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IOT ENABLED INTELLIGENT SMART PHOTO VOLTAIC H-BRIDGE INVERTER WITH HARMONIC REDUCTION FOR DOMESTIC APPLICATIONS

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Abstract: This project aims to develop an IoT-enabled intelligent smart H-bridge inverter with harmonic reduction for domestic applications. The proposed system utilizes advanced control techniques to minimize the harmonic distortions in the output waveform of the inverter, which enhances its performance and reduces the impact on the grid. The system includes a microcontroller-based control unit that monitors the load and adjusts the switching pattern of the inverter to achieve a lower THD (total harmonic distortion) level. Additionally, the system is integrated with IoT technology, enabling users to remotely monitor and control the inverter through a mobile application or a web interface. The proposed system is expected to improve the reliability, efficiency, and flexibility of the inverter, making it an ideal solution for domestic power generation applications.

Keywords:IOT,H-Bridge inverter,THD.

I.INTRODUCTION

Internet of Things (IoT) may be a hot topic in the industry but it's not a new concept. IoT refers to a network comprised of physical objects capable of gathering and sharing electronic information. It includes a wide variety of "smart" devices, from industrial machines that transmit data about the production process to sensors that track information about the human body. These sensors can use various types of local area connections such as RFID, NFC, Wi-Fi, Bluetooth, and Zigbee.

Sensors can also have wide area connectivity such as GSM, GPRS, 4G, and LTE. Out of the potential Internet of Things application areas, Smart Cities (and regions), Smart Car and mobility, Smart Home and assisted living, Smart Industries, Public safety, Energy

&environmental protection, Agriculture and Tourism as part of a future IoT Ecosystem have acquired high attention.

Similarly, in recent times, there has been continuous increase in energy consumption which has also led to the increase of renewable energy production. There are different sources of energy currently in use but unfortunately, most of the energy sources come from conventional fossil fuels. The environmental impacts of fossil fuels such as oil, coal and gas are very enormous and hazardous. Apart from contaminating the air, polluting and harming the environment, it has been identified as the main culprit in increasing greenhouse gases (GHGs) in the atmosphere, which is causing global climate change. One of the most immense methods of generating electricity without emissions or noise is through PV solar electricity by converting abundant sunlight to electrical energy. Solar photovoltaic (PV) systems are used for several applications since the maintenance required is low and no pollution discharged.

II.BLOCK DIAGRAM

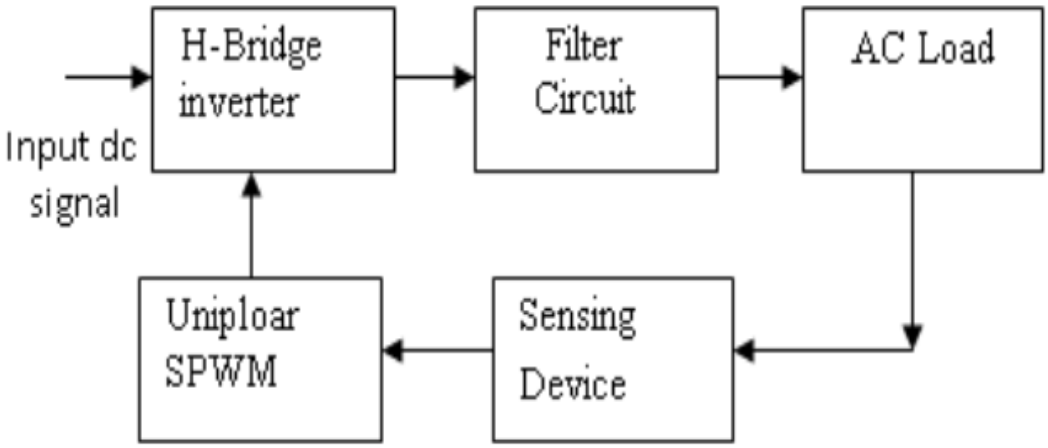


Fig.1. Block diagram of unipolar PWM control of H-bridge inverter

III.H-BRIDGE INVERTER

An H-bridge inverter is a type of power electronics circuit that is commonly used for converting DC voltage to AC voltage. The name "H-bridge" refers to the arrangement of the four switches in the circuit, which resemble the letter H. The H-bridge inverter is a popular circuit topology for applications such as motor drives, grid-tied solar inverters, and uninterruptible power supplies.

The basic H-bridge inverter circuit consists of four switches, typically MOSFETs or IGBTs, arranged in a bridge configuration. The switches are controlled by a high-speed pulse-

width modulation (PWM) signal generated by a microcontroller or other digital control circuit. By varying the duty cycle of the PWM signal, the amplitude and frequency of the output AC voltage can be controlled.

Fig.2. Symmetrical structure enhanced H-Bridge (SSEHB) multilevel inverter.

IV.PROPOSED SYSTEM

Energy is the indispensable need for the economic progress and social advancements. Based on the forecasting of the World Energy Forum the fossil fuels depletion will occur within another 10 decades. About 79% of world energy requirement were met by power generated by fossil fuels. Further the usage of fossil fuels causes environmental problems. In rural areas of growing nations power supply through grid system creates economic crisis because of the long transmission line requirement.

The supply of electricity with small diesel generators is costly and creates green house effects. To overcome the above problems renewable energy sources such as wind, solar, hydro, tidal, etc can be used for power generation. Among all renewable energy sources solar is the most suitable for power generation due to its non depleting nature, absence of CO2 or any other gaseous emission and elimination of transmission lines for power supply from grid.

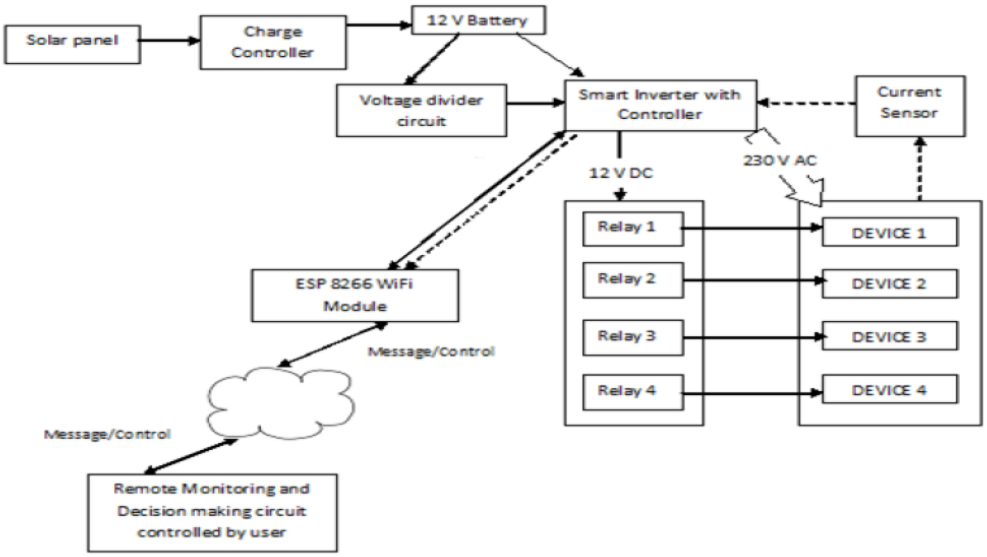


Fig.3.: Block Diagram of the Proposed IoT-based smart controlled inverter.

V.LITERATURE SURVEY

The increasing energy demand and pollution caused by the rapidly depleting fossil fuels have now given way to the use of renewable sources to meet energy demands. Among the renewable energy sources, high interest is on the solar energy which generates electricity using PV (Photo Voltaic) modules. The fact that there is a need for more efficient usage of renewable energy sources and solar energy happens to be one of them the smart inverters are need of the day. The solar energy can be used to charge the batteries during day time and the stored energy in the battery can be used when solar energy is not present.

The Smart inverters are generally as inverters which are charged through solar energy and which can perform solar tracking. The authors have used stepper motors to perform the solar tracking using the MQTT algorithm.

VI..CHARACTERISTICS

A harmonic is a signal or wave whose recurrence is a vital (entire number) numerous of the recurrence of some reference flag or wave. The term can likewise allude to the proportion of the recurrence of such a sign or wave to the recurrence of the reference flag or wave. Let's speak to the principle, or key, recurrence of a rotating current sign, electromagnetic field, or sound wave.

This recurrence, normally communicated in hertz, is the recurrence at which the majority of the vitality is contained, or at which the sign is characterized to happen.

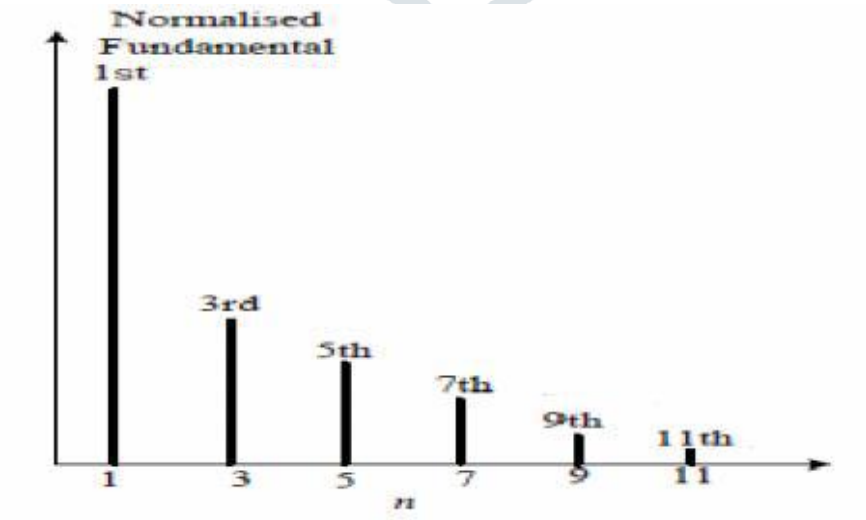


Fig.4. Harmonic Spectra of an Inverter

VII.SIMULATION AND OUTPUT WAVEFORMS

An H-bridge inverter is an electronic circuit that converts DC power from a battery or other source into AC power that can be used to operate household appliances. In a traditional H-bridge inverter, the output waveform can be distorted by harmonic distortion, which can reduce the efficiency of the inverter and cause interference with other electronic devices.

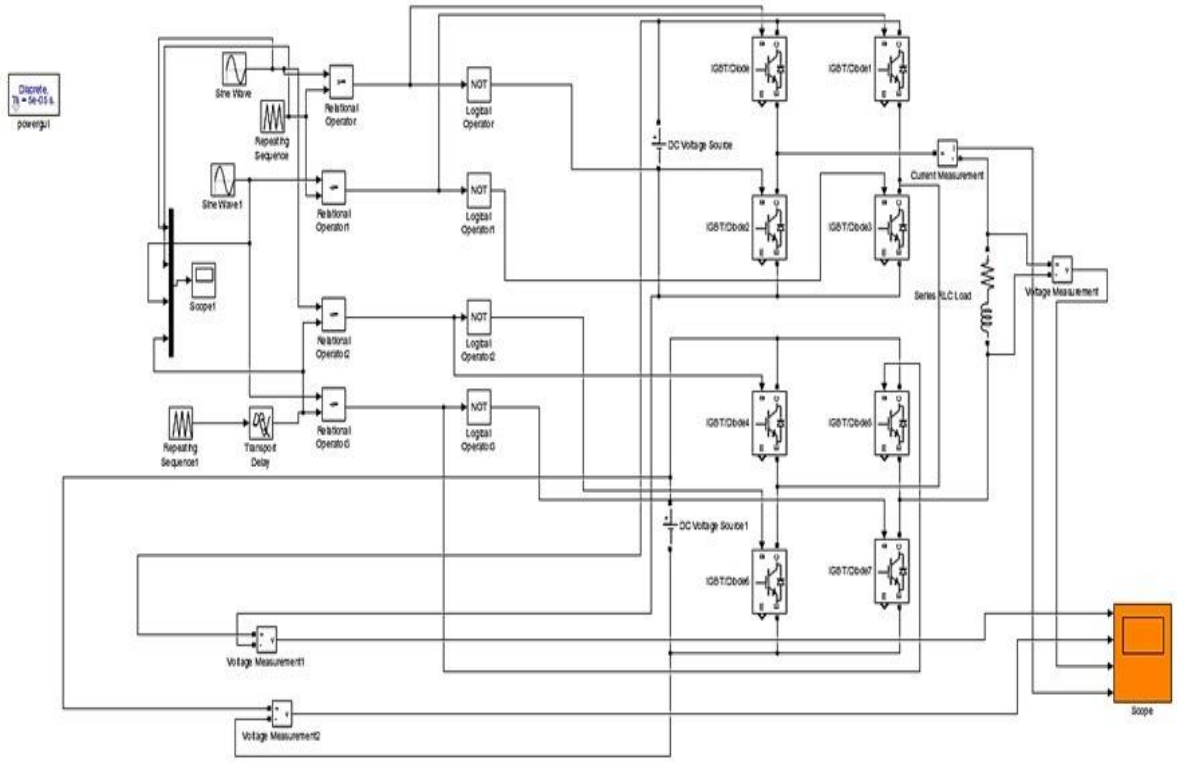
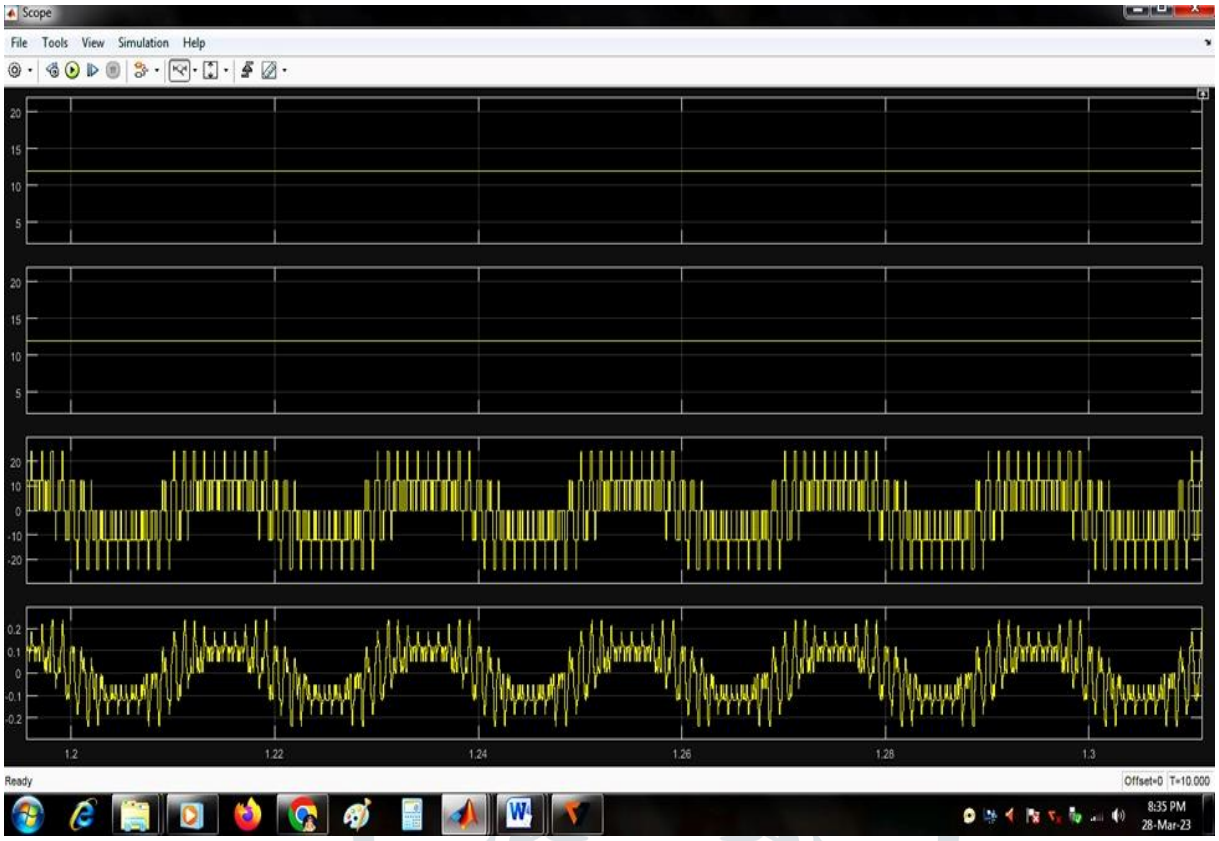


Fig.5. Output Diagram

VIII.SIMULATION



The development of an IoT-enabled intelligent smart H-bridge inverter with harmonic reduction for domestic applications is a significant advancement in the field of power electronics. The aim of this technology is to provide a more efficient, reliable, and cost-effective solution for power generation and distribution.

The H-bridge inverter is a popular topology used in power electronics due to its ability to provide a sinusoidal output waveform. However, the harmonic distortion caused by the switching operation of the inverter can lead to significant power loss, lower efficiency, and can damage the connected.

X.REFERNCES

[1]. D Chauhan, S Agarwal, Suman M.K,"PoliciesFor Development Of Photovoltaic Technology:A Review" International Journal of software & hardware research in engineering, Vol. 1, pp. 52-57, December 2013.

[2]. A Mamun A, M Elahi, M Quamruzzaman ,MTomal, "Design and Implementation of Single Phase Inverter" International Journal of Science and Research (IJSR), Vol.2, P 163-167, february 2013.

[3]. A Qazalbash, A Amin, A Manan, M Khalid, "design and implementation ofmicrocontroller based PWM technique forsine wave inverter" International Conference on power Engineering Energy and Electrical Drives, , P 163-167, March 2009, IEEE.

[4]. L Hassaine, E Olías, M Haddadi, A Malek, " Asymmetric SPWM used in inverter grid connected" Revue des Energies Renouvelables Vol. 10, pp. 421-429,2007.

[5]. M.N Isa, M.I Ahmad, A.Z Murad, M.K Arshad, "FPGA Based SPWM Bridge Inverter ", American Journal of Applied

[6]. B Ismil, S Taib, A Saad, M Isa, " development of control circuit for single phase inverter using atmelmicrocontroller" First InternationalConference PEC, p 437-440, November 2006,IEEE.

[7]. S.M Islam, G.M sharif, "microcontroller based sinusoidal PWM inverter for photovoltaic application" First InternationalConference development in renewable energy technology, p 1-4, December 2009, IEEE.

[8]. P Zope, P Bhangale, P Sonare, S Suralkar,"design and implementation of carrier based sinusoidal PWM inverter" International Journal of advanced research in electrical, electronics and instrumentation engineering, Vol 1, pp.230-236, October 2012.

[9]. R Senthilkumar, M Singaaravelu, " designof single phase inverter usingdsPIC30F4013" International JournalEngineering Research & Technology (IJERT), Vol 2, pp. 6500-6506, 2012.