NON HYDRAULIC SOLAR PANEL SLANG

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ABSTRACT
The effectiveness of a sun panel is appreciably decreased while dust (occasionally called soiling) builds up on its surface, lowering the amount of daylight that reaches the sun cells underneath. They need to be wiped clean occasionally, normally with water, so that it will utilise their meant functionality to the utmost. Cleaning will become tough, expensive, and tough in a few locations because of water constraint. The pioneering and powerful sun photovoltaic conversion approach is broadly utilised to transform sun energy. A new tool for electrostatic cleansing has been designed and implemented. The cleansing overall performance of this tool has been examined thinking about the electrode designs. The electric powered subject fee turned into decided via way of means of analytical and numerical techniques with inside the traditional version. The published circuit forums of the proposed version and the traditional version have been produced. The conventional version with effective and negative waveform is broadly utilized in electrostatic purifier studies. Dust elimination efficiencies and electric losses for exceptional frequency and voltage values have been in comparison for each card. It has been proven that the proposed version can carry out cleansing with excessive performance in spite of comparable loss variation.
Keywords: Arduino Uno, LCD display, Battery, Mosfet, Voltage Controller, AZO polymer coating plate, DC motor.

1. INTRODUCTION
With the increasing use of energy and climate change due to the use of fossil fuel sources, there is growing interest in renewable energy sources, including the direct use of solar radiation by photovoltaic cells (solar panels). However, these are subject to degradation in efficiency due to factors such as location, environment and weather conditions. Other conditions include dust accumulation on the panels, shading from structures such as trees and buildings, seasonal changes, weather influences such as snow, rain, clouds, and animal (bird, etc.) migration routes in the vicinity of the production site. The pollution of the panels caused by these factors influences the output voltage of the panel and thus the energy production. However, solar power plants require data monitoring.

2. Literature survey
2.1 Design on Measurement and Control System of Cleaning Robot Based on Sensor Array detection
A new quite home intelligent cleaner adopted the inaudible and infrared device array, that has performed the period surroundings perception, is introduced, and this cleaner driven by step-motor has the facility of autonomous operating by itself and thus the functions of the automatic obstacle detection and obstacle shunning. This paper adopts the grid scanning formula supported electrical map notice floor coverage task, and styles synthesis detection system supported device array finding technique technology per formula characteristics, experimental results for obstacle detection by static

finding indicate that the designed detection system improves cleansing robot's surroundings perception and path search ability greatly.

2.2 Deployment of mobile robots with energy and timing constraints

Mobile robots are commonly used in many applications, like carpet cleaning, search and rescue operation, and exploration. Many studies are dedicated to the management, sensing, and communication of robots. However, the activity of robots has not been fully addressed. This paper investigates mechanism activity for coverage tasks. Every temporal property and energy constraints are considered; the robots carry restricted energy and wish to complete the tasks before deadlines. A speed-management technique is projected to form an alternative the travelling speeds to maximize the travelling distance beneath every energy and temporal property constraints.

2.3 Solar tracker robot using microcontroller

The target of this project is to develop an automatic star huntsman mechanism (STR) that is capable to trace most intensity level. The potency of the solar power conversion is often optimized by receiving most lightweight on the solar array this mechanism is programmed to find daylight by exploitation two light-weights Dependent Resistors (LDR). Servo motor aligns the solar array to receive most lightweight. Digital compass is employed to find the position of the mechanism. Two changed DC servo motors can move the mechanism back to the initial position once the mechanism is out of position.

2.4 Solar Panel Automated Cleaning System

In this prototype, the moist cleansing device turned into followed for higher cleansing and to keep away from taking the threat of the glass panel being scratched through the dry brush. Compared with this, this challenge indicates strategies for cleansing water being recycled and additionally destiny
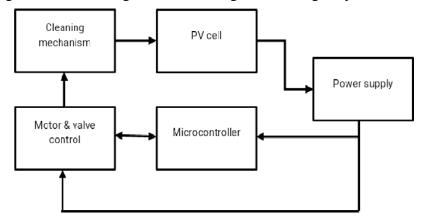

Fig. 1: Block diagram of the cleaning system

automation, therefore slicing labour costs. It is envisaged that the challenge could result in the improvement of a clever completely computerized strength and aid green cleansing device. a nylon spiral brush and wipers cleansing device that cleans on set cleansing cycles. The brush rotates to smooth because it horizontally interprets throughout an array of panels. The tool is hooked up on a fixed of battery powered-motorized wheels. At the top of the panel, there could be a docking station. It additionally has its very own solar panel to rate the battery.

2.5 Design and Implementation of Automated Dry Solar Panel Cleaner

In the proposed automated solar panel cleansing gadget, the subsequent additives, are used: a microcontroller that's Arduino UNO board, 2- channel 12V relays to govern route of automobile's rotation, Ultrasonic sensors to experience the rims of the panel, spinning brushes positioned at every aspect of the gadget derived via way of means of DC automobiles and every other automobile to pressure the chassis alongside the panel. These additives engage with every difference to shape a

cleansing gadget. The gadget changed into experimentally proven very green in cleansing sun panels inside the Gulf place, as sand and dirt lessen PVs performance drastically on this place.

TITLE	TECHNOLOGY	DISADVANTAGES
Design on Measurement and Control System of Cleaning Robot Based on Sensor Array detection	Computer embedded platform and signal process system using FGPA	The power supply required for the robot cannot be supplied in all the cases
Deployment of mobile robots with energy and timing constraints	Micro controller, embedded system, motion sensors	The time constraints and range was limited
Solar tracker robot using microcontroller	Digital Compass, Servo motor, Light dependent sensor	The tracker system need to regularly update , but the range is 7.00 am to 7.00 pm
Solar Panel Automated Cleaning System	DC geared Motor, Rails, Timer, Spiral brushes, Plumber block bearing	Continuous wiping may down the efficiency photovoltaic screen
Design and Implementation of Automated Dry Solar Panel Cleaner	Arduino UNO REVS, DC motors, wipers, Mechanical system	Regular supply of water needed for consistent process

3 Proposed Methodology and Future Work
A method has been developed for cleaning photovoltaic modules, based on the electric charge of moving waves on small particles suspended in a liquid, removing dust and similar dirt (except algae) that forms on the surface of solar modules can. One electrode is charged with a very high negative voltage and the other electrodes are charged positively, causing dust particles to be ejected from the plates. In another mechanism, the dust was removed by an electric curtain with the electric field density distribution. The electric field will distribute along both vertical and horizontal directions. In this system, the density of the electric field varies across the plate, exerting a force on the dust that moves it away from the plate.

In the proposed method as we mentioned in the block diagram below, we are using a materials such as a Microcontroller, Voltage controller to control the moving plate and supply of voltage on the dust particles, AZO polymer coating plate used to detach dust from solar panels and also easy penetration of sun energy into the photovoltaic panels.
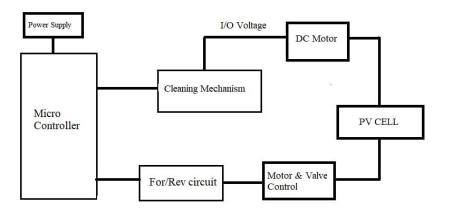
BLOCK DIAGRAM

Fig 2 Block diagram of Proposed System

Result and Discussion

Electrostatic Cleaning of photovoltaic modules has many important advantages when electrostatic cleaning is integrated into the photovoltaic module to make it self-cleaning. Firstly, the downside is the cost of replacing existing cleaning techniques and retrofitting electrostatic cleaning panels to existing PV panels or replacing PV panels. Other advantages of electrostatic cleaning include unattended cleaning, lower cost, higher reliability, less maintenance, no need for cleaning liquids (detergents) or water, avoiding the use of abrasive materials, higher panel efficiency, and longer panel life.
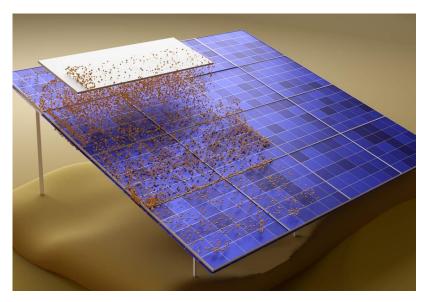

Fig 3 Diagram of Model

REFERENCES

1. G. Dai and T. Chen, "Design on Measurement and Control System of Cleaning Robot Based on Sensor Array detection," 2007 IEEE International Conference on Control and Automation, 2007, pp. 1319-1322, doi: 10.1109/ICCA.2007.4376574.

2. Yongguo Mei, Yung-Hsiang Lu, Y. C. Hu and C. S. G. Lee, "Deployment of mobile robots with energy and timing constraints," in IEEE Transactions on Robotics, vol. 22, no. 3, pp. 507-522, June 2006, doi: 10.1109/TRO.2006.875494.

3. B. Afarulrazi, W. M. Utomo, K. L. Liew and M. Zarafi, "Solar Tracker Robot using microcontroller," 2011 International Conference on Business, Engineering and Industrial Applications, 2011, pp. 47-50, doi: 10.1109/ICBEIA.2011.5994256.

4. S. K. Thomas, S. Joseph, T. S. Sarrop, S. B. Haris and R. Roopak, "Solar Panel Automated Cleaning (SPAC) System," 2018 International Conference on Emerging Trends and Innovations In Engineering And Technological Research (ICETIETR), 2018, pp. 1-3, doi: 10.1109/ICETIETR.2018.8529032.

5. F. I. Alzarooni, A. K. Alkharji, A. A. Alsuwaidi and E. R. Almajali, "Design and Implementation of an Automated Dry Solar-Panel Cleaning System," 2020 Advances in Science and Engineering Technology International Conferences (ASET), 2020, pp. 1-4, doi: 10.1109/ASET48392.2020.9118209.

6. Libra, M.; Daneček, M.; Lešetický, J.; Poulek, V.; Sedláček, J.; Beránek, V. Monitoring of Defects of a Photovoltaic Power Plant Using a Drone. Energies 2019, 12, 795, doi:10.3390/en12050795.

7. Ghazi, S.; Sayigh, A.; Ip, K. Dust effect on flat surfaces–a review paper. Renew. Sustain. Energy Rev. 2014, 33, 742–751, doi:10.1016/j.rser.2014.02.016.

8. 'Chanchangi, Y.N.; Ghosh, A.; Sundaram, S.; Mallick, T.K. Dust and PV performance in Nigeria: A review. Renew. Sustain. Energy Rev. 2020, 21, 1–14, doi:10.1016/j.rser.2020.109704.

9. Mazumder, M.K.; Sharma, R.; Biris, A.S.; Zhang, J.; Calle, C.; Zahn, M. Self-cleaning transparent dust shields for protecting solar
panels and other devices. Part. Sci. Technol. 2007, 25, 5–20, doi:10.1080/02726350601146341.

10. Casanova, J.Z.; Piliougine, M.; Carretero, J.; Bernaola, P.; Carpena, P.; Mora-Lopez, L.; Sidrach-Cardona, M. Analysis of dust losses in photovoltaic modules. World Renew. Energy Congr. 2011, 2985-2992, doi:10.3384/ecp110572985.

11. H. Kawamoto and M. Kato, "Electrostatic Cleaning Equipment for Dust Removal from Solar Panels of Mega Solar Power Generation Plants," 2018 IEEE 7th World Conference on Photovoltaic Energy Conversion (WCPEC) (A Joint Conference of 45th IEEE PVSC, 28th PVSEC & 34th EU PVSEC), 2018, pp. 3648-3652, doi: 10.1109/PVSC.2018.8547468.

12. H. Kawamoto and T. Shibata, "Electrostatic cleaning system for removal of sand from solar panels," 2013 IEEE 39th Photovoltaic Specialists Conference (PVSC), 2013, pp. 0094-0098, doi: 10.1109/PVSC.2013.6744107.

13. P. A. Patil, J. S. Bagi and M. M. Wagh, "A review on cleaning mechanism of solar photovoltaic panel," 2017 International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS), 2017, pp. 250-256, doi: 10.1109/ICECDS.2017.8389895.

14.   M. Mazumder et al., "Characterization of Electrodynamic Screen Performance for Dust Removal from Solar Panels and Solar Hydrogen Generators," in IEEE Transactions on Industry Applications, vol. 49, no. 4, pp. 1793-1800, July-Aug. 2013, doi: 10.1109/TIA.2013.2258391.

15.   M. Adochitei, C. Harabagiu, D. Astanei and R. Burlica, "A new solar energy converting system with vertical photovoltaic panels," 2014 International Conference and Exposition on Electrical and Power Engineering (EPE), 2014, pp. 1129-1131, doi: 10.1109/ICEPE.2014.6970085.