IoT based solar powered BLDC motor drive using CUK converters for agriculture water pump

Vigneshwaran Perumal[1]
Asst. Professor, Department of EEE
K. Ramakrishnan College Of Engineering, Trichy, Tamil Nadu, India
vigneshgemini@gmail.com

R. Saranraj [2]
Asst. Professor, Department of EEE
K. Ramakrishnan College Of Engineering, Trichy, Tamil Nadu, India

Abstract—
Technology is developing very fast in this modern era and its application will be wider. This paper presents an Internet of Things based agriculture water pump which help in easy monitoring the agriculture field .An added advantages over IoT was utilizing renewable solar energy, which cuts the cost of electricity and pollution. The entire power control operation is performed by CUK converter for effective use of water and electricity. Effective use of BLDC motor made the entire operation flexible and simple. The simulation work was done through Mat lab and also developed a hardware kit to verify the simulation results.

Keywords—***IoT , Brushless DC motor & Cuk Converter***

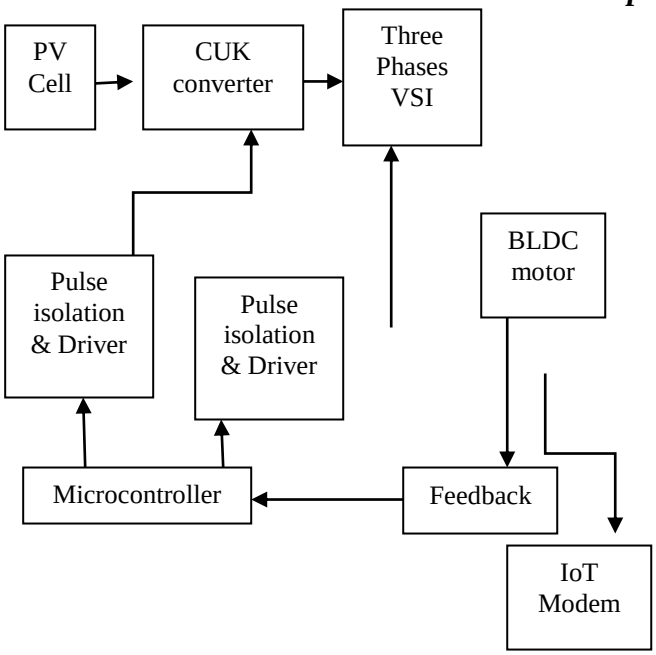
I. INTRODUCTION (*Heading 1*)

Agriculture is the backbone of many developing countries; latest technologies with renewable energy source make it as simple and efficient way in cultivating the land. It is clear and judicious in inaccessible locales where the transmission and delivered control is costly, therefore solar power is most prominent and available energy source used in pumping water.
The solar power coupled BLDC motor system requires add up data all in all framework with the objective that the system parameter can be picked in such a way that the working bend of the heap should coordinate through the solar cell cluster [1-2].
The proposed IoT based solar powered BLDC motor drive framework is structured as follows

II. DESIGN OF PROPOSED SYSTEM

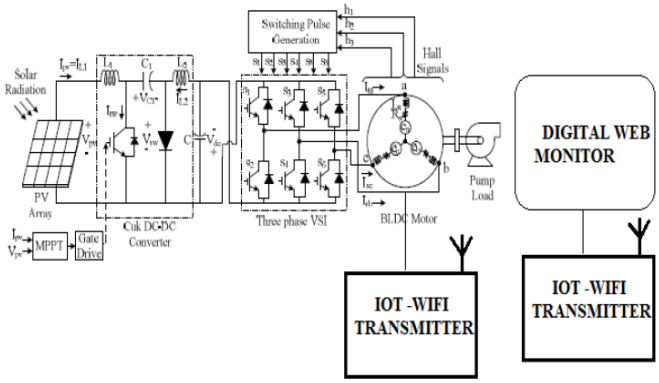
The proposed framework comprises of Photovoltaic panel, a Cuk converter, a VSI, a BLDC motor and IoT modem.

Proposed SPV exhibit took care of water siphoning framework with a gradual conductance (INC) MPPT calculation is utilized to work the CUK converter to such an extent that the SPV cluster consistently works at its MPP and the IOT BASED BLDC MOTOR experience diminished ebb and flow at the beginning. A three stage voltage source inverter (VSI) is worked by central recurrence exchanging for the electronic substitution of BLDC engine.



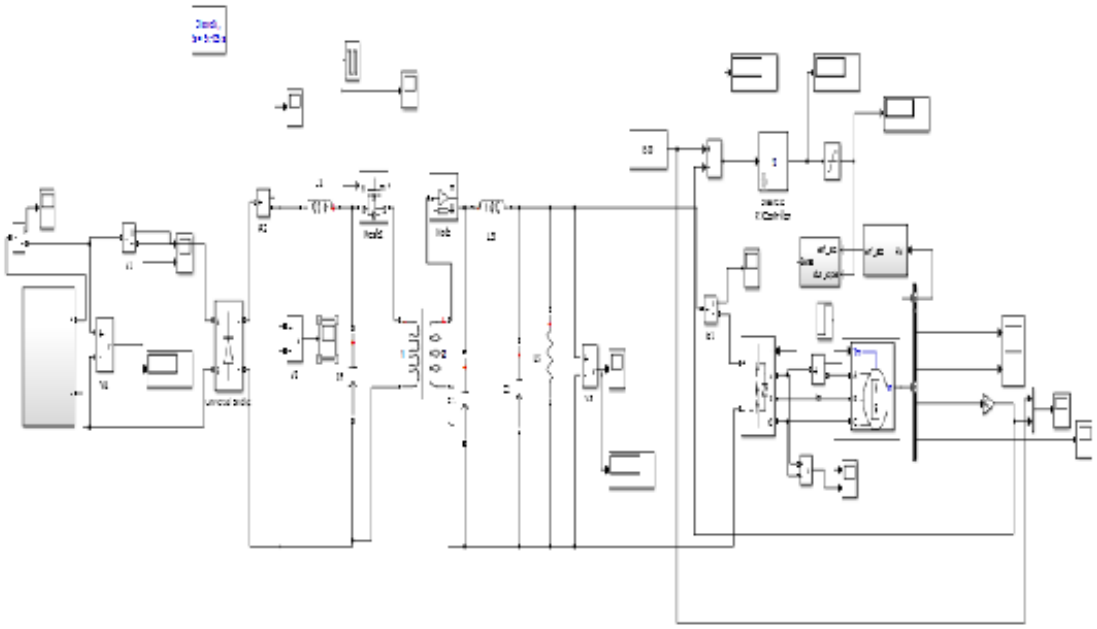
Recreation results utilizing MATLAB/Simulink programming is analyzed to show the beginning, elements and consistent state conduct of the proposed water siphoning framework exposed to the irregular variety consistently displays good execution paying little mind to the sun oriented irradiance level or its in the sun powered irradiance. The SPV cluster is structured with the end goal that the proposed framework variety.

The SPV cluster produces the electrical force request by engine siphon. This electrical force is taken care of to the engine siphon by means of a CUK converter and a VSI. The SPV cluster shows up as a force hotspot for the CUK converter as demonstrated Ideally, a similar measure of intensity is moved at the yield of CUK converter which shows up as an info hotspot for the VSI. Practically speaking, because of the different misfortunes related with a DC-DC converter, somewhat less measure of influence is moved to take care of the VSI. The beat generator produces, through INC-MPPT calculation, exchanging beats for IGBT (Insulated Gate Bipolar Transistor) switch of the CUK converter. The INC-MPPT calculation utilizes voltage and present as criticism from SPV exhibit and creates an ideal estimation of obligation cycle. Further, it creates real exchanging beat by contrasting the obligation cycle and a high recurrence transporter wave. Along these lines, the most extreme force extraction and consequently the productivity improvement of the SPV exhibit is practiced.

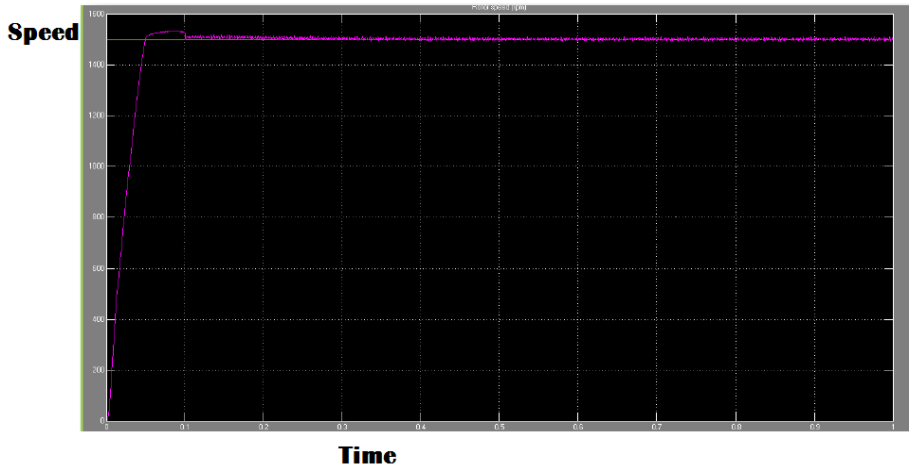


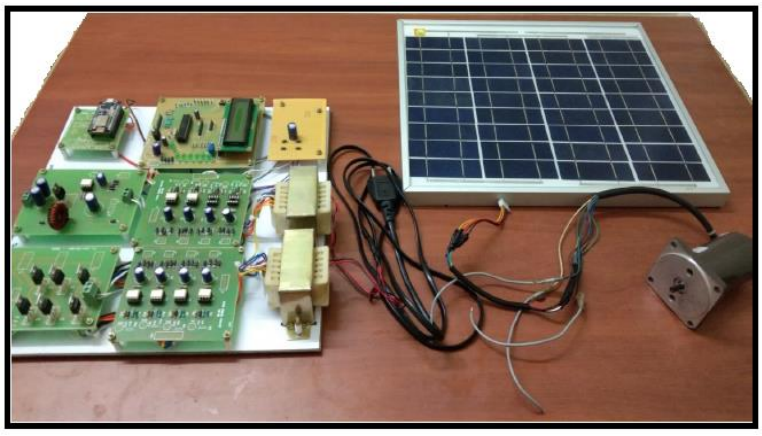
The VS, changing over DC yield from a CUK converter into AC, takes care of the IOT BASED BLDC MOTOR to drive a water siphon coupled to its pole. The VSI is worked in basic recurrence exchanging through an electronic replacement of IOT BASED BLDC MOTOR helped by its implicit encoder. The high recurrence exchanging misfortunes are in this way wiped out, contributing in an expanded productivity of proposed water siphoning framework.

III. SIMULATION & EXPERIMENTAL RESULTS



The simulation circuit generate graph observed the various speed range.





The Hardware output matched with the simulation results

IV. CONCLUSION

Internet of things made the water pump as automation in agriculture sector. The simulation result indicates the speed of BLDC motor with respective to time. The future scope of this paper to effective utilizes the other renewable energy source during cloudy weather and night-time, which will make it more efficient.

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