

INTERDISPLINARY PROJECT

EARTH BIO BATTERY

Submitted in partial fulfillment of the award of bachelor of
technology degree in biotechnology

Submitted by

JEEVIKA R (39230018)

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**SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

**Accredited with Grade “A” by NAAC
JEPPIAAR NAGAR, RAJIV GANDHI SALAI,**

CHENNAI - 600119

APRIL-2022



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DEPARTMENT OF BIOTECHNOLOGY

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of JEEVIKA R (39230018), JOEVATHY J (39230021), LOHAPPRIYA R R (39230023), SUBIKSHA T V (39230047) who carried out the project entitled "EARTH BIO BATTERY" under my / our supervision from 19-03-2022 to 29-04-2022.

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Head of the Department

DR.RAMESH KUMAR

Submitted for Viva voce Examination held on 29-04-2022

Internal Examiner

DR.BHAVANILATHA

External Examiner

DR. RAMESHKUMAR

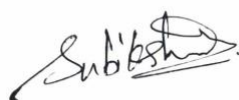
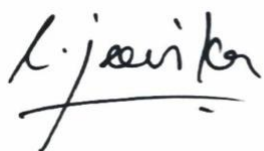
DECLARATION

We JEEVIKA R(39230018), JOEVATHY J (39230021),
LOHAPPRIYA R R(39230023), SUBIKSHA T V(39230047)
hereby declare that the Project Report entitled “EARTH BIO-
BATTERY” done by us under the guidance of Dr MASILAMANI
and DR BALAMURUGAN at is submitted in partial fulfillment of
the requirements for the award of Bachelor of Technology
degree in BIOTECHNOLOGY.

DATE: 29-04-2022

PLACE: CHENNAI

SIGNATURE OF THE CANDIDATES



ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to Board of Management of SATHYABAMA for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to Dr SWARNALATHA, Dean, School of BIO & CHEMICAL ENGINEERING and DR RAMESH KUMAR, Head of the Department, Dept. of BIOTECHNOLOGY for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Project Guide Dr MASILAMANI for his valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the Department of BIOTECHNOLOGY who were helpful in many ways for the completion of the project.

TABLE OF CONTENTS

1.INTRODUCTION.....	6
2.ABSTRACT.....	7
3.OBJECTIVES.....	8
4.WORKING OF EARTH BATTERY.....	8
5.WHAT'S NEEDED?.....	9
5.1.MATERIALS USED.....	9
5.2 TOOLS AND EQUIPMENT FOR CONSTRUCTION.....	9
6.PROCEDURE.....	10
7.RESULT.....	11-14
7.1 VOLTAGE OF INDIVIDUAL CELLS.....	11
7.2 VOLTAGE OF INDIVIDUAL CELLS AFTER 1 HOUR.....	12
7.3 VOLTAGE OF INDIVIDUAL CELLS AFTER 2 HOURS	13
7.4 VOLTAGE OF INDIVIDUAL CELLS AFTER 24 HOURS.....	14
7.5 DISCUSSION.....	14
8.PROTOTYPE.....	15
9.APPLICATION.....	16
10.CONCLUSION.....	16
11.REFERENCES.....	17
12.PROJECT PHOTOS.....	18,19

1.INTRODUCTION

- ▶ **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 are not environment-friendly.**
- ▶ **A Bio battery is an electrical energy storage device which is used in several applications.**
- ▶ **This battery can be powered with the help of organic compound**

2.ABSTRACT

- ▶ Earth battery involves the use of soil as the medium for generating electrical energy.
- ▶ Soil naturally contains energy in the form of telluric current that is capable of generating a DC supply electricity.
- ▶ Different types of soil contain different electrical resistivity and conductivity values.
- ▶ The selection of the clay soil is due to its low resistivity and high moisture content.
- ▶ Electrodes made of two dissimilar materials, copper plates and screw, were used to conduct electricity.
- ▶ Operation of earth battery as a free electricity source was demonstrated successful.



Earth battery

3.OBJECTIVES:

- ▶ **To generate power that is environment friendly**
- ▶ **To produce cost-effective energy source**
- ▶ **To develop DC voltage of 37V from Earth Battery**
- ▶ **To produce energy source device by organic compound (wet mud)**

4.WORKING OF EARTH BIO-BATTERY:

- ▶ **Earth battery use wet soil or bacteria rich compost as electrolyte solution instead of acids.**
- ▶ **Organic matter releases electrons as it decomposes, which can be captured by the electrodes.**
- ▶ **Earth battery is based on electron affinity (the amount of energy liberated when an electron is added to a neutral atom to form a negatively charged ion)**
- ▶ **Low to high (DC) can drive small-scale electronic devices such as LED**

5.WHAT'S NEEDED?

5.1 MATERIALS USED:

Materials used for this earth battery project includes mud (wet or dry clay), copper plate, screw, plastic cup, switch, grow light, plants, cardboard box.

s.no	ITEM	QUANTITY
1	Copper wire 24m (size 5cm to 2m)	4
2	Copper plate 2kg	2
3	Screw	90
4	Plastic container	83
5	switch	1

5.2 TOOLS AND EQUIPMENT USED FOR CONSTRUCTION:

1. Snips cutter
2. Masking tape
3. Measuring tape
4. Hammer
5. Nail puller
6. Nose pliers
7. Cordless drill
8. Voltage tester(multimeter)

6.PROCEDURE:

- ▶ Firstly, snips cut the copper plate up to 5cm and copper wire cut up to 4cm.
- ▶ Then take a plastic cup and fill with soil (wet or dry clay).
- ▶ Screw(negative) and copper plate(positive) are connected alternatively by negative and positive terminals of wire.
- ▶ Total 83 plastic cup were introduced and 83 other pairs of electrodes were inserted into cup to give total of 8 cells.
- ▶ To demonstrate series connection of voltage, 37 DC earth battery cells were prepared in separate plastic cup and moistened by water.
- ▶ The voltage of each cell was measured independently with multimeter and the reading were recorded at intervals of 1 hour.
- ▶ Tabular column attached below with readings



7.RESULT:

- ▶ There were about 8 different tests Undertaken to determine the voltage of individual cells and overall series voltage.
- ▶ It is taken in between hours to a whole day (24 hours).
- ▶ Voltage of individual cells in different hours are listed below.

7.1 VOLTAGE OF INDIVIDUAL CELLS

Cell	Voltage (v)
1	5.12V
2	5.65V
3	4.51V
4	5.56V
5	2.50V
6	3.8V
7	5.31V
8	3.21V
Total voltage for series connection	35.66V

7.2 VOLTAGE OF INDIVIDUAL CELLS AFTER 1 HOUR:

CELL	VOLTAGE(V)
1	5.21
2	5.65
3	4.40
4	5.50
5	2.51
6	3.5
7	5.81
8	3.21
TOTAL VOLTAGE FOR SERIES CONNECTION	3.57

7.3 VOLTAGE OF INDIVIDUAL CELLS AFTER 2 HOURS

Cell	Voltage(V)
1	5.2V
2	5.40V
3	4.51V
4	5.50V
5	2.50V
6	3.4V
7	5.31V
8	3.21V
Total voltage for series connection	35.03V

7.4 VOLTAGE OF INDIVIDUAL CELLS AFTER 24 HOURS

Cell	Voltage(V)
1	5.31V
2	5.8V
3	4.51V
4	5.35V
5	3.6V
6	3.8V
7	5.32V
8	3.30V
Total voltage for series connection	36.99V

7.5 DISCUSSION:

- ▶ The overall series voltage increased eventually 35.66V to 36.99V.
- ▶ This result is approximately equal to the overall Ideal series voltage which is obtained by the summation of the Individual cell voltage.

8.PROTOTYPE:

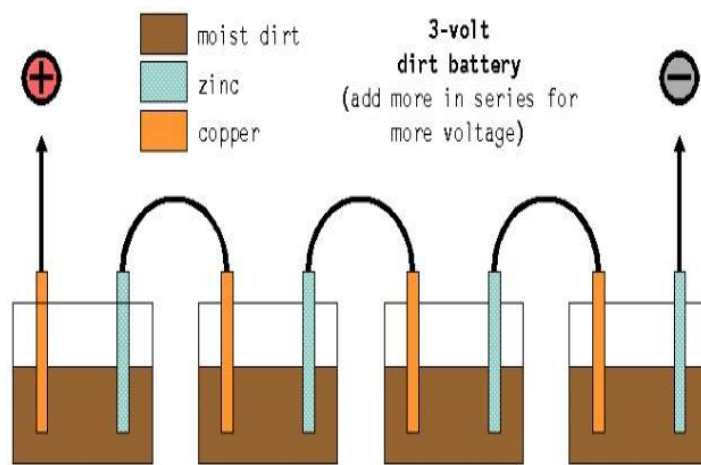
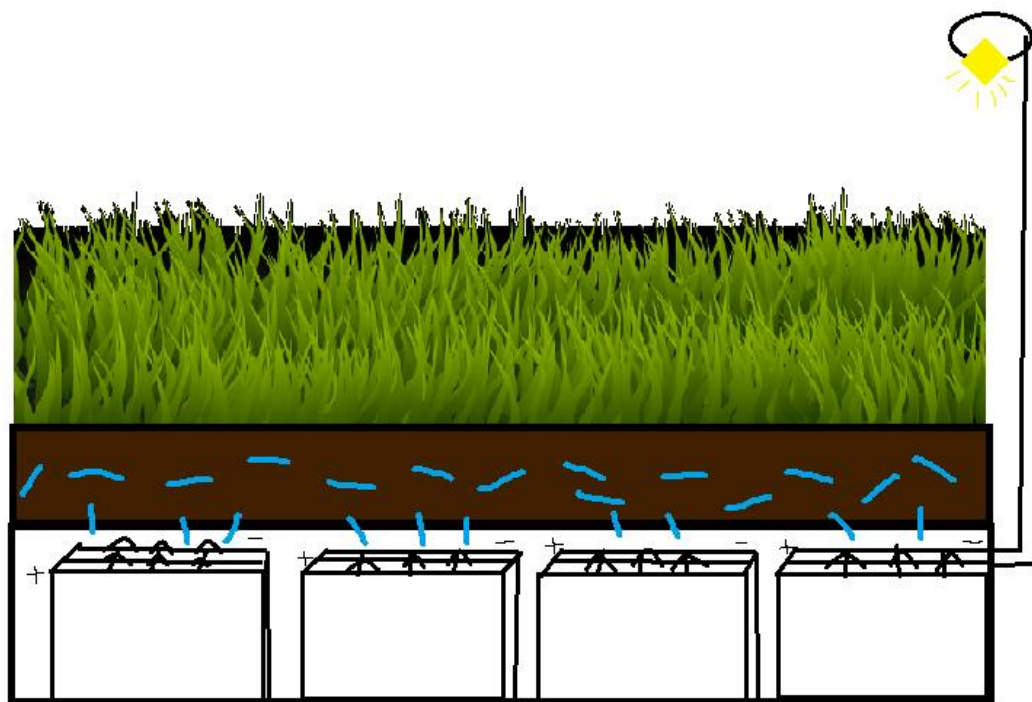


Figure 2.1: Earth battery cells connected in series



9.APPLICATION:

- ▶ **Earth battery has no harmful effects on human as well as environment so which can be used in laboratories**
- ▶ **Installing this prototype in big portable container can switch on low-powered LED bulbs at night under fly-over bridge, eventually assisting street children and needy students for studying and accessing light for their livelihoods in the abandoned area underneath the fly-over bridge**

10.CONCLUSION:

- ▶ **Results of experimental study on earth batteries using copper wire and copper plates, we report successful design, construction and operation of an earth battery as an alternate energy source for low power electric supply applications.**
- ▶ **As a result, a solution for more efficient electricity generation was developed.**
- ▶ **Produce electricity with readily available raw materials and no-cost soil collection using a simple process.**
- ▶ **Power sources that are cost-effective might help to prevent power outages.**

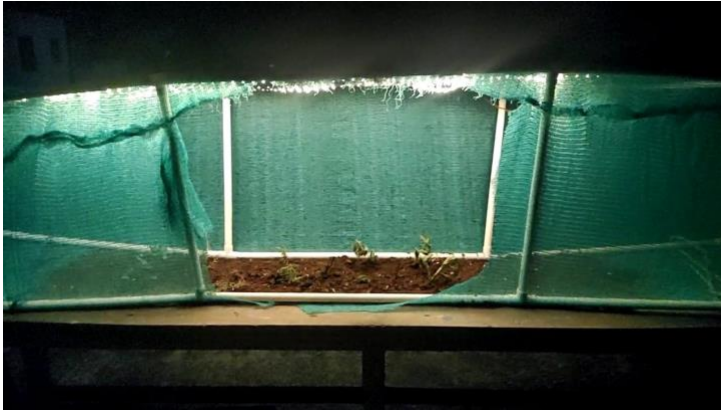
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- ▶ Fesquet, 1878. "Oliver Byrne, and John Percy," The Practical Metal workers Assistant. H.C. Baird & Co.,
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- ▶ Lord Kelvin, 1800. Sea Battery: Method and Apparatus, US

PROTOTYPE IMAGE REFERENCES:

- ▶ 1ST Image : From zetatalk.com
- ▶ 2ND Image : Created by LOKAPRIYA(39230023)

12.PROJECT PICTURES







INTERDISCIPLINARY PROJECT

EARTH BIO-BATTERY

PROJECT CARRIED OUT BY

JEEVIKA R(39230018)
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LOHAPPRIYA R R(39230023)
SUBIKSHA T V(39230047)

UNDER THE SUPERVISION OF:

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(PROFESSOR)
DEPARTMENT OF ELECTRONICS &
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DEPARMENT OF BIOTECHNOLOGY
SCHOOL OF BIO&CHEMICAL ENGINEERING
SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY & APRIL-2022

EARTH BIO-BATTERY

OBJECTIVES:

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ABTRACT

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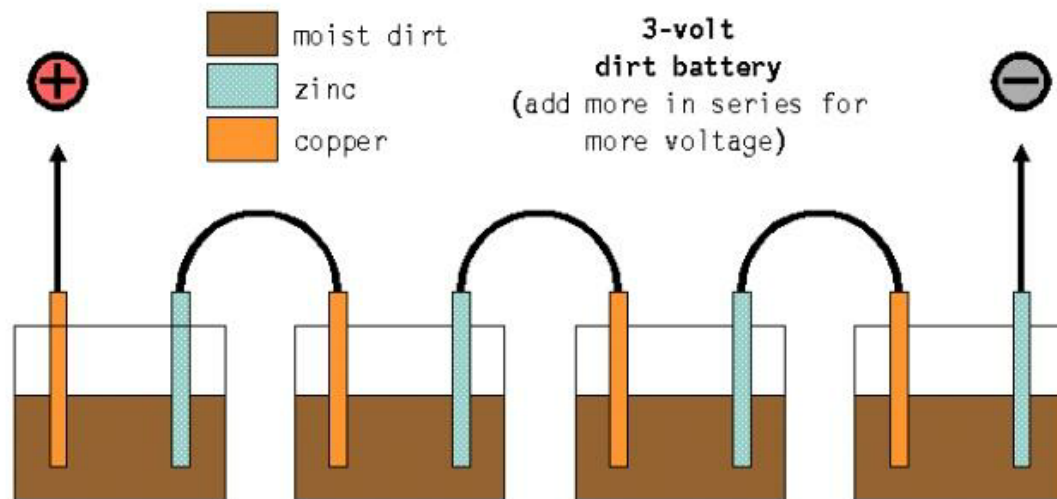
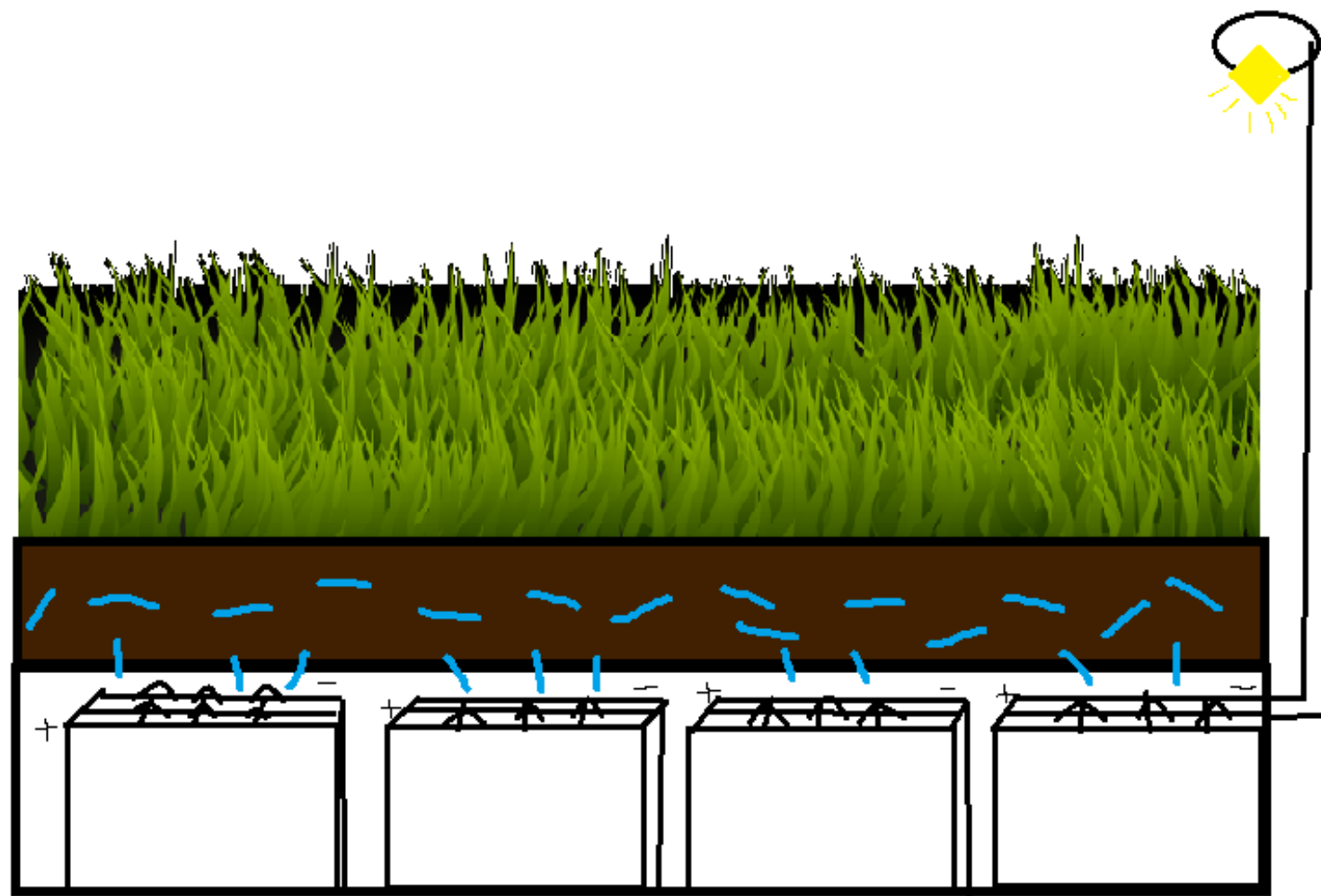
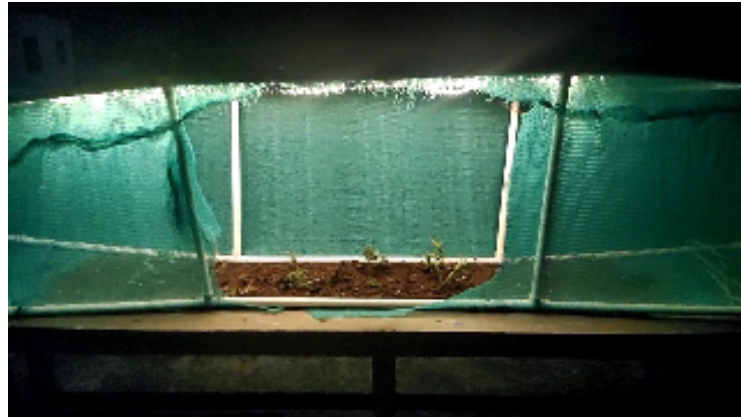


Figure 2.1: Earth battery cells
connected in series



Project (video & PICS)



APPLICATION

- ▶ Earth battery has no harmful effects on human as well as environment so which can be used in laboratories
- ▶ Installing this prototype in big portable container can switch on low-powered LED bulbs at night under fly-over bridge, eventually assisting street children and needy students for studying and accessing light for their livelihoods in the abandoned area underneath the fly-over bridge.

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Thank you