Design of a Solar Tracking System for Renewable Energy on Arm

K. Nishanth Rao, C. Srikanth, S.V.S. Prasad, Arulananth T S

Abstract--- This paper mainly focuses on the outline and development of charging arrangement of LiPo batteries with the assistance of followed sun based boards. In this way a vitality administration framework is advanced in mechanical vehicle. The proposed framework was experienced trying on the VANTER automated stage. This mechanical framework is outlined utilizing brilliant host of microcontroller. On this premise, our proposition makes a two sided fold commitment. On one side, it demonstrates the utilization of development of a sun based following system for expanding the robots control paying little mind to its portability. On the opposite side, it has outline of intensity framework execution in view of two batteries. In these two batteries, one is charging freely and other is giving vitality to robot. This paper revolves around the diagram and improvement of a progression charging structure for Li– Po batteries by infers of took after sun situated sheets. In this way, the execution of an aggregate essentialness organization structure associated with a mechanical examination vehicle is progressed. The proposed system was attempted on the VANTER mechanized stage—a free unmanned examination vehicle spoke to extensive expert in affirmation. The eagerness of this robotized system lies in the blueprint thought, in perspective of a canny array microcontroller. On this preface, our suggestion makes a twofold tremendous duty. From one point of view, it shows the improvement of a sun situated after instrument went for growing the vagabond's ability paying little regard to its conveyability..

Keywords: Li–Po battery, Arm7 LPC 2148 Microcontroller, Robotic vehicle, Mems Sensor, Light Dependent sensor, Li–Po Rechargeable battery, Solar Panel.

I. INTRODUCTION

Sunlight based power frameworks in self-ruling automated vehicles have been frequently utilized for a few years. A genuine case is the Sojourner meanderer, in which the vast majority of the provided vitality is produced by a lessened size photovoltaic board. Be that as it may, if there should be an occurrence of rare to no sun oriented light, the wanderer ought to limit utilization, since its batteries in line couldn't be energized when exhausted. The utilization of battery-powered batteries in a space mission was utilized without precedent for the Mars Exploration Rovers. By the by, the requirement for more noteworthy task self-sufficiency by Spiritand Opportunity was explained by methods for bigger convey sunlight based boards. This arrangement fills in as the reason for the plan of sunlight based boards for the future ExoMars mission. This wanderer, on account of its high-proficiency ultra-thin-film silicon cells developed on a carbon-fiber fortified plastic, is equipped for giving higher power. NASA outlines propelled distinctive ages of investigation vehicles. This is the case of K9, a wanderer for remote science investigation and self-ruling task; field incorporated outline and activities, a trend setting innovation model by Jet Propulsion Laboratory for long-extend portable planetary science; and Micro5, a progression of mechanical vehicles conceived for lunar investigation. As its fundamental outline advantage, this wanderer arrangement has a double sun powered board framework coupled to a helped suspension system. This keeps the controller arm mounted on the center of the meanderer from minimizing sun based board produced control and enables it to tidy sun based board surface.

II. EXISTING METHOD

The meanderer that will go be set up has an arrangement of two wheels that are backside coupled to a plane of skeleton that turn confidently. These two wheels are worked by lasting rigging DC engine that conveys 1000 rpm with a beginning torque of 2Kg/cm. Required programming for this automated stage has three principle levels. Beginning level program will be done in Matlab dialect which will be performed in remote PC and offers GUI to show and control mechanical vehicle. Second stage program will be done in C dialect that keeps running over PIC 16F877A microcontroller. The Communication between ace microcontroller and remote PC will be surrendered out by Zigbee convention.

III. PROPOSED METHOD

Here, in this venture, we rent solar panel which is hooked up to a motor for rotation. The attitude of inclination of the sun panel is completed to maximize the power storage. The sun panel is directed consistent with a sensor network so that they're exposed to highest sunlight. This in flip expenditures the battery with excessive effectively. The rotation of the motor and the sensor community is completed making use of a microcontroller. The microcontroller can be in charge for the movement of the robot, optimizing the power consumption and recharging the battery. Optimization is completed by means of the microcontroller through constantly monitoring the battery stage. A threshold worth is about and every time the battery cost decreases beyond the edge worth, the microcontroller detects it and takes the proper measures, for illustration, the

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action of the robot i.E., its pace is lowered. Accordingly, the robot uses the available power for other excessive precedence duties, for illustration, powering the communications process and sending information about the present battery quandary.

IV. HARDWARE SYSTEM

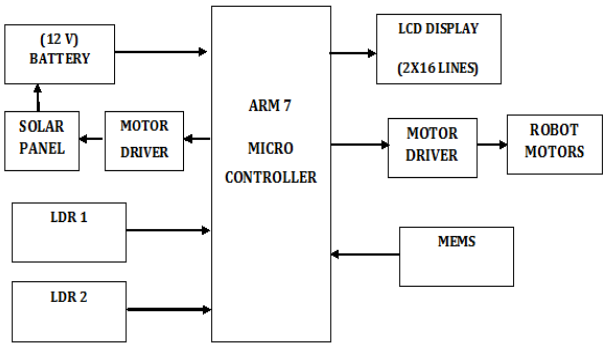

Fig: Block diagram

In this project, we design and develop a robot which will optimize the usage of the battery power, which is being charged using solar panels. The main purpose of this project is to design and construct an energy management system which is used to optimize the usage of battery power of a Li Po battery by the use of a microcontroller in a robot.

V. METHODOLOGY

Microcontroller: This section varieties the manipulate unit of the entire undertaking. This section truly includes a microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and many others. The Microcontroller types the heart of the assignment since it controls the gadgets being interfaced and communicates with the gadgets in line with the software being written.

Arm7 TDMI:ARM is stands for advanced RISC Machines, it is the title of a category regarding processors, and it is the title of a sort science too. The Risc guide set, and related decode mechanism are a lot easier than of complex guideline Set laptop (CISC) designs.

Liquid crystal show: LCD is a flat panel display, digital visible show that makes use of the sunshine modulation homes of liquid crystals. Liquid crystals don't emit mild directly. Lcds are to be had to show arbitrary pics or fixed pics which can also be displayed or hidden, corresponding to preset words, digits, and seven-section shows as in a digital clock.

Solar Panel With 9W/12V: Solar panel is a photovoltaic module or photovoltaic panelis interconnected and assembled by photovoltaic cells, it is also known as the solar cells. The photovoltaic module is commonly known as the **solar panel**, it is used as a component with the higher photovoltaic system to offer the electricity for commercial and residential applications. Because solar panel is a single photovoltaic module it can only produce a less amount of power, a photovoltaic module installation normally it includes an array of photovoltaic modules or panels, for an example like inverter, batteries. Photovoltaic systems like panels or modules are used for either on- or off-grid applications, and for solar panels on spacecraft.

Fig: Solar Panel with 9W/12V

The solar panel it uses the light energy which emits from the sun to generate the electricity by using the photo-electric effect.

LDR: The action reverse shows that when the light is turned on, the assurance of the LDR falls, empowering current to experience it. This is an instance of a light sensor circuit: When the light level is low the assurance of the LDR is high.

Fig: LDR Sensor

Battery 12V/1.2A: A battery is an electrical device with the combination of one or more than one electrochemical cells; this battery is used to store the chemical energy into the electrical energy to supply the power. The battery are firstly invited by the Voltaic pile in the year 1800 by Alessandro Volta, now a days the battery are used commonly for the power source for all types like household, industrial applications, etc… accordingly the battery are estimated in the year 2005 in the world wide battery it generates a billions of sales in the year, with the some percentage annual growth. Batteries are used for reusable purpose for years in a standby mode for power applications or it may be discarded also. Miniature cells are also used to power device such as like wristwatches, wall watches, mobile phones, larger batteries they are provide standby power for the computer data services.

Fig: Battery with 12V/1.2A

Batteries Monitoring System The main moto of this system is to surge the life and energy storage capacity of Li-Po cells. Here the checking of state of charge is necessary. The system permits continuous measurement of both the capacity of battery in as charge and one being discharged.

Charging and Discharging Algorithm The procedure gives selection of battery. It will gives evidence about charging and discharging of batteries. The batteries used of twelve volts, 1200mA. Vup is defense condition voltage for battery charging and Ven is extreme voltage for battery discharging. Edge values for this charging and discharging guideline is defined in the SHM programmed algorithm to avoid LiPo batteries from damaging and to extend their life cycle.

VI. RESULTS

The main focus of the project is solar power system will be going to operate the robot. For this the power administration will be consistinng ofa smart battery, that combines both communication and electronics devices those are able to controls the charge. Power administration system made up of photovoltaic cells, a charger device, selector system and battery. LPC2148 - ARM7 is used for a microcontroller which accomplishes 2 main functions that are it will identifies sunlight & operates the tracked solar panels toget extreme voltage power supply. Light sensors are used to identify sunlight and the solar panel will rotate to appropriate side. And another microcontroller is used for Battery switching.

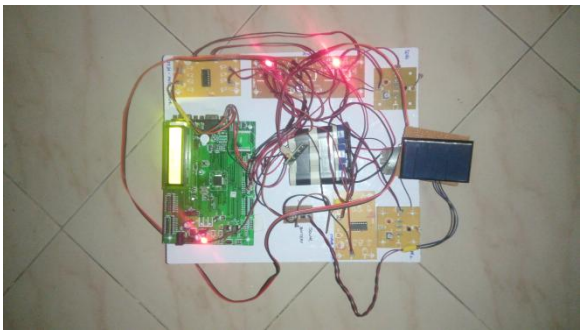

Figure: Result of solar robot

VII. CONCLUSION

The main focus of the project is solar power system will be going to operate the robot. For this the power administration contains a smart battery that combines bothcommunication and electronic devices that are able to controls the charge. Power administration system consists of photovoltaic system, a charger device, selector and battery system. Arm microcontroller is used as a smart microcontroller which accomplishes of two main functions that are it catch sunlight & controls the tracked sun based solar panels to get extreme powers. Light sensors are used to identify sunlight and the solar panel will rotate to appropriate side. Microcontroller is used for Battery switching. Depending on the current ratings switching action will be performed, so continues supply will be provided to system.

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