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INVERTER BACKUP TIME INDICATOR USING ARDUINO NANO

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ABSTRACT

Iridescent India have inverter battery indicator, however shows the last level of limit. The 90% of inverter fabricates has no limit demonstrating worked in framework in their inverters. Remaining inverter with indictors is an excess of exorbitant. The inverter backup time indicator will assist us with figuring out the number of time will endure inverter battery or any battery which is associated with the Load system. This inverter backup time indicator will assist the consumer with dealing with the battery utilization as indicated by their capacities and know about unexpected shut down of the inverters. The Arduino Nano is a vital part, which is little in size and accompanies most recent microcontroller chipset. That makes the inverter backup time indicator compact and more reliable. The model has been carried out utilizing little battery. A basic technique is created to get the inverter backup time. It very well may be executed on any home inverter battery by rolling out certain improvements in source code of Arduino Nano.

Keywords: Arduino Nano, Current Sensor, Voltage Sensor, LCD and Battery.

I. INTRODUCTION

In this paper our point is to show remaining limit of inverter. Little gadget which can be put on any inverter by applying a few programmable changes like battery capacity and output voltage, here by thought of venture cost we are utilizing little li-po battery to demonstrate the project. Whenever a battery activity is involved for operating a given load, knowing the backup time of the battery becomes an important factor with the system.

However a backup time indicator is generally never given even in a large portion of the high level battery charger units, which makes it unimaginable for the client to understand the leftover bakcup power inside the related battery. With such troublesome situation the client is simply passed on to figure the full release time through experimentation techniques. The plan of a battery backup time indicator circuit introduced here is intended for satisfying the above prerequisite so the client can outwardly screen the bakcup time as well as the utilization status of the load associated with the battery continuously.

II. METHODOLOGY

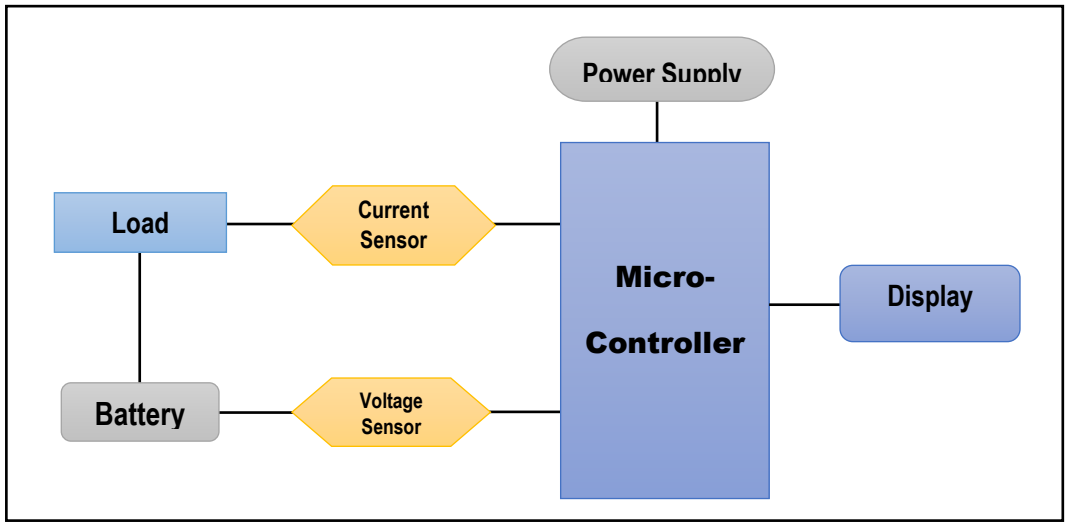

Figure 1: Block Diagram of Inverter backup indicator

The above figure shows the block chart of inverter backup time indicator. Which comprise of microcontroller, current sensor, voltage sensor, show, power supply, load and battery. The microcontroller assumes the vital part in this task. We can utilize a power supply for working the microcontroller and different gadgets or we can utilize a similar battery supply to work the parts of the framework. The load is associated with the battery and the current sensor associate in series with load to detect the load current and it will send the information to microcontroller for further process. The

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voltage sensor is associated with battery to quantify the battery voltage and the deliberate voltage signal is given to microcontroller to computing the backup time. The beneath estimations are made to compute the backup time.

Calculation:

We can calculate the backup time of inverter battery as follows.

First we have to calculate the battery percentage. For that lets consider the Vhigh is the voltage of completely energized battery and Vlow is the completely discharged battery. Let's K and Kp is actual constant and present constant.

$$K = Vhigh - Vlow \quad \text{- - - - - (1)}$$

$$Kp = Vhigh - Vpresent \quad \text{- - - - - (2)}$$

Therefore,

$$\text{Battery percentage}(\%) = \frac{(K - Kp) \times 100}{K} \quad \text{- - - - - (3)}$$

Second we need to calculate the actual capacity (Amp-hour) of battery,

$$\text{Battery capacity} = \frac{(\text{Battery \%}) \times (\text{Total Capacity of Battery})}{100} \quad \text{- - - - (4)}$$

Now calculate the backup time of inverter battery as Tbackup,

$$Tbackup = \frac{(\text{Battery voltage}) \times (\text{Battery capacity})}{\text{Total watts on laod}} \quad \text{- - - - - (5)}$$

But

$$\text{Total watts (on load)} = (\text{Battery Voltage}) \times (\text{Load cuurent}) \quad \text{- - - - - (6)}$$

From equation (5) & (6), Tbackup is given by,

$$Tbackup = \frac{(\text{Battery voltage}) \times (\text{Battery capacity})}{(\text{Battery Voltage}) \times (\text{Load cuurent})} \quad \text{- - - - (7)}$$

$$Tbackup = \frac{\text{Battery capacity}}{\text{Load cuurent}} \quad \text{- - - - - (8)}$$

The above Tbackup formal gives the battery backup time in hours because the battery capacity is always given in the ampere-hours to get the time in min we have to multiply by 60 above equation as (8) follows,

$$Tbackup\ (\text{in min}) = Tbackup\ (\text{in hours}) \times 60 \quad \text{- - - - - (9)}$$

Using above equation (9) of backup time formula we can calculate the backup time of inverter battery or any battery.

III. DESIGN AND DESCRIPTION

The schematic outline in figure 2 shows the implementation of the inverter backup time indicator. The Ardunio nano board can work on 5-18 volt supply here we are involving inverter battery as voltage source. To Charge battery, 12V DC adapter has been taken in the used. The INA219 current sensor uses to detect the load current and conveys the identified current message as serial data and serial clock to arduino nano at pin number A4 and A5 which utilizes for a similar sign sort. The voltage sensor is associates across the source battery to detect the condition of charge and convey the analog signal to arduino nano at pin number A0.

The microcontroller received the equivalent signal from the current sensors and voltage sensor at arduino pin number A4, A5 and A0 respectively. Then based on that received signal from the sensors the microcontroller will gauge's the load current and the battery voltage. When we get the battery voltage and the load current utilizing these present time information and pre portray information of battery which previously set in the arduino nano with those boundary we can work out the backup time of the battery. Then at that point the determined backup time signal is send by the microcontroller to the LCD for displaying the backup time of the battery.

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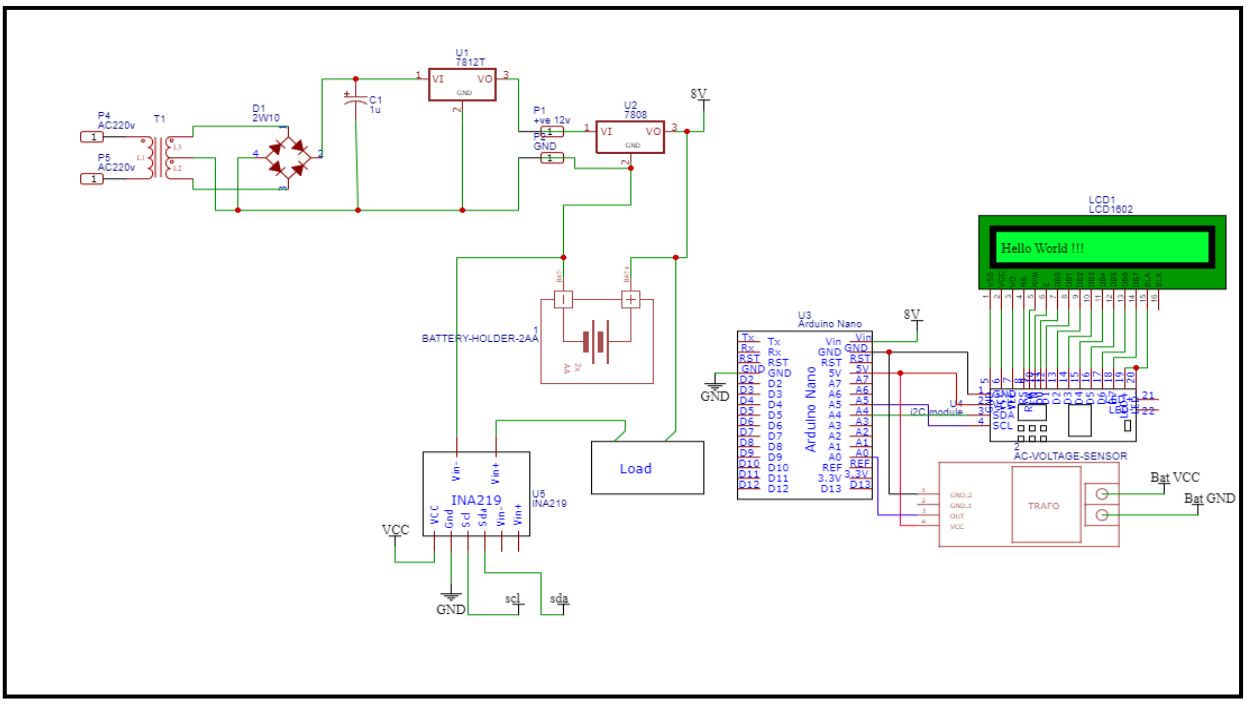

Figure 2: Schematic Diagram of Inverter backup indicator.

IV. RESULTS

Utilizing the mentioned methodology and schematic outline we executed the equipment circuit which shows the backup time of the demonstrated battery. The schematic has been planned utilizing Proteus online Circuit Schematics and PCB planning device. The schematic is changed over into a PCB. The PCB looks something like beneath. The underneath figures shows the equipment Implementation of inverter backup time indicator. The Figure 3(a) , Figure 3(b), Figure 3(c) and Figure 3(d) shows the backup time of the battery, percentage of the battery, load current and Vout i.e. state of charge of the battery respectively.

This backup time indicator device can be utilized with any inverter battery by supplanting the exhibited battery and doing some arduino nano source code changes as indicated by the hardware evaluations. Here is the aftereffect of the inverter backup time indicator using Arduino Nano.

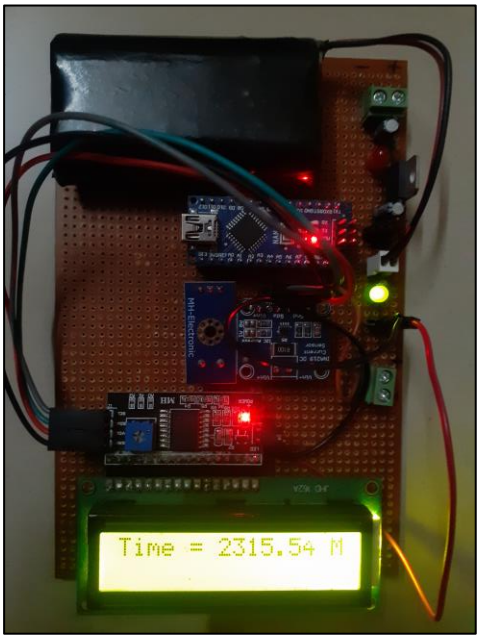

Figure 3(a): Displaying Backup time of battery

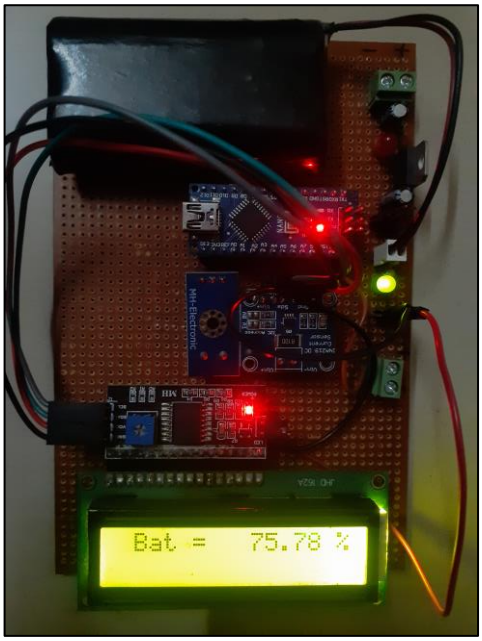

Figure 3(b): Displaying Load Current

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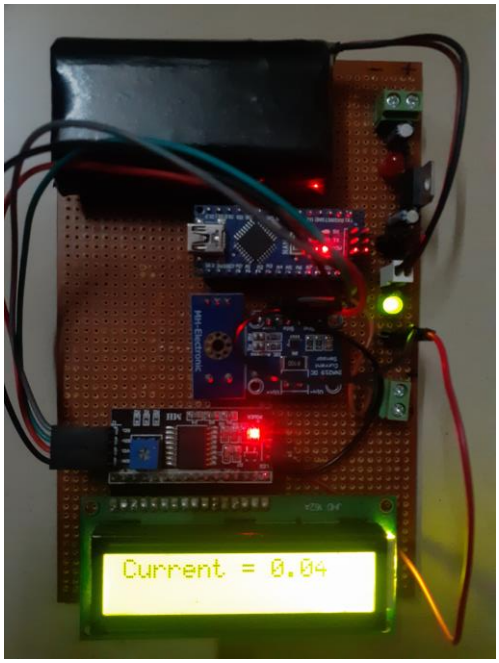

Figure 3(c): Displaying Battery Percentage

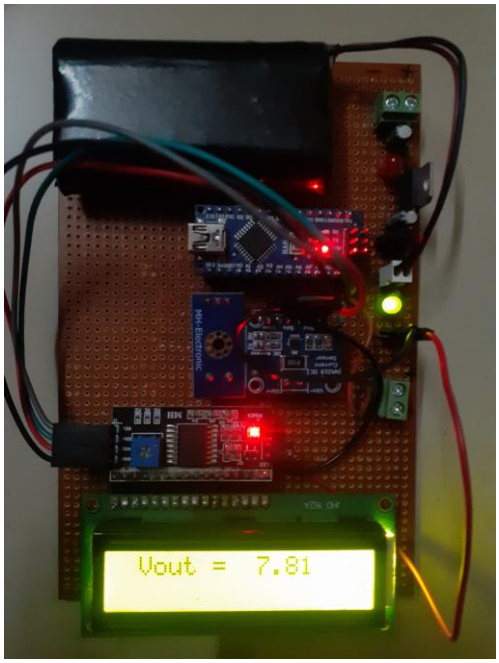

Figure 3(d): Displaying Vout

V. CONCLUSION

The inverter backup time indicator will assist us with figuring out the number of time will endure inverter battery or any battery which is associated with the framework. This invertor backup time indicator will assist the consumer to dealing with the battery use as per their capacities and know about unexpected shut down of the inverters. This device will show the load current, battery voltage, battery capacity and remaining backup time of the inverter on LCD which gave on the device. It assists the consumer to utilising and monitoring the inverter and because of small size of inverter backup time indicator it can be easily put on any inverter.

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