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# Solar Powered Electric Vehicle Charging Station

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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 generate emissions as well. This paper on a solar powered electric vehicle charging station is a working solution to close the gap in achieving a truly renewable and clean vehicle. The currently scenario of today solar energy ecosystem is that, it is highly unstructured and localized. There are about 50 solar power plants in India but none of them are connect in a manner that there would be a method to perform analytical analysis of the solar energy produced. This paper aims to finding a possible method to connect the solar powered electric vehicle charging station and to perform analytical operations to increase efficiency of Solar Energy.***

***Keywords: Electric vehicles, Charging station, Solar powered plants, Solar energy.***

## I. INTRODUCTION

In today's world, fossil fuel is the power source as it provides energy for automobiles, airplanes, and it is a used to produce electricity. However, fossil fuel cause environment problem.

In order to solve this problem, there are two paths: first, through designs which consume less energy and improve fuel efficiency; second through usage of alternative energy with storage such as hydrogen or battery. Now a days, 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.



Figure 1:Solar Electric Charging Station



Figure 2: Charging Vehicle Through Battery

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The base designed is a mobile solar car park roof. Nowadays, there are few solar car parks 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 that allows direct DC charging from the solar panel to different vehicle traction batteries. The latest development in the field of micro-electronics and the Internet of Things gives us the ability to connect the entire infrastructure to the internet at very low power consumption and cheap price. The main objective of this project is to decreases the use of fossil fuels and to increase the use of renewable sources like wind ,solar energy, etc. This Project focus 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 Embedded System.

## II. LITERATURE REVIEW

Solar panels and solar energy have been prevailing from a decade along with their shortcomings. In the recent years, the booms in micro-electronics have made a huge impact in increasing computational power and cost of embedded electronics. it has become very easy to produce intelligence to things. Keeping this in mind we have tried to find a probable model for connecting the Solar Energy system with these micro-electronic systems to give birth to the Internet of Things. We have designed architecture for connecting the individual solar units to the internet along with providing them with sensors that can be used to measure their efficiency. As an overall design these panels become the part of a huge network of panels that can talk to each other and behave in an intelligent fashion. This would lead to real-time knowledge about the operations and detect failures in an early stage with the formulation of a standard data schema we should be able to make more and more devices that communicate with cloud services without worrying about any proprietary protocol. The Schema would help us concentrate what on the data is about more that how to send the data. In this manner that servers also cares less about what format the data is going to come in and dedicate more processing power towards the analysis and data and learn from the data.Further more and more algorithms can be formulated to make sense of the data so collected and help in increasing the efficiency of the solar energy system. Finally, we would state the if the motioned procedure is followed to setup an analytic system then a very efficient Solar analytics system could be built at a very low cost and also very high efficiency rate.

## III. PROPOSED SYSTEM

A prototype module will be develop for the project. It includes particular PCB boards for all interfaces according to the block diagram. Every PCB will be connected with jumper wires.Wireless communication GSM is used for sending messages. For demo be about we used the LDR is used for finding the day/night.

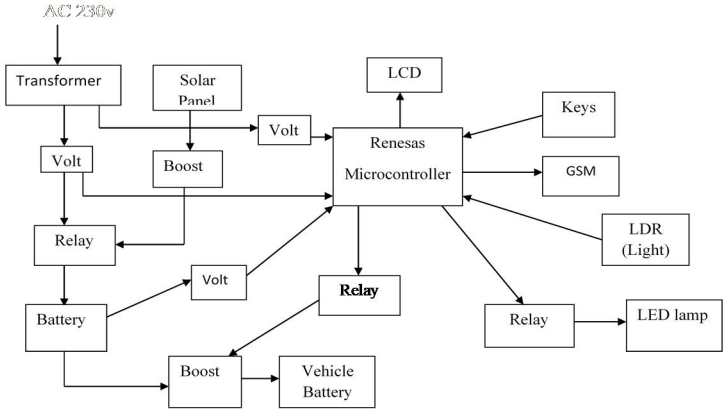



Figure 3: Block Diagram

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

*1)* Solar panels is used for converting the solar energy into electricity
*2)* GSM is used for communication.
*3)* For demo purpose two lead acid batteries are used.
*4)* We are using step down transformers.

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## IV. HARDWARE DESCRIPTION

This section gives information about hardware components used

### *A. RENESAS 64-PIN*

It has General-purpose register 8 bits × 32 registers (8 bits × 8 registers × 4 banks), ROM 512 KB, RAM: 32 KB, Data flash memory: 8 KB ,On-chip high-speed on-chip oscillator and also it has On-chip single-power-supply flash memory and On-chip debug function.

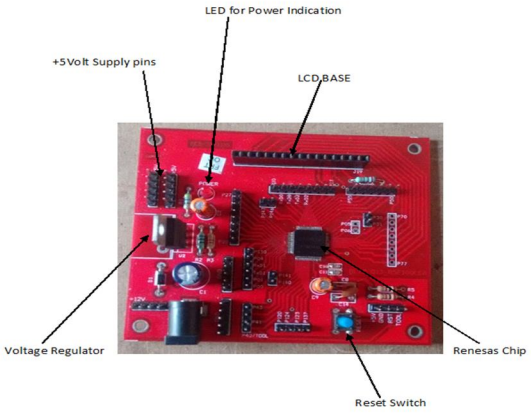



Figure 4: RENESAS 64-PIN BOARD

### *B. LCD*

A liquid crystal display is a flat panel display and an electronic visual display, based on Liquid Crystal Technology. A liquid crystal display consists of an array of little segments that can be handled to present information. Liquid crystals display do not emits light directly instead they can use light modification techniques.

LCD's are used in various range of applications, including computer monitors, televisions , instrument panels, aircraft cockpit displays, signage, etc. They are common in customer devices such as video players, clocks, watches, calculators, and telephones.



Figure 5: LCD DISPLAY

### *C. Solar Panel*

A solar panel is a packed, attached assembly of photovoltaic cells. The panels can be used as a component for a larger photovoltaic cells to generate and supply electricity in commercial applications. Because a single solar panel can generate only a limited amount of power, many installations contain many panels. A photovoltaic system commonly includes an array of solar panels, an inverter, and eventually a battery and interconnection wiring. A solar cell also called photovoltaic cell or photoelectric cell is a solid state electrical device that changes the energy of light directly into electricity by the photovoltaic effect.



Figure 6: SOLAR CELL

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*D. Crystalline Silicon Modules*

Many solar modules are currently generates from silicon photovoltaic cells. These are commonly classified as monocrystalline or polycrystalline modules.

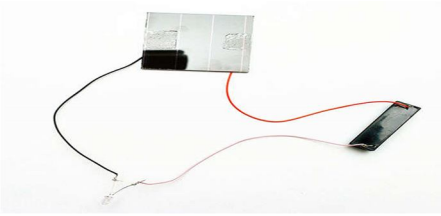


Figure 8: CHARGING SOLAR PANEL

*E. GSM*

In the GSM Module SIM900 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz SIM900 features GPRS multi-slot class 10/ class 8 and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.



Figure 10: GSM MODULE

*F. Battery*

The storage battery where electrical energy can be stored as chemical energy and chemical energy is then converted to electrical energy as when esstential. The converts of electrical energy into chemical energy by applicable external electrical source is known as charging of battery. The conversion of chemical energy into electrical energy for providing the external load is known as discharging of secondary battery. Throughout charging of battery, current is passed through it which causes some chemical changes inside the battery. These chemical changes consume energy during their formation.




Figure 11: 12V, 7AH BATTERY

*G. Relay*

The relay is an electrically controlled switch. Current flowing through the coil of the relay generates a magnetic field which attached a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and nearly have double throw switch contacts as shown in the diagram. Relays permit one circuit to switch a second circuit which can be completely different from the first.




Figure 9: SPDT RELAY

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### *H. Transformer*

A transformer is a device that carries the electrical energy from one circuit to another through inductively coupled conductors. A differing current in the first winding generates a varying magnetic flux in the transformer's core and thus a it flows magnetic field through the secondary winding. This varying magnetic field a differ electromotive force (EMF) in the secondary winding. This effect is known inductive coupling.

### *I. Keypad*

The keypad is about 4x4 Matrix Membrane Keypad (#27899) .This 16-button keypad supplies a functional human interface component for microcontroller systems. appropriate adhesive backing produce in an easy way to set up the keypad in a different of applications.

## V. SOFTWARE DESCRIPTION

This section gives brief description about software requirements

*1)* Cube suite + IDE
*2)* Renesas flash programmer
*3)* Language: Embedded C

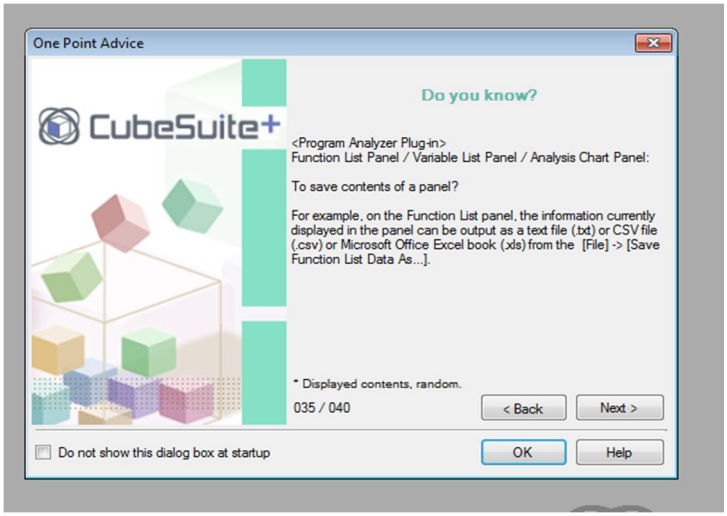



Figure 9: CUBESUITE SOFTWARE

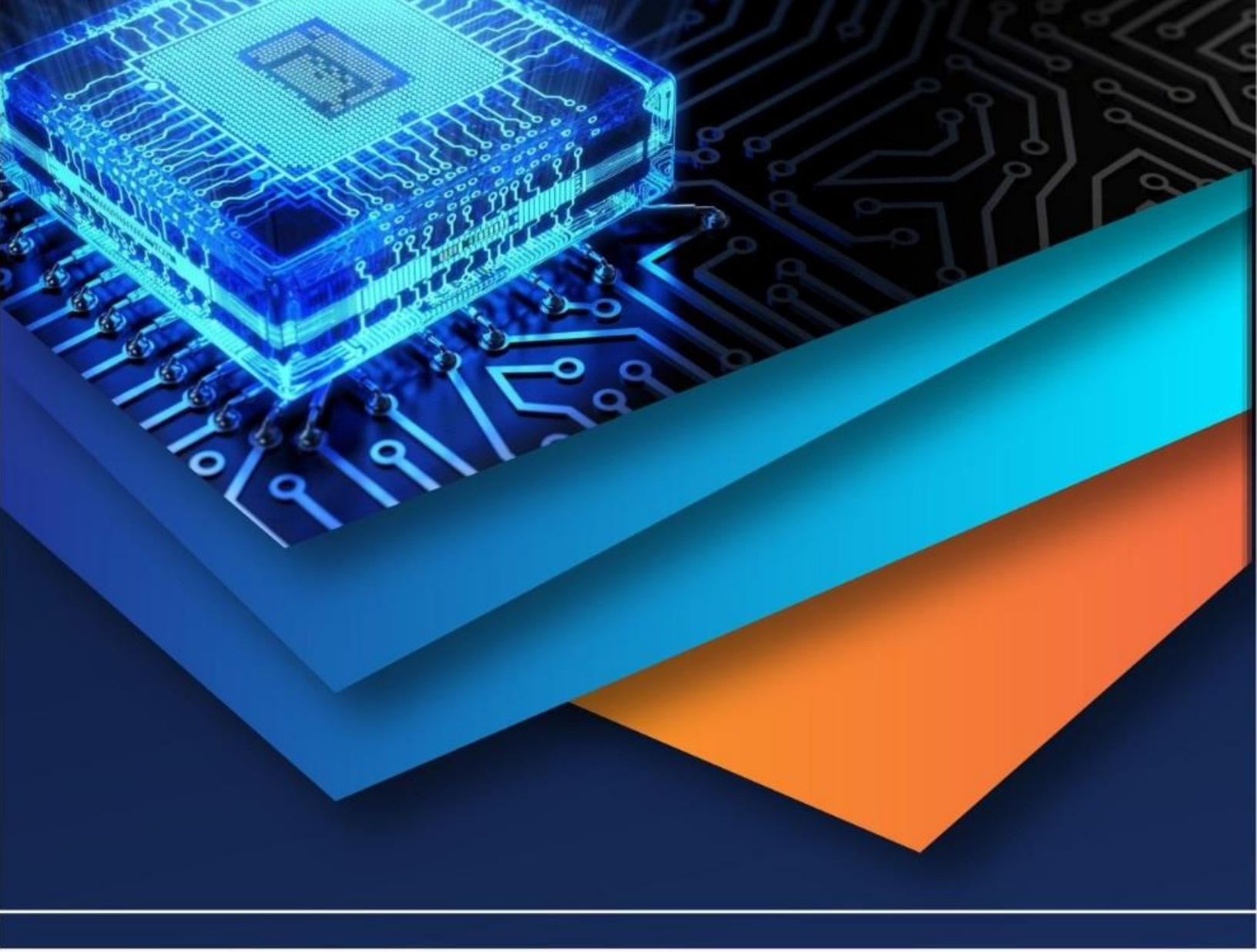
## VI. CONCLUSION

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 interconnected 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. The Renesas microcontroller placed at the centre 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.

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