Summary:

The solar PV MPPT charge controller project aims to extract the maximum power from the PV solar panels which have a problem of fluctuating power output.This may be used to charge a battery or power a DC load. The project involves building a charge controller circuit and programming a microcontroller to track the maximum power point of the solar panel. The MPPT charge controller will ensure that the batteries are charged at the highest possible rate, resulting in longer battery life, reduced maintenance costs, and improved system performance. The project provides an opportunity to learn about solar energy, microcontroller programming, DC-DC Converters .In addition to the benefits mentioned above, the solar PV MPPT charge controller project offers several other advantages. Firstly, it can help reduce the carbon footprint by encouraging the use of renewable energy sources. Solar energy is a clean and sustainable source of energy that can help reduce the dependence on fossil fuels. Secondly, the project can help reduce electricity bills by generating electricity from solar energy instead of using grid power. This can result in significant cost savings over the life of the solar PV system.The project will require a solar panel, a battery, and other necessary components such as voltage regulators, current and voltage sensors, and connectors. The testing stage will involve measuring the Power output of the MPPT charge controller using a solar panel and battery and comparing it with an unregulated charging system.The end product will be a fully functional MPPT charge controller that can be used to charge batteries or power DC loads using solar energy efficiently.

Lastly, the project provides an opportunity to learn about various technical concepts such as analog and digital electronics, microcontroller programming, and power electronics. By building the MPPT charge controller, one can gain a deeper understanding of how solar energy systems work and how to design and build electronic circuits. This knowledge can be applied to other projects and can be useful in various engineering and technical fields.

SYSTEM DESIGN:

In this project, a standalone PV system, featuring a battery is proposed and simulated under load fluctuations and non-uniform irradiance conditions. Results validated the proposed technique capability in maintaining voltage stability and preserving power balance at the DC-bus in addition to eliminating battery overcharge. Moreover, resulting in batteries with longer life span and reduced size and cost. Finally, these results were reassured when testing the considered system with a commercial load under real-time solar irradiance data during a summer month and winter month. Experimental prototype implementation of the proposed system is to be considered.

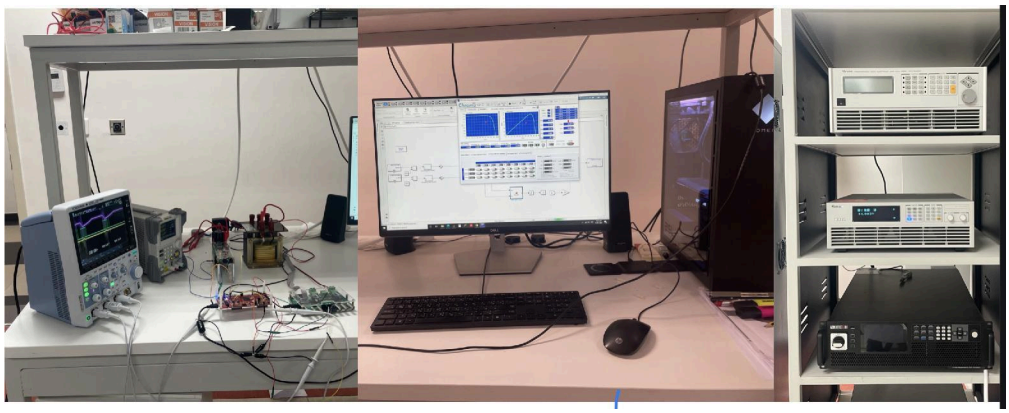

Figure 1: Proposed implementation Architecture

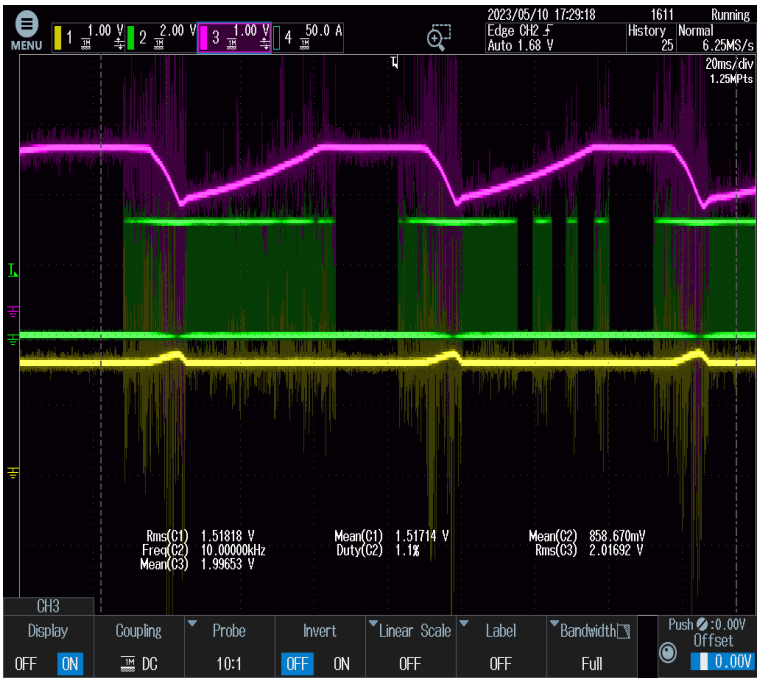

Figure 2: Hardware Results