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DEVELOPMENT OF SOLAR MODULES WITH INCREASE IN EFFICIENCY USING LIGHT BOUNCING

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***Abstract*—Solar energy is a useful energy resource available in plenty in countries like India. Harvesting this energy for maximum power generation is the area of interest to the researchers. Solar power is the conversion of sunlight into electricity, either directly using photovoltaic (PV), or indirectly using concentrated solar power (CSP).In CSP plants at locations with large amounts of direct normal irradiance, Thermal Energy Storage (TES) system is where solar thermal energy is stored during the day time and is used for electricity production during the night. Thermal Energy Storage (TES) systems when integrated into the solar cycle can address such issues related to energy efficiency, process flexibility, reducing intermittency during non-solar hours. The proposed concept will reduce the number of modules needed to build solar energy stations. In this project we want to measure the efficiency of solar panels with the help of halogen bulbs.**

I. INTRODUCTION

There is now a growing need for energy security in the global economy. All stakeholders (countries) are seeking energy independence to keep themselves on track. While developing countries such as China, Brazil, and India will grow at very high rates, the demand for oil will always increase, resulting in a contraction in supply. With the rapid decline of the energy supply of oil and gas and the adverse effects of their use on the climate cycle, this is forcing us to look for electricity elsewhere and change consumers' minds on 2% electricity consumption. Public transport, transport, transportation, energy conservation and energy awareness are some of the indicators of lifestyle changes. As the greater impact of energy challenges such as inflation and climate change unfolds, governments in many countries are now more aware of the benefits of other public services and are supporting new technologies. Renewable energy sources can meet the world's energy needs repeatedly and with great potential. They can increase the diversity of energy markets, ensure long-term energy sustainability and reduce local and global air emissions. They can also provide the best options for businesses to meet specific needs for energy services (especially in rural and rural areas), create new jobs and produce local products. Although there are many commercial recycling technologies, most are still in the early stages of development and unknown. They need constant research, development and demonstration. Also, with the exception of some markets, few renewable energies can compete in price with natural gas. But most recycling can reduce costs, close gaps and increase competitiveness. This will require further technological development and commercialization and enhanced production capacity for further production.

Renewable energy has been important to humanity since the beginning of civilization. For centuries, biomass has been used in many ways – for heating, cooking, power generation and power generation – for business and later for power generation, including electricity and wind power. Renewable energy mainly depends on the energy flow from solar energy and the earth's ecosystems from the earth's geothermal energy. A distinction can be made between:

- Biomass (plants grown from solar energy).
- Wind power (uses solar energy to drive the weather).
- Solar energy (for heat and electricity generation).
- Hydroelectric Ocean energy (including wave, current and tidal energy).
- Geothermal energy (heat stored in rocks from the earth's natural heat flow).

The share of renewable energy in electricity generation is small. Figure 1 shows the global distribution of various energy sources in the world today. It shows that natural resources such as coal, natural gas and oil already meet a large part of the electricity generation need. Natural resources are being depleted rapidly due to increased demand, so renewable energy can reduce the high dependency on these resources.

II. TECHNICAL USE

Arduino is an open source computer hardware and software company, project, and user community that designs and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License or the GNU General Public License permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits. The name Arduino comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet. The bar was named after Arduino of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014.

The cost of electricity produced by solar energy depends on the light intensity from morning to evening during the day. More energy can be drawn in the middle of the day when the light intensity of is at its peak. It is also very important for the to consider the orientation of the panel. If the panels are installed so that the receives maximum power in the afternoon, the power received by the will be minimal in the morning and evening due to the falling electricity to the solar panel. If the panel mounts the perpendicular to the light, the will

produce the highest power compared to other angles of incidence.Therefore, it is best to set panel to face the sun longer or to make a solar tracking mechanism for panel . The rail is designed so that follows the sun on one axis (azimuth) or two axes (azimuth and elevation). Since the electricity produced by the PV module is directly related to the intensity of the light received, spot light technology would be a better solution to improve the physical activity. This will reduce the cost of generating electricity from photovoltaic panels. It was discovered by Sungur C. Multi-axis tracking system generates 42.6% more energy than fixed panel.

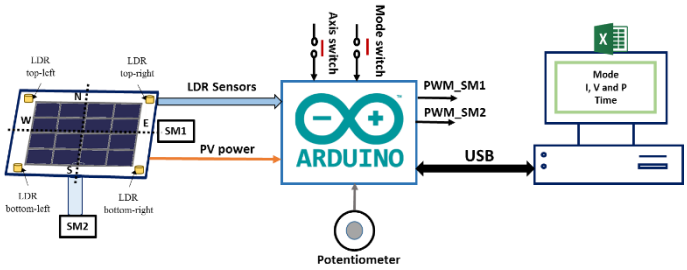

Fig.1 Simulated Design of the Project

III. HARDWARE

For automatic mode, the microcontroller converts the analog values of the LDR sensors (pins A0 to A3) into digital values. It then uses two pulse-width modulated (PWM) signals (pins 5 and 6) to control two servo motors (up and down and side-by-side) to track the sun. The changes occur in two axes, east to west azimuth along the solstice path and south to north elevation along the summer path. For manual mode, the potentiometer (pin A4) is used to control the movement of the two servos, use the knob (pin 11) to connect the potentiometer to the up and down servos or the left and right servos. Also, another button (pin 12) is used to switch between the two modes.

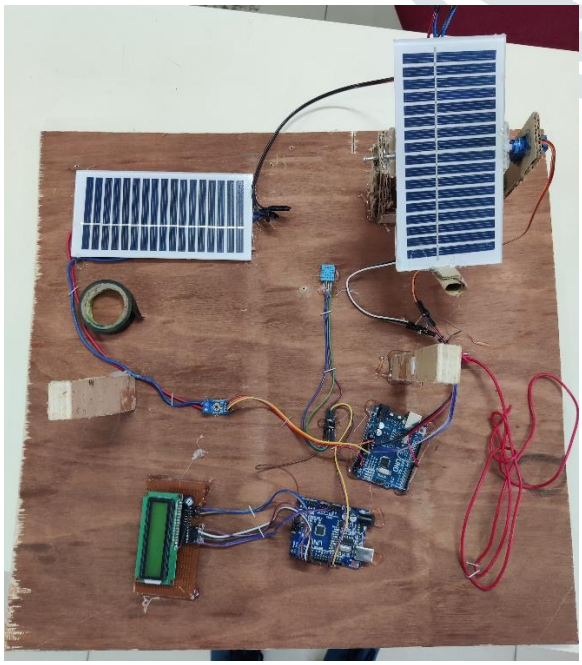

Fig. Hardware of the project

IV. LITERATURE SURVEY

Mayank Kumar Lokhande [2] presented an automatic solar tracking system. He designed a solar panel tracking system based on microcontroller and observed that single axis tracker increases efficiency by 30% compared to the fixed module. Guiha Li, Runsheng Tang, Hao Zhong [3] investigated horizontal single-axis tracked solar panels. They obtained result as eastwest axis tracking was poor to improve the energy while tracking the sun about south-north was best. The efficiency increased for east-west axis was less than 8% whereas for south-north axis increased by 10-24%. Chaiko and Rizk [4] developed a tracking system using solar panels efficiently. They designed a simple single axis tracking system using stepper motor and light sensor. They observed that this system stretches the efficiency of power collection by keeping a solar panel perpendicular to the sun rays. And they also found that the power gain was increased by 30% over static PV system. Imam Abadi, Adi Soeprijanto and Ali Musyafa [5] designed fuzzy logic based single axis solar tracker. They implement a fuzzy logic controller on ATMEGA 8353 microcontroller to improve the power energy of PV panel. They found that the PV panel has maximized and it exceeded upto 47% compared to the stationary system. Ashwin R, Varun A.K et al. [6] presented a sensor based single axis solar tracker to achieve highest degree of energy through solar panel. It keeps tracking continuously for the maximum strength of light. This system spontaneously changes its direction when the sun moves from its position to get maximum light energy. Therefore, the experimental result shows the robustness and productiveness of the proposed method. Gamal M DOSOUKY, Abou-Hashema et al. [7] presented an enhanced orientation design for energy-productivity in PV panels. For maximum incident radiation, the panels are pitched with monthly-based angle. They investigate the proposed strategy in two cities i.e. Japan (Fukuoka) and Egypt (AI-Kharijah). The results showed that the proposed design attained a growth of energy building in both the cities.

IV.GRAPHICAL REPRESENTATION

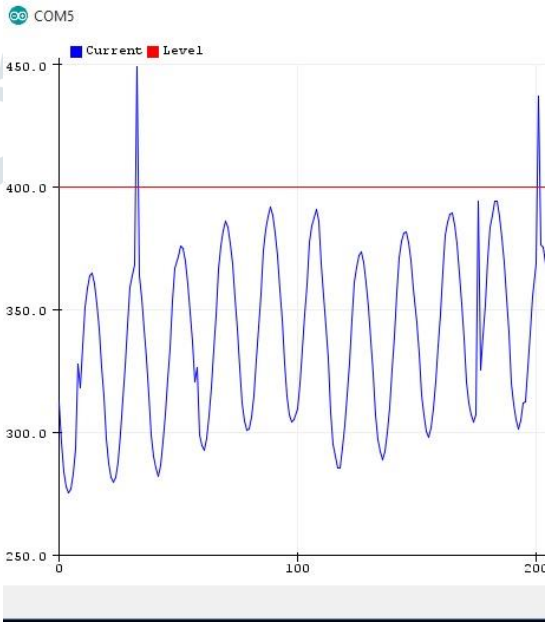

Fig. Simulation Result

CONCLUSION

In this paper the results obtained show that, use of plane mirror for improving the performance of the solar panels have shown impressive results. An important advantage of using of plane mirror is that, they are inexpensive, cost-effective and easily available in the market. It is making the usage of solar panel more feasible in developing countries of the world like Pakistan, reducing the overall cost of electricity generation and improving the efficiency by PV solar system at home. Another advantage, is the easy installation and cheapness of this system.

REFERENCES

[1] Aggarwal, S. and P. Nijhawan (2016). Review on solar and wind power potential in India. Power Electronics (IICPE), 2016 7th India International Conference on, IEEE.

[2] Ali, R. B., et al. (2016). Design, modeling and simulation of hybrid power system (Photovoltaic-WIND). Sciences and Techniques of Automatic Control and Computer Engineering (STA), 2016 17th International Conference on, IEEE.

[3] Anjali Rana, M. I. (2015). "Implementation of a Wind/PV Hybrid System using MATLAB/Simulink." International Journal of Advanced Research in Electrical Electronics and Instrumentation Engineering 4(7): 8.

[4] Spertino, F.; Ahmad, J.; Ciocia, A.; Di Leo, P. Techniques and experimental results for performance analysis of photovoltaic modules installed in buildings. Energy Procedia 2017,

[5] A.K. Saxena and V. Dutta, “A versatile microprocessor based controller for solar tracking,” in Proc. IEEE, 1990.