BANGLADESH UNIVERSITY OF ENGINEERING AND TECNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Project Report

Course No: EEE 316

Course Title : Power Electronics Laboratory

Group: 4   Section: C2

Project Title: Variable DC Battery Charger with Auto cutoff Feature and Deep Discharge Control of Battery.
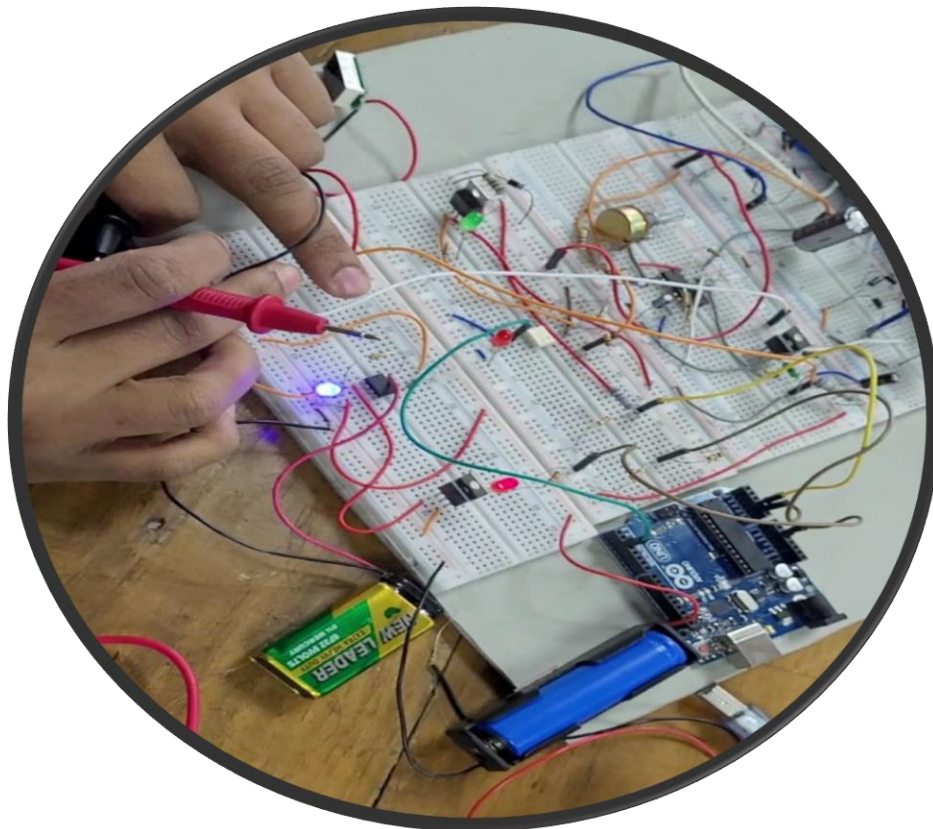
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Content

Objective:

The objective of the power electronics project "Variable DC Battery Charger with Auto cutoff Feature and Deep Discharge Control of Battery" is to design and implement a battery charger that can charge a battery with a variable DC output. The charger will use a converter to convert the AC input voltage to a variable DC output voltage that can be adjusted to meet the specific requirements of the battery being charged. The charger will also include an auto cutoff feature that will automatically shut off the charging process when the battery is fully charged. Also, when the Voltage level of Battery is below a certain threshold level it will stop discharging and turned off.

The project aims to achieve the following objectives:

1. Design and implement a converter that can convert the AC input voltage to a variable DC output voltage.
2. Design and implement a charging circuit that can regulate the charging current and voltage to the battery.
3. Design and implement an auto cutoff feature that will automatically shut off the charging process when the battery is fully charged.
4. Test the battery charger and verify that it can charge the battery with the desired output voltage and cutoff feature.

The project will require knowledge of power electronics, circuit design, and control theory to design and implement the converter, charging circuit, and auto cutoff feature. The project will also require testing and validation to ensure that the charger functions as intended and meets the desired performance specifications.

Methodology:

Software Implementation:

In proteus or other simulation software, a charging or discharging condition of a battery cannot be simulated. Only battery of constant voltage can be dealt with in simulation. So software simulation was not a handy tool in this case.

Hardware Implementation:

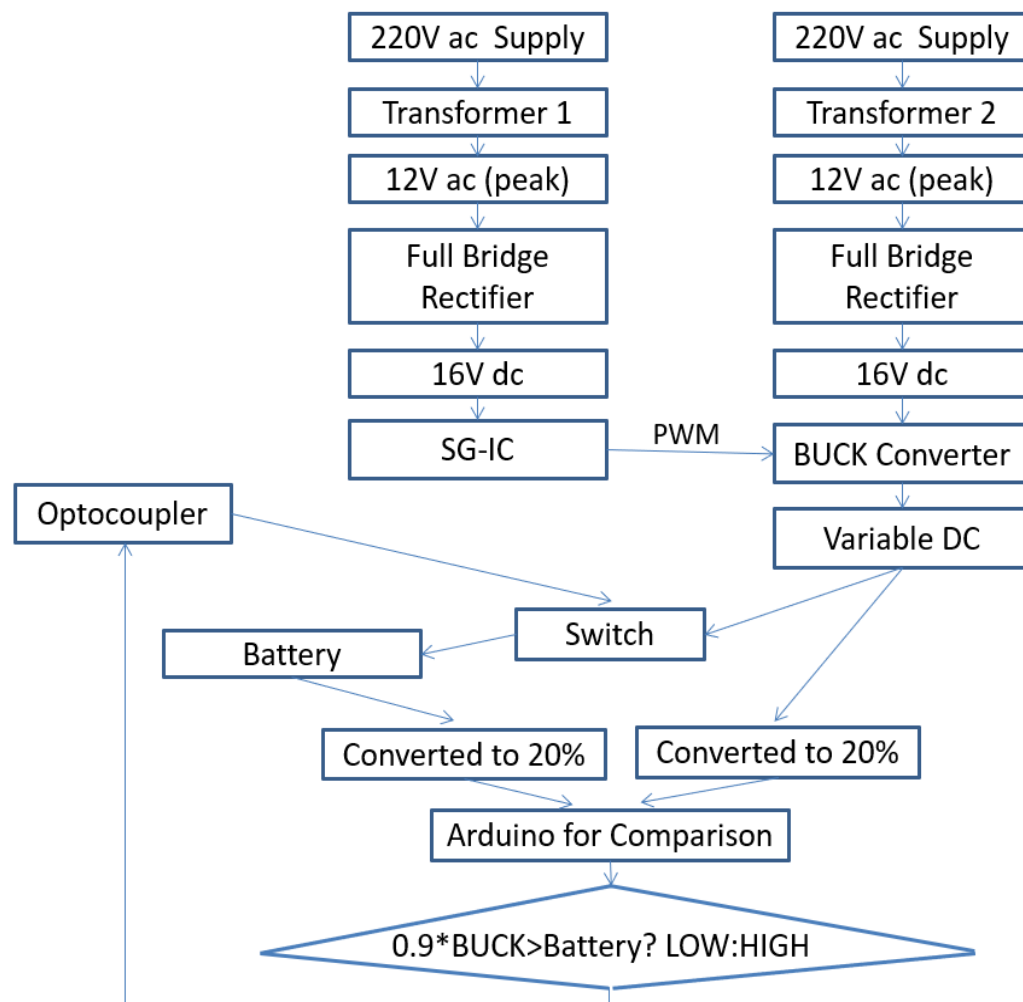Block diagram for Charging Circuit is Given below:

Fig : Block Diagram for charging Circuit.

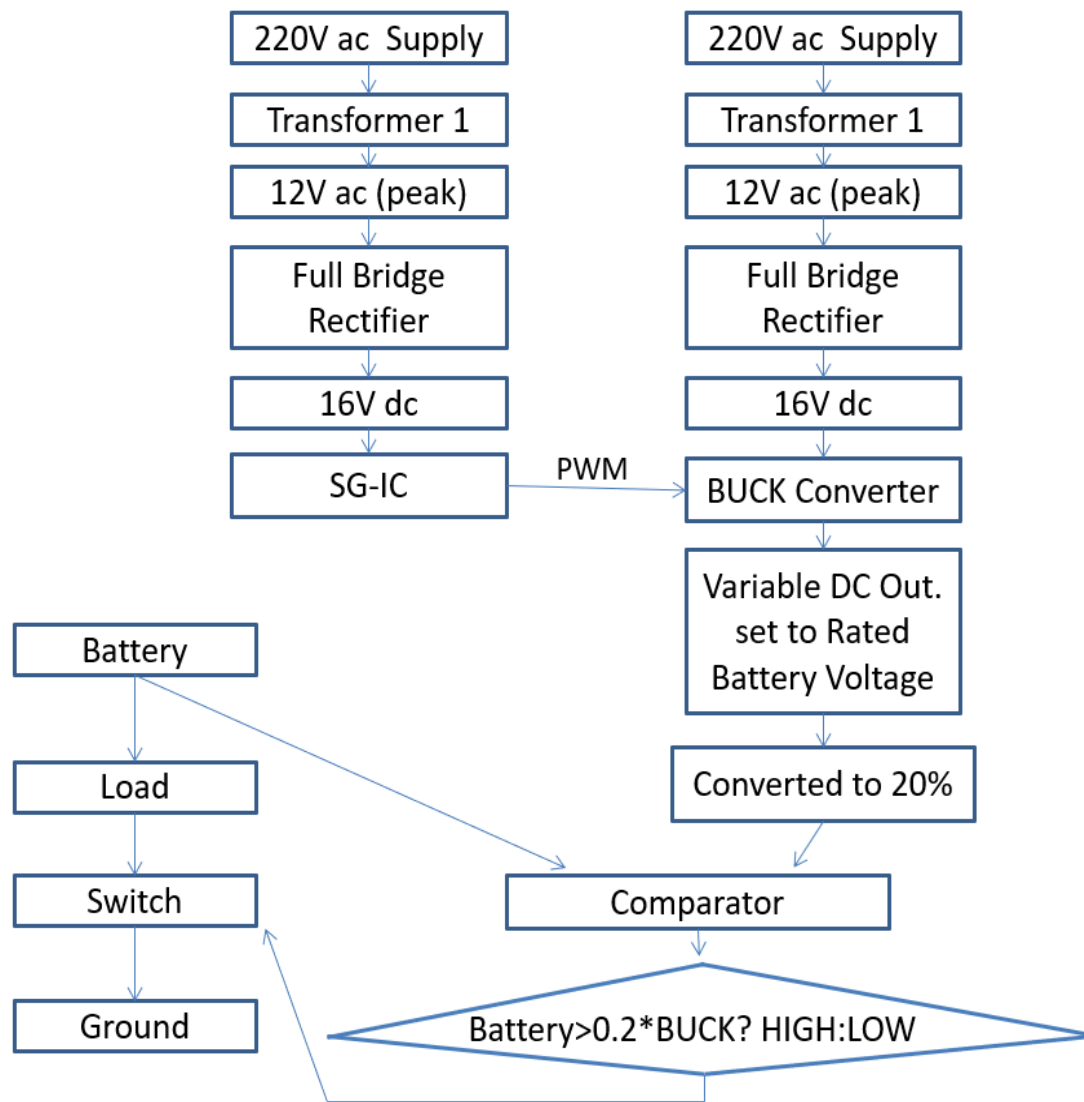## Block diagram for Dis-charging Circuit is Given below:

Fig: Block Diagram for Discharging Circuit.

When voltage across the battery is more than 90% it will stop charging and in the second case when the battery voltage is less than 20%, it will stop discharging.

Project Setup:

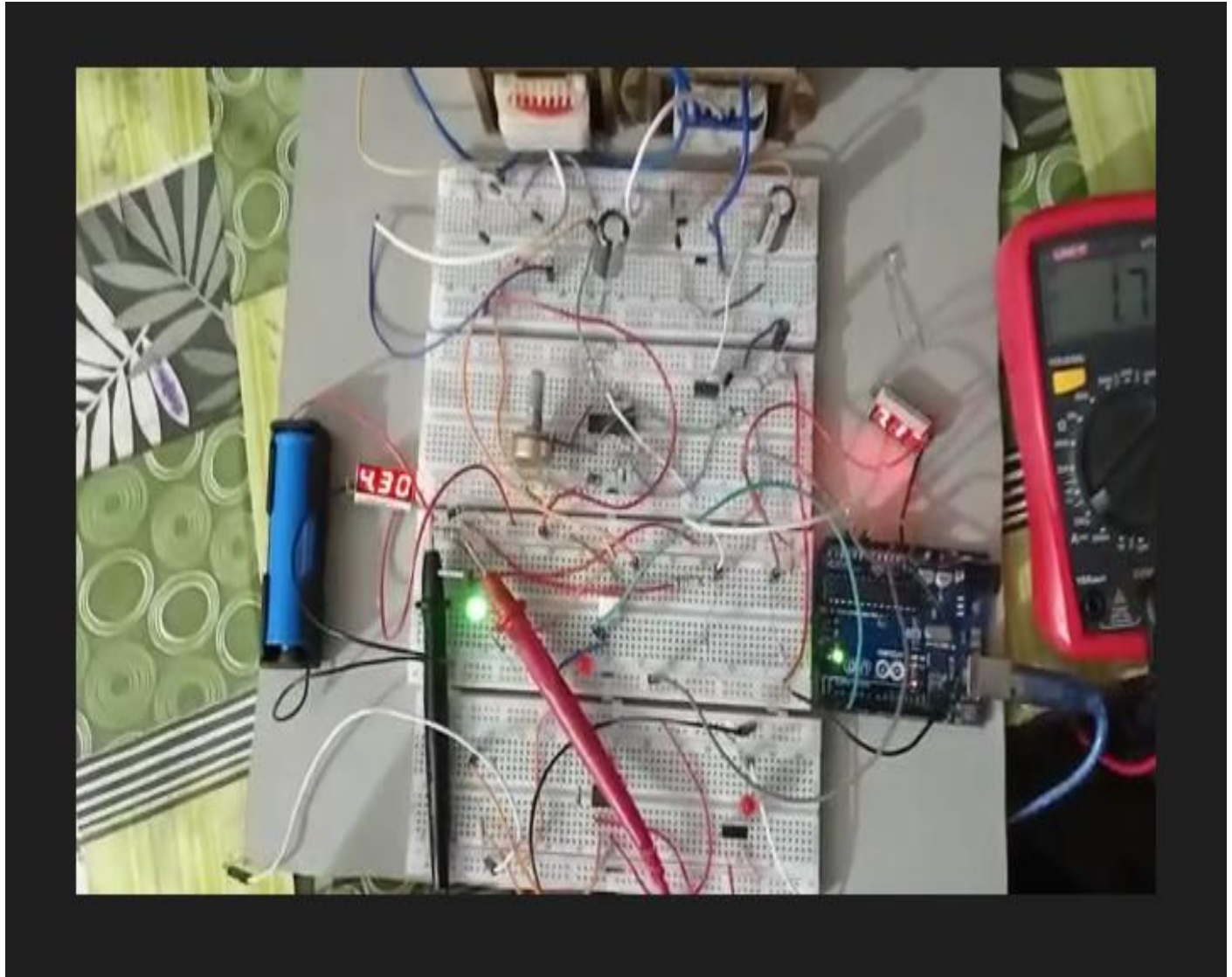Here is the real time picture of our project set up:


Fig: Circuit Diagram

Results:

As we are implementing 'Battery charger with variable DC output using converter with auto cutoff feature and deep discharge Feature' for easier realization, the result has been showed step by step.

Steps of charging with auto cutoff:

Step 1: Here is the full setup of the project. If the voltage across the battery is smaller than our reference ,the green LED is on and charging has been started.
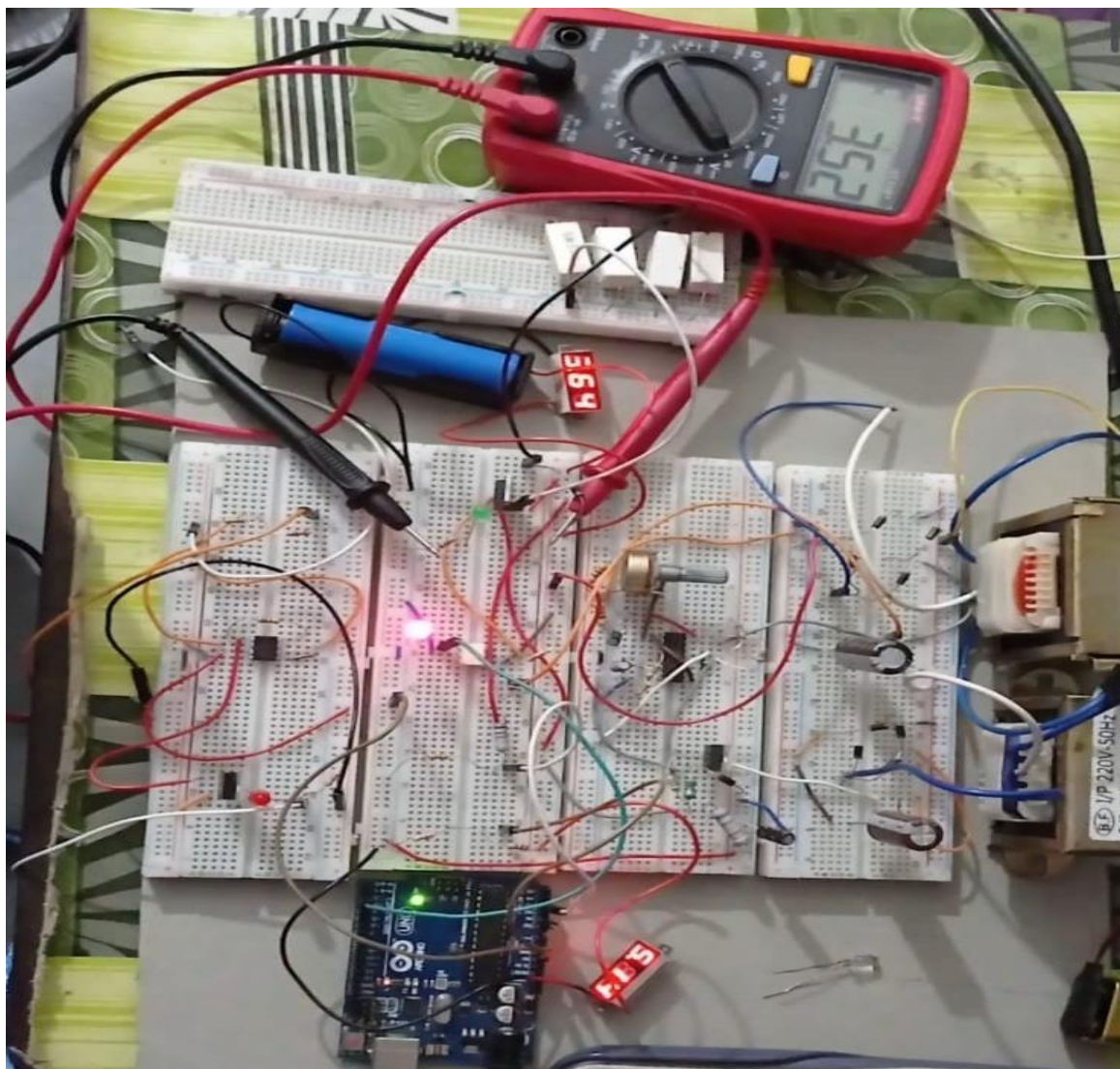
Step 2: Here is the charging state is displayed. At first the voltage across the battery is 3.31 V . Then after few seconds it is 3.38 V.
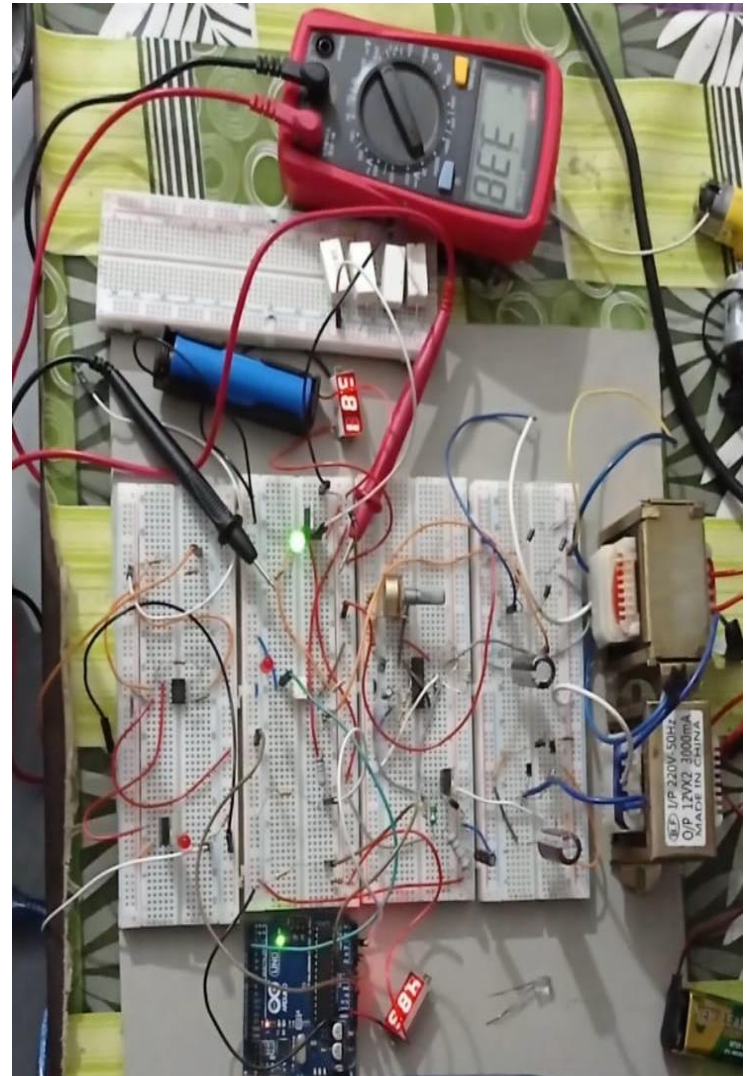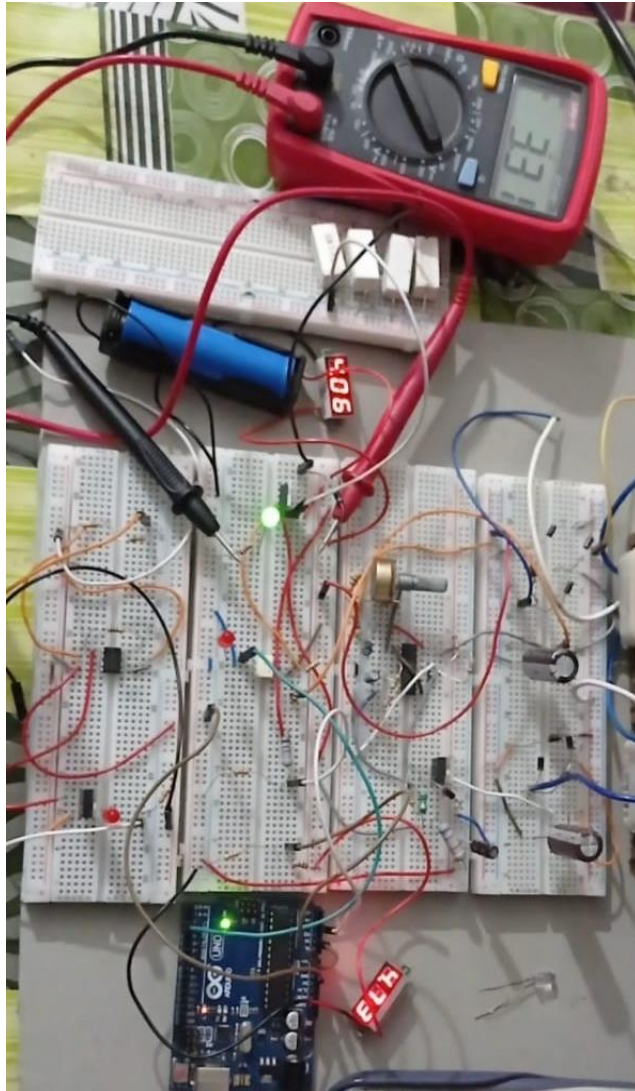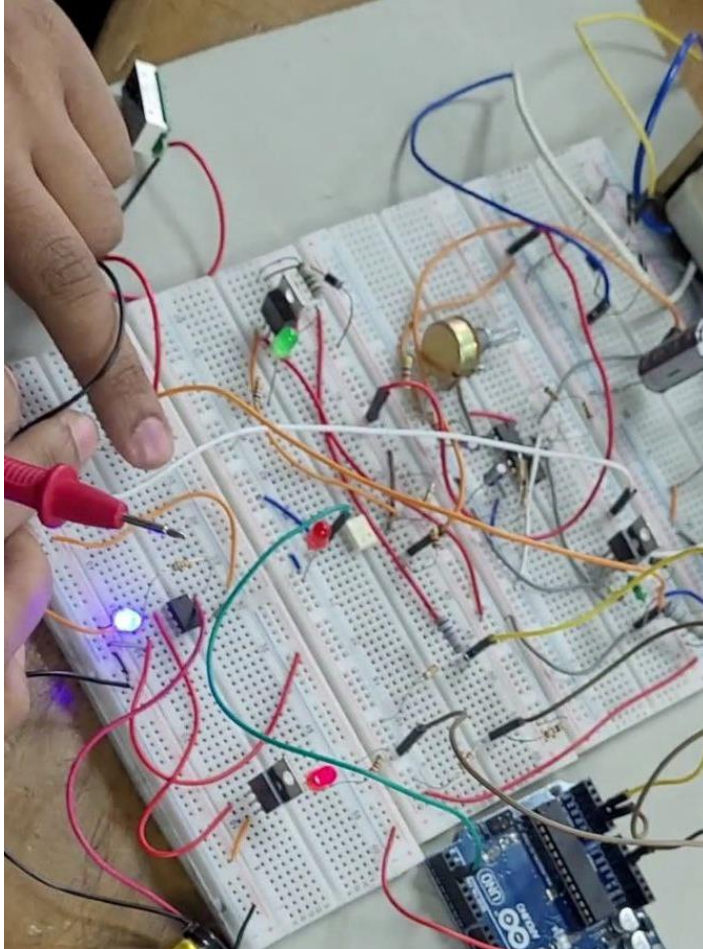
Step 3 : Our battery has a facility of auto cut off when it is 90% charged. At the rightmost part, there is a buck converter, when the output of the buck converter is 90% ,the red LED is on and the charging process is stopped.
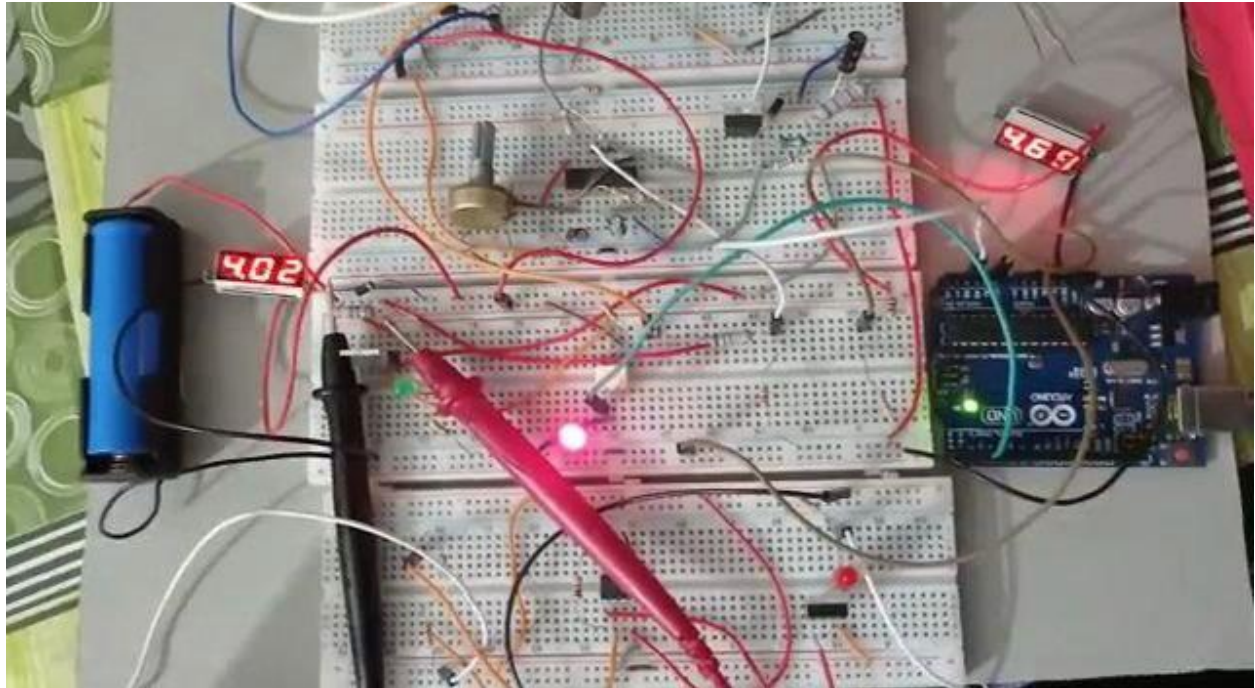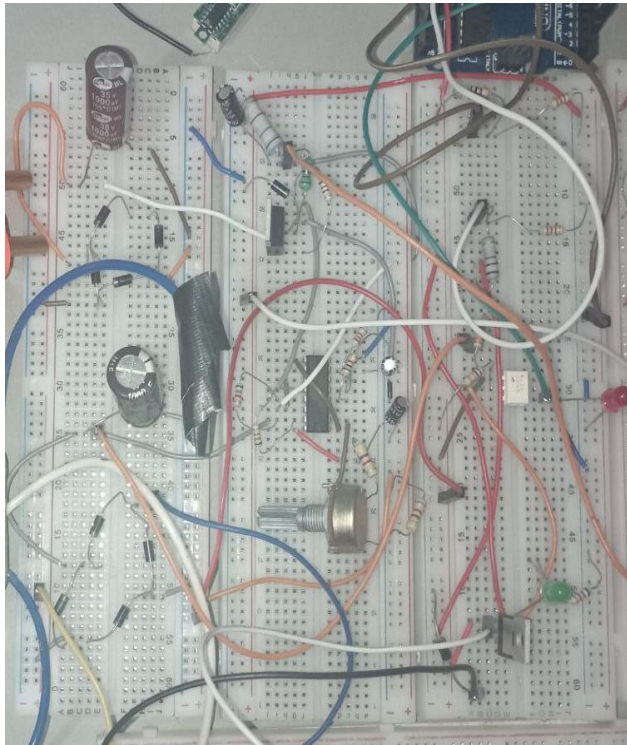
Steps of deep discharge:

Step 1: Here the blue led is on that indicates that the battery is discharging.

Step 2: Here the blue led is off that indicates that the battery is not discharging.

Discussion:

A battery charger with variable DC output using a converter with auto cutoff and deep discharge features is a useful and practical project. It can be used to charge a wide range of batteries. The variable DC output feature allows for charging different battery types with different voltage and current requirements.

The converter used in this project is a DC-DC converter. The converter was designed to operate efficiently and with low power losses. The auto cutoff feature is important as it protects the battery from overcharging, which can damage the battery and reduce its lifespan. The deep discharge feature ensures that the battery can be charged even if it has been discharged to a very low voltage, which is helpful when dealing with batteries that have been left unused for long periods.

One of the challenges in designing such a project is selecting the appropriate charging algorithm for the battery type being charged. Different battery chemistries require different charging algorithms, and an incorrect algorithm can damage the battery. Therefore, it was important to research the correct charging algorithm for the battery being charged and ensure that the charging circuit is designed to implement it correctly.

Another important consideration is the safety features of the circuit. Since batteries can be dangerous if not handled properly.

Overall, a battery charger with variable DC output using a converter with auto cutoff and deep discharge features is a useful and practical project that can be used in a wide range of applications. With proper design and implementation, it can be an efficient and safe way to charge batteries.