone, so you can access anything and everyone in a user-friendly way anytime, anywhere through a special portal. The cloud therefore functions as an entry point for IoT access. In this paper, we use an IOT-based home automation system that aims to develop a home automation system that gives users full control over all aspects that are remotely controlled in their homes. The automation system can control from an Android phone.

## II. METHODOLOGY

### BLOCK DIAGRAM

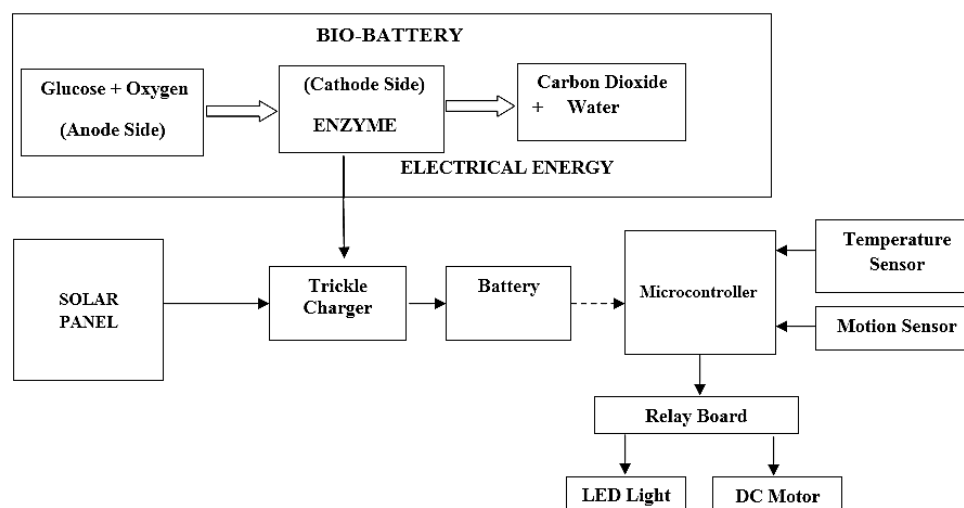


Fig1. Schematic view of bio battery for home automation

The Fig1 Shows the schematic view of bio-battery for home automation. By using the wastes of vegetables having acidic content such as cucumber, beetroot, carrot, etc for the production of energy, these wastes are fermented for about 4 to 5 days, the fermented juice produced by this process is nothing but an acid, which act as an electrolyte. When the anode (Zinc) and cathode (Aluminium) are placed in this electrolyte there will be a movement of electrons which constitutes an electric energy and this energy can be stored in a battery for useful applications.

As seen in the block diagram, the electrical energy produces by both solar and bio-battery units are connected to trickle charging unit. Initially the battery is not connected to load, when the charging of battery is done. Then the battery is connected to load for further automation process. Here the temperature and motion sensors are used to control the switching of the DC motor & LED light respectively.

**CONSTRUCTION OF BIO-BATTERY**

Bio battery construction can be carried out with four components such as anode, cathode, electrolyte and separator. The four components are closed one above the other so they can be arranged together. Like other batteries, the negative anode and the cathode are positively charged. The main difference between the anode and cathode allows the flow of electrons inside and outside it. In bio battery construction, the anode connection is located at the top of the battery, while the cathode connection is arranged at the bottom of the battery. Electrolytes containing separators are located between these two connections

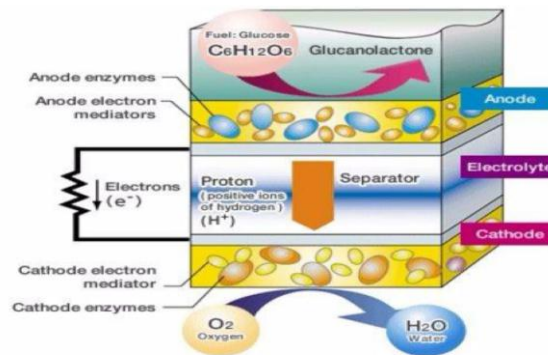


Fig2. Structure of Bio-battery

**WORKING OF BIO-BATTERY**

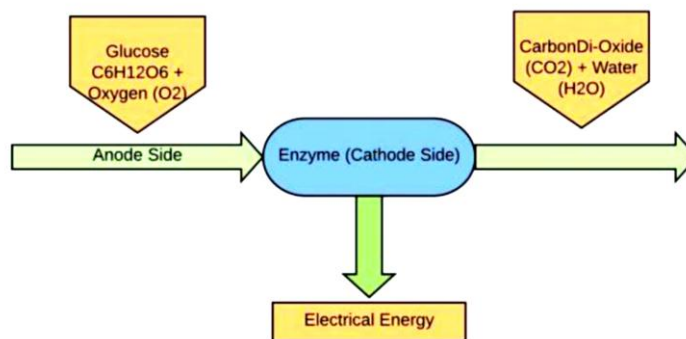


Fig3. Working of bio-battery

In the Fig3 shows, glucose is used by the anode, while enzymes are used by the cathode. Glucose is broken down into electrons and protons on the side of the battery anode. The flow of protons and electrons can move to the side of the cathode through a separator and mediator respectively. Enzymes are used on the cathode side, which produces water from the protons and electrons are transferred from the anode side. This is where the oxygen reduction reaction occurs. The above reaction produces electrons and protons in the system and produces electricity.

**HOME AUTOMATION**

Now there is a demand for smart homes where devices can be monitored and controlled from common devices. In this paper the ATmega 328 microcontroller is used to control the load. Temperature sensors and monitoring are used to monitor the operation of DC motors and LED lights using Blynk software. Blynk is a set of tools for all producers, Copyright to IJIREEICE

inventors of misuse, designers, teachers, morons and geeks who want to use their smart phones to control electronics like Arduino, RaspberryPi.

With Blynk you can simply connect the amazing interface of various widgets that we provide, upload sample code to your hardware and enjoy the first results in less than 5 minutes! This works perfectly for beginners and saves a lot of time for evil geniuses.

Blynk is not an application that only works with certain shields. Instead, it must support the boards and shields that are already used. And it works on iOS and Android.

**III. RESULT AND DISCUSSION**

By using 250 grams of bio waste (vegetables & fruits) it will take three days for fermentation by using vinegar as catalyst. This composition will generate 1.28 V of electricity. By increasing the quantity of bio wastes the generation of voltages will be more.

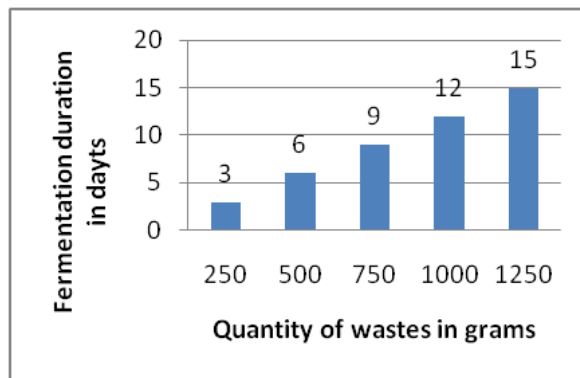


Fig4. Graph of Fermentation duration vs Quantity of wastes used

We can observe from the graph, the duration of fermentation process is depends on the quantity of bio -materials (bio wastes) used for generation of electricity.

Table I voltage generated with respect to different quantity of bio waste

Quantity of wastes in grams	Voltages in V
250	1.28
500	2.56
750	3.84
1000	5.12
1250	6.4

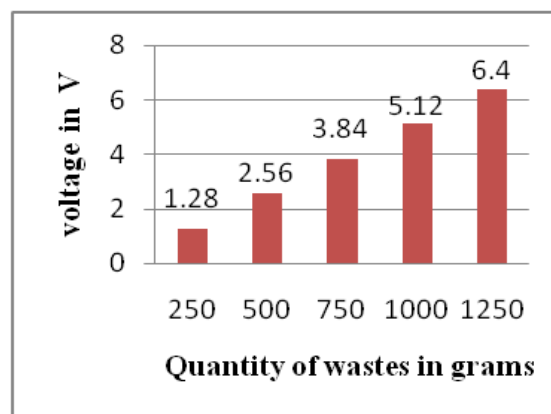


Fig5. Graph of Voltage vs Quantity of bio wastes used in grams

From the graph we can observe that, by increasing the quantity of bio wastes, the generation of electricity from bio battery will be more.

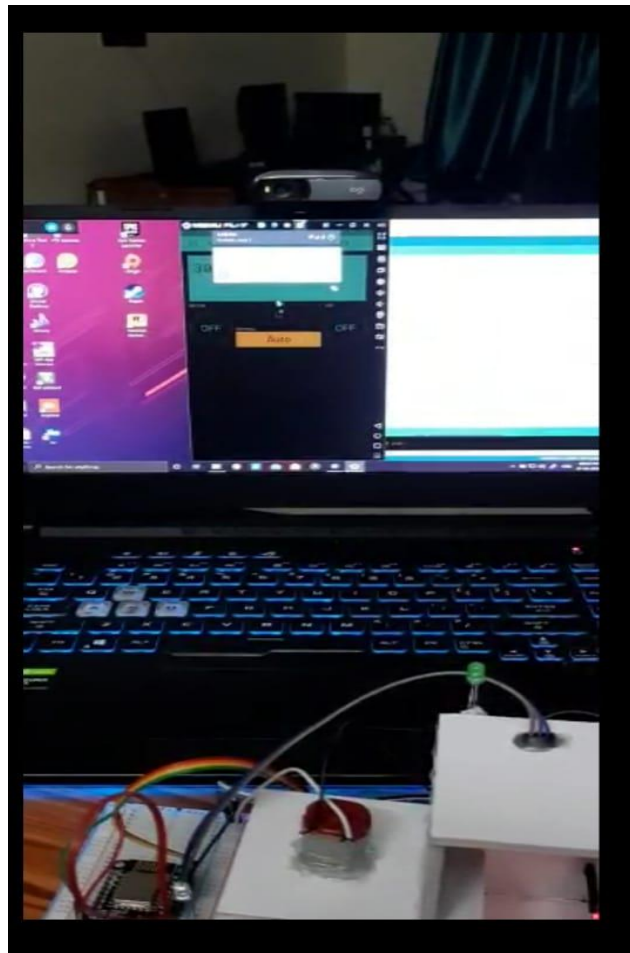


Fig6.

#### IV. CONCLUSION

Bio batteries are a source of energy for the future. Because it is scalable on all household appliances. Bio waste will be a fuel for bio batteries as it is very high scalability and durability. Bio batteries are small and flexible. Waste generated after electricity generation can be used as fertilizer to make our system truly environmentally friendly. The use of IOT-based home automation systems, with which we can monitor and control devices remotely. By combining usage of bio waste and IOT based home automation, we can develop a sustainable environment preservation system.

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