Development of Smart Electric Vehicle Charging Station-An off Grid Bunk

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***Abstract*- While electric vehicles are generally seen as clean vehicles, they are not completely clean because the production of electricity might generates emissions as well. The current scenario of today's solar energy ecosystem is highly unstructured and localized. There are above 50 solar power plants in India but none of them are connected in a manner that they would be a method to perform analytical analysis of the solar energy produced[1]. Today with the advancements in the sensor technology it is very viable option to connect the solar energy systems to GSM. Once these systems are connected, the user can receive the messages and analyze performance, productivity and efficiency [3]. This project aims at finding a possible and viable method to connect the solar powered electric vehicle charging station and perform analytical operation to increase efficiency of solar energy.**

***Index terms*- automobiles; electric vehicle; mobile solar car roof; solar charge station**

I.INTRODUCTION

In today's world, fossil fuel is the main power source as it provides energy for automobiles, airplanes, and it is also used to produce electricity. However, fossil fuel cause environment problem. In order to solve this problem, there are two paths. One is through designs which consume less energy and improve fuel efficiency. Other through usage of alternative energy with storage such as hydrogen or battery [4].

Recently, in the field of automobiles, many companies have developed commercially available electric cars that consume alternative fuels. Nevertheless an electric car or electric vehicle is only as clean as the primary energy used to power it. That means we also have to look at clean electricity generation if we want to improve the traffic based air pollution with electric vehicles. The base design is a mobile solar car park roof [2]. Today, there are few solar car park which are in the market which are mobile grid connected solar systems. The system discussed in this paper is a mobile multifunctional solar charge station which allows direct DC charging from the solar panel to different vehicle traction batteries. The latest development in the field of micro-electronics and Internet of Things gives us the ability to connect the entire infrastructure to the internet at a very low power consumption and cheap price. When producing energy, which eventually leads to global warming. In future cars, busses and all kind of vehicles will be using electrically charging condition so there is a need to have an off grid bunks all over so we can charge the vehicles from that bunk. To charge the vehicle it will take respective time. In a mean while you can do other work. Once the charge is completed message will be sent to that person by the GSM module. Later he can collect the charged vehicle. Same problem facing with the mobiles too. At the traveling time mobiles will get switch off due to low battery condition so because of grid bunks we can charge the mobiles.

II. OBJECTIVES

The main objective of this project is to decrease the use of fossil fuels and increase the use of renewable sources like wind energy, solar energy, etc. This project aims at finding a possible and viable method to connect the solar powered electric vehicle charging station and perform analytical operations to increase efficiency of Solar Energy. To build the communication path between the user and the charge station by using advanced technologies in IoT.

III. METHODOLOGY

A. BLOCK DIAGRAM

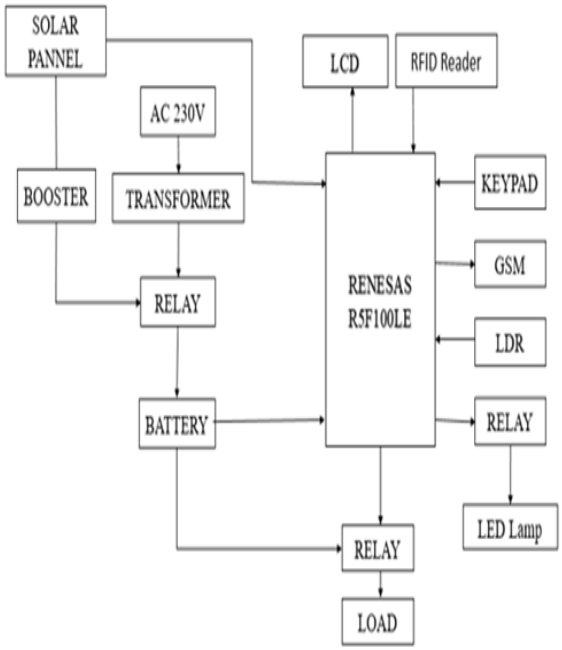


Fig 1: Block Diagram

The Renesas microcontroller placed at the center of the block diagram shown in figure.1 forms the control unit for the entire project. A program is embedded in the microcontroller to take the actions based on the inputs provided to it. The format in which data is sent across the network and the model in which it is stored and handled plays a major part in building a scalable application. The next step in the process is to define a structure that will be able to store the data received in the efficient manner. And if the variations in the solar output occurred then a message will be sent to respected mobile number through GSM. In this project transformer is used for taking the Ac voltage. When the power from solar panel, the relay switches to Ac 230v to charge the battery. We use step down transformer to decrease the voltage from 230v to 12v. As an extension to the project we are developing automatic street lights on and off systems using LDR as a sensor. Here also we use relay to switch on and switch off street lights based on the readings of LDR. The overall process is controlled by Renesas microcontroller. Power generated by the solar panel and the information about battery charge level is displayed in LCD for user notification.

B. DESCRIPTION

A prototype module will be developed for the project. It includes individual PCB boards for all interfaces according to the block diagram. Every PCB will be interconnected with jumper wires.

- Solar panel is used for converting solar energy to electricity.
- GSM is used for communication.
- For demo purpose we used two lead acid batteries.
- We are using step down transformers.

C. HARDWARE DESCRIPTION

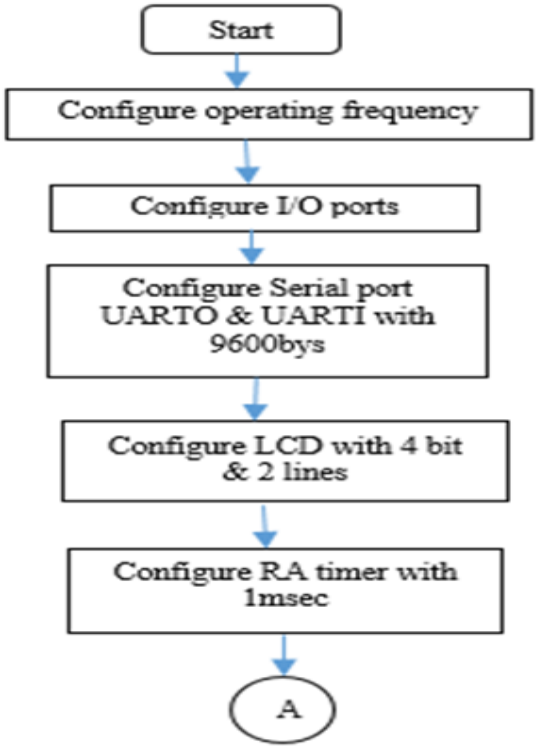
Renesas : 5V, 700mA
LCD : 5V, 230mA
Solar panel : 12V, 1A
GSM : 12V, 1A
Battery : 12V, 1A
Relay : 12V, 1A
Transformer : 230V, 1A
LDR : 5V, 10mA
LED Lamp : 230V, 1A
Keypad

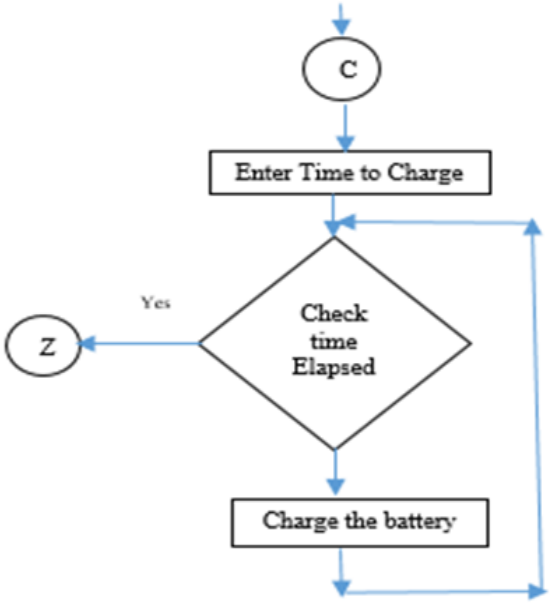
D. SOFTWARE DESCRIPTION

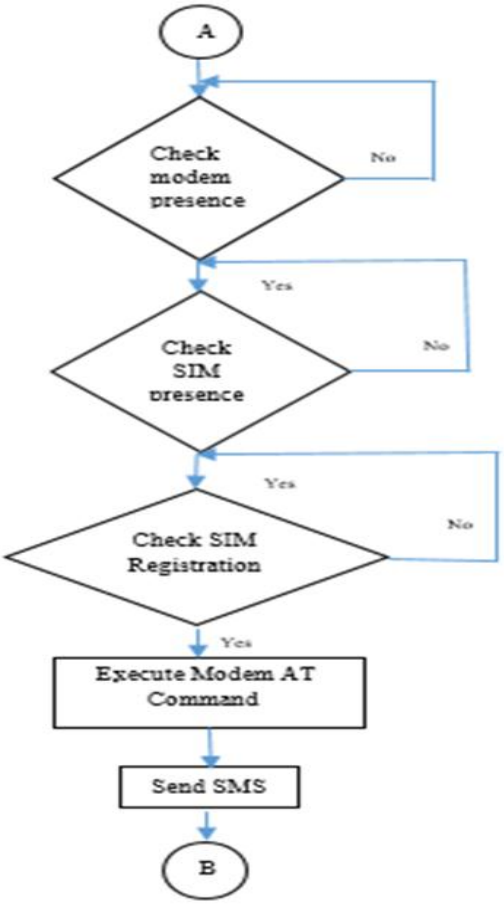
Embedded C: The C standard does not care about embedded, but vendors of embedded systems usually provide standalone implementations with whatever amount of libraries they are willing to provide. C is widely used general purpose high level programming language mainly intended for system programming.

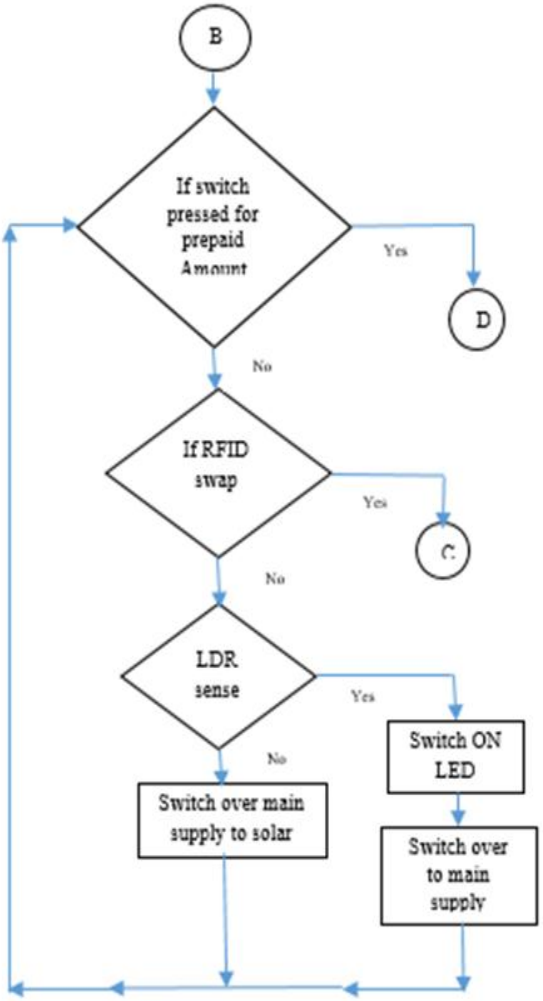
Renesas Flash Programmer: Renesas flash programmer: Flash programmer is done using this software. It is a software package used to program the on-chip flash memory of renesas microcontrollers. It provides usability and functionality optimized specifically for the flash programming. It has the following features support for programming under pc control. Ability to cooperate with software by batch processing. Programming a unique code to a designated area of flash memory. Easier creation of projects.

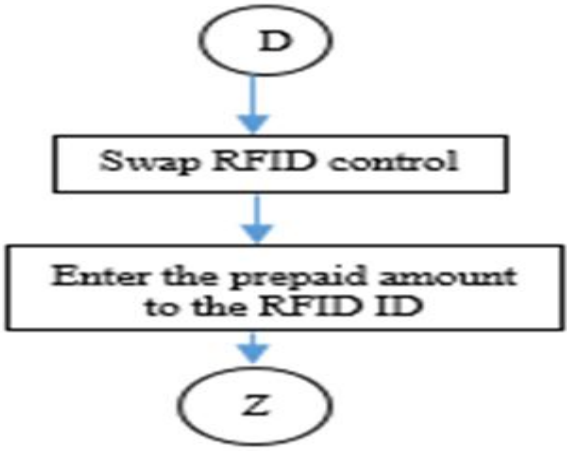
E. FLOWCHART


Start
Configure operating frequency
Configure I/O ports
Configure Serial port UARTO & UARTI with 9600bys
Configure LCD with 4 bit & 2 lines
Configure RA timer with 1msec
A

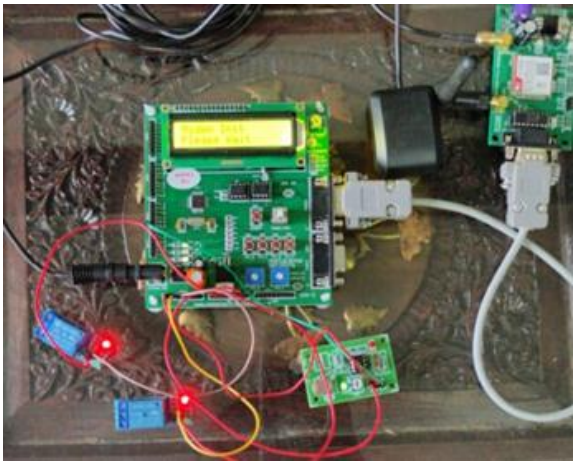

C
Enter Time to Charge
Check time Elapsed
Yes
Z
Charge the battery


A
Check modem presence
No
Yes
Check SIM presence
No
Yes
Check SIM Registration
No
Yes
Execute Modem AT Command
Send SMS
B


B
If switch pressed for prepaid Amount
Yes
D
No
If RFID swap
Yes
C
No
LDR sense
Yes
Switch ON LED
No
Switch over main supply to solar
Switch over to main supply



IV. HARDWARE ARRANGEMENTS



The above figure is the prototype module developed for the project. It includes individual Renesas microcontroller board for all interfaces according to the block diagram. Every component will be inter-connected with jumper wires. Wireless communication GSM is used for sending message. For demo concern we used the LDR is used for finding the day/night.

V. EXPECTED RESULTS

Indicates the system has been started.

Indicates GSM module activated.

Battery charging with electricity generated by solar when AC 230V is OFF.

Battery charging with electricity generated by AC 230V when solar is not sufficient.

Battery charging with electricity generated by solar when AC 230v is ON

Entering mobile number from keypad

Indicates LOAD battery charging started

Indicates LOAD battery charging completed

VI. ADVANTAGES AND DISADVANTAGES

F. ADVANTAGES

- It saves time.
- Manual operation has been reduced to major extent.
- Less man power required.
- Efficient distribution system.
- Easy to use.
- Efficient and reliable.
- Cashless payments.
- The main motive is to eliminate the paper based records using smart phone

G. DISADVANTAGES

- Carrying power supply.
- If GSM is not getting the network means there may be delay in sending information.
- Since it is handled mutually there is a chance that the person who is handling make errors.

H. APPLICATIONS.

- It is used for the field of consumer electronics and appliances.
- Implemented in various fields such as a smart city, healthcare, smart home, smart car, energy system, and industrial security.
- The solar energy is becoming a potential solution towards sustainable energy supply in future.
- In general remote monitoring systems have to fetch, analyze, transmit, manage and feedback the remote information by utilizing the most advanced science and technology field of communication technology and other areas.

VII. CONCLUSION AND FUTURE SCOPE

I. CONCLUSION

The project is designed using structured modeling and is able to provide the desired results. It can be successfully implemented as a Real Time system with certain modifications. Science is discovering or creating major breakthrough in various fields, and hence technology keeps changing from time to time. Going further, most of the units can be fabricated on a single along with micro-controller thus making the system compact thereby making the existing system more effective. To make the system applicable for real time purposes components with greater range needs to be implemented.

J. FUTURE SCOPE

For project demo concern, we have developed a prototype module. In future, this project can be taken to the product level. To make this project as user friendly and durable, we need to make it compact and cost effective. Going further, most of the units can be embedded along with the controller on a single board with change in technology, thereby reducing the size of the system.

Fig 2. SOLAR CHARGING STATION

VIII. ACKNOWLEDGMENT

We would like to acknowledge the help and encouragement given by various people during the course of this project. We are deeply indebted and very grateful to the invaluable guidance given by project guide Mr. Keerthi Kumar. S. H. Professor during this project work. We would like to express our sincere gratitude to Dr. M S Nagaraj Professor and Head, Department of Electrical and Electronics Engineering, BIET, Davangere, for her kind support, guidance and encouragement throughout the course of this work. We are thankful to our beloved principal Dr. H. B. Aravinda for providing excellent academic climate. The support provided by the college and departmental library is greatly acknowledged.

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