iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** I **Month of publication:** January 2022

DOI: https://doi.org/10.22214/ijraset.2022.40144

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue I Jan 2022- Available at www.ijraset.com

Smart Highway with Green Energy

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Abstract: ***In today's globalized world, road is that the suggests that to be a part of countries, cities, towns etc. In recent years all the previous technologies modified into new technology like icebox, TV, Washing Machine, cooler etc. All the items as modified however highways aren't modified. The "Smart Highway" is that the conception to create road roads smarter, safer, and a lot of energy economical for generating electricity exploitation alternative energy, wind energy, for charging the vehicle's exploitation these energies, for lighting, and for observation the condition of the road. The vehicle moving on roads generates great deal of energy in kind of vibration that is utterly wasted in addition they manufacture greenhouse gases that ultimately results in warming and depletes layer. So, there's a desire to create some revolutionary changes in conception of highways. We have a tendency to will use the vibration energy made by vehicles that is born-again into electricity. Equally by exploitation completely different techniques, wind energy, alternative energy and alternative form of inexperienced energies made on road as conjointly born-again into electricity. So, in this paper we have a tendency to be attempting to throw some lightweight on techniques of utilizing inexperienced energy on road in fruitful manner.***

Keywords: sensible highways, Vibration energy, alternative energy, Wind energy, semiconductor diode lightening

I. INTRODUCTION

The idea of planning a brand new system for the sensible route that don't consume vast quantity of electricity and illuminate massive areas with the very best intensity of sunshine is regarding every engineer operating during this field. Providing street lighting is one among the foremost necessary and pricy responsibilities of a town. Lighting will account for 10-38% of the overall energy bill in typical cities worldwide. Street lighting may be a significantly essential concern for public authorities in developing countries owing to its strategic importance for economic and social stability. Inefficient lighting wastes vital money resources each year, and poor lighting creates unsafe conditions. Energy economical technologies and style mechanism will cut back price of the road lighting drastically. Rising oil prices feature the abuse of property power supply applications. Wind vitality may be a standout amongst the foremost appealing property power supply advancements on account of its high proficiency and low contamination. Be that because it could, since the vitality created by wind vitality transformation frameworks changes with environmental meteorology and wind speed, stunning varieties in vitality generation could expand the operating expenses of the electrical structure in lightweight of the very fact that the stores are going to be developed and also the potential dangers are going to be place for the unwavering quality of the ability provide. An automatic plant watering system victimization microcontroller ATMEGA328P is programmed such that it offers the interrupt signals to the motor via the relay. Soil detector is connected to the Arduino board that senses the condition content gift in the soil. Whenever there's a modification inside the condition content of the soil, the detector senses the modification, giving signal to the small controller so as that the pump(motor) is activated. this concept is employed for automatic irrigation system. Soil condition sensors live the meter water content in soil. Since the direct measuring mensuration of free soil condition wants removing, drying, and weight of a sample, soil condition sensors live the meter water content indirectly by victimization another property of the soil, like electrical phenomenon, stuff constant, or interaction with neutrons, as a proxy for the condition content. The relation between the measured property and soil condition ought to be tag and may vary hoping on environmental factors like soil kind, temperature, or electrical natural phenomenon. reflected microwave radiation is choked with the soil condition and is utilized for remote sensing in geophysics and agriculture. transferrable probe instruments are going to be utilized by farmers or gardeners. Soil condition sensors typically raise sensors that estimate meter water content. Another class of sensors live another property of condition in soils called water potential. These sensors ar generally noted as soil water potential sensors and embody tension-meters and mineral blocks. the most thought within the gift field technologies ar Automation, Power consumption and value effectiveness. Automation is meant to scale back man power with the assistance of intelligent systems. Power saving is that the main thought forever because the supply of the ability is obtaining diminished because of varied reasons. the most aim of the project is Automatic street power saving system with LDR, wind mill and automatic irrigation this can be to save lots of the ability. we wish to save lots of power mechanically rather than doing manual. therefore it's simple to form price effectiveness. This saved power may be employed in another cases.

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II. LITERATURE SURVRY

Now days, the globalized world, trace is the means to join countries, metropolises, municipalities etc. In recent times all the old technologies changed into new technology like fridge, Television, Washing Machine, collarets. so that the all the effects are changed but roadways aren't changed. The “Smart Highway" is the conception to make trace roads smarter, safer, and more. Energy effective for generating electricity using solar energy, vibration energy, wind energy, for charging the vehicles using these powers, for lighting, and for covering the condition of the road. The vehicles moving on roads generates large quantum of energy in form of vibration that's fully wasted also they produce hothouse feasts which eventually leads to global warming and depletes ozone sub caste. So, there's a need to make some revolutionary changes in conception of roadways. We can use the vibration energy produced by vehicles that is converted into electricity. Also, by using different Ways, wind energy, solar energy and other type of green powers produced on trace are also converted into electricity. So, in this paper we're trying to throw some light on ways of exercising green energy on trace in fruitful manner. The worldwide concern to mitigate the soaring energy crisis introduces us to the small-scale renewable energy generation as a preferred enabling source for highway lighting. However, the extensive cost and performance inconsistency of the pure solar panel based solutions further motivate efforts in designing a hybrid energy solution for highway lighting is controlling multiple energy sources to provide an effective environment for such a small-scale application context and Improving the battery performance . More specifically,we consider the solar panel and Vertical Axis Wind Turbine(VAWT), which utilizes energy from the aerodynamic losses produced by vehicles in the highways, as two main sources for energy generation. This hybrid system allows for generating uninterrupted energy by solar during the day and by VAWT at all day and night times whenever a vehicle passes the lamppost. For maximum effectiveness, a micro-controller is employed in this system to sense the internal requirements for utmost performance. A test-bed prototype is developed to evaluate the performance of the proposed system over a pure solar based lighting system via a projected cost analysis. The result demonstrates withdrawal of solar dependency followed by a less energy requirement in the hybrid lighting system according to different busyness level of the highway. The paper initial deals with the present situation of the wind energy in Asian country. Wind energy is obtainable with none price and it doesn't emit any greenhouse gases. This makes it a good supply of energy production for any developing state. the sphere of wind energy has tremendous scope for innovation, translating to universe applications and tremendous economic chance. it's crucially necessary for Asian country, as our economy continues to evolve, and that we should guarantee each Indian has access to chance, good jobs and keep. For that we are going to want bigger resources. Clean, property, renewable - and equally necessary, domestic sources of energy area unit essential to satisfy the potential of Asian country within the returning years and it's sure that wind energy can play a serious half in shaping India’s future. Wind generation has emerged because the biggest supply of renewable energy within the world. Keywords: Wind Energy, Non typical Energy, Sources of Wind Energy, Renewable Resources I. Introduction Asian country is that the home of one.25 billion individuals i.e. 17.5% of the entire world population, that makes it second most thickly settled country in world. Asian country has the second quickest growing economy of the planet. India’s substantial and sustained economic process over the years is inserting huge demand on its energy resources.

III. BLOCK DIAGRAM

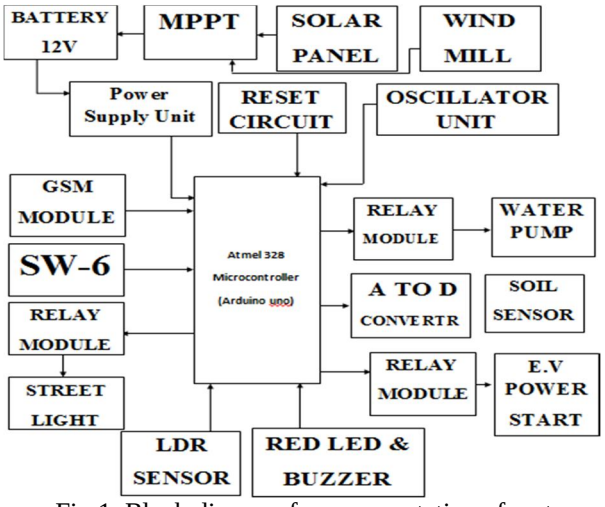


Fig.1: Block diagram for representation of system.

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IV. SYSTEM DEVELOPMENT

A. Light- Dependent Resistor (LDR)

Photo resistor or light-dependent resistor (LDR) or photocell is a light- controlled variable resistor. The resistance of photo resistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. Photo resistor can be applied in light-sensitive sensor circuits, and light-and dark- actuated switching circuits.

The electrons are liberated when the light falls on the detector. The photons absorbed when the light intensity exceeds a certain limit. For these reason lots of free electrons and hole are released and resistance is dropped dramatically. The equation to show the relation between resistance and illumination can be written as

$$R = A * Ea$$

LDR is a special resistance whose value depends on the intensity of the light which is falling on it. It has resistance of about 1 mega ohm in case of total darkness, but a resistance of only about 5k ohms when brilliance illuminated. It responds to a large part of light diapason. We've erected separator circuit with LDR and 100K variable resistance connected in series. It's well known that that voltage is directly commensurable to conductance. Acuteness can be acclimated by using variable resistance.

The current standing of the lights is calculated as follows

$$I\ (amp) = POWER/\ VOLTAGE$$
$$= 3/\ 12\ A$$
$$= 0.25\ A$$

Thus, the current standing used in lights is 0.25 A. The bulb number used is 20.

Thus, the current consumption of the lights used = (0.25 x 20)A. I (amps) = 5. Since the current consumption used is 5A. A Relay of 10A contact current is used for the control circuit of the lights.

B. Relay Module

Relay is named for automatic switching ON/ OFF. The coil resistance of the relay used is 82Ω. Relay working voltage = 12v, Resistance of the Relay = 82Ω

Thus, I (relay) = 12/82 A = 0.15 A

Since the current consumption used is 0.15 A, a BC 547 transistor with collector current standing of 0.8 A, collector to base voltage of 11v, collector to emitter voltage of 7v and emitter to base voltage of 4v is considered suitable to drive the relay used in the affair of the control circuit.

Cost analysis

The present situation if the night time is 12 hours and the 300 lights are working under 12 volts, and the power of the light is 60 watts. The road distance consider 1 kilometer, the unit is calculated below

$$Unit = p * T/\ 1000$$
$$= 60\ *12/1000$$
$$= 0.72\ Units\ per\ day$$

Let the cost of electricity per unit is 5.50 taka also the total cost per month = 0.72 *5.5 * 30 = 118.8 taka per month per light The Total quantum for all light is = 118.8 * 300 = 35640 Taka Using automatic intensity control circuit The vehicle moves late night small number, so the lights don't get voltage 12 volt all time. In small- city for the automated system let’s consider 2 cases heavy business and veritably light business.

Case 1 Heavy business, the road is continuously having vehicles; power consumption will be,

Total = 0.72 Watts per month per vehicle = 216 watt per month Total cost = 35640 taka

Case 2 Light business, a veritably many vehicles pass by this road, For a trace minimal speed can be considered as 30 kilometer per hour, So it'll take 2 min to cover the stretch of 1 km for light business of 100 vehicles it would take 200 twinkles i.e. 3 hours 20 twinkles

$$Unit = 30 * p * T/\ 1000$$
$$= 30 * 60\ *4/1000$$
$$= 7.2\ Units\ per\ month\ per\ beacon$$
$$= 2100\ unit\ per\ month\ for\ all\ lights\ Total\ cost = 7.2 * 300\ *5.5 = 11800\ taka$$

For Therefore in any of the cases, the system in this paper is able of saving electricity.

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Equation of Wind Power

Wind Power depends on the quantum of air (volume), the speed of air (haste), the mass of air (viscosity), flowing through the area of interest (flux)-

Kinetic Energy Description Ke = ½ m v2

Power is KE per unit time. p = ½ mv2

Fluid mechanics gives mass inflow rate (viscosity * volume flux) dm/ dt = ρ * A * v

Therefore

$$P = \frac{1}{2} pAv3$$

Power ~ cube of velocity
Power ~ air density
Power ~ rotor swept area, [A= πr2]

V. SYSTEM DESIGN

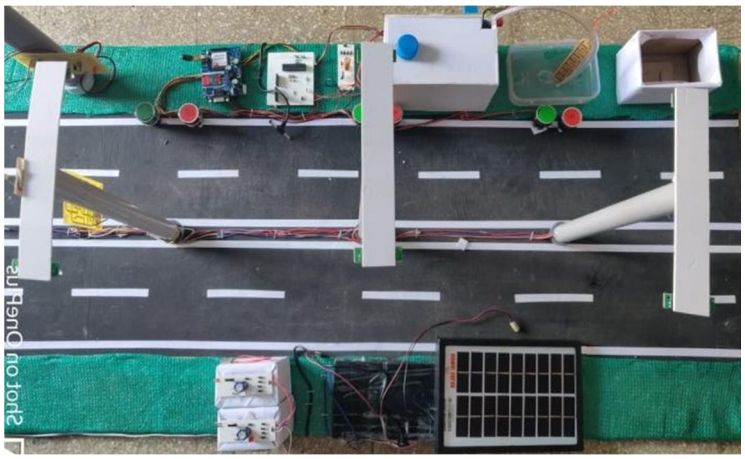


Fig.2: prototype smart highway with green energy.

1) In this project smart system has been implemented for the highway system which uses concept of controller. This project includes use of various sensors like like ldr, relay, and soil moisture sensor.

2) GSM used for detects various type of accidents, to avoid it, a novel idea is proposed for monitoring the accident over the highways and sensor that Using wireless communication message will be sent to another vehicle. (Home, hospital, police station or quick response team)

3) The system is to reduce power consumption during night times. At night times, street lights are switched on even there is no vehicle. The system with an LDR sensor to sense the object and turn ON the light. If the vehicle is not present, it will be OFF.

4) Soil moisture sensor is check soil is dry or wet if soil is dry then soil sensor sense send pulses to controller and water pump is ON until soil wet.

5) Solar panel and wind turbine is used for generating electricity and store the charge into the battery.

VI. CONCLUSION

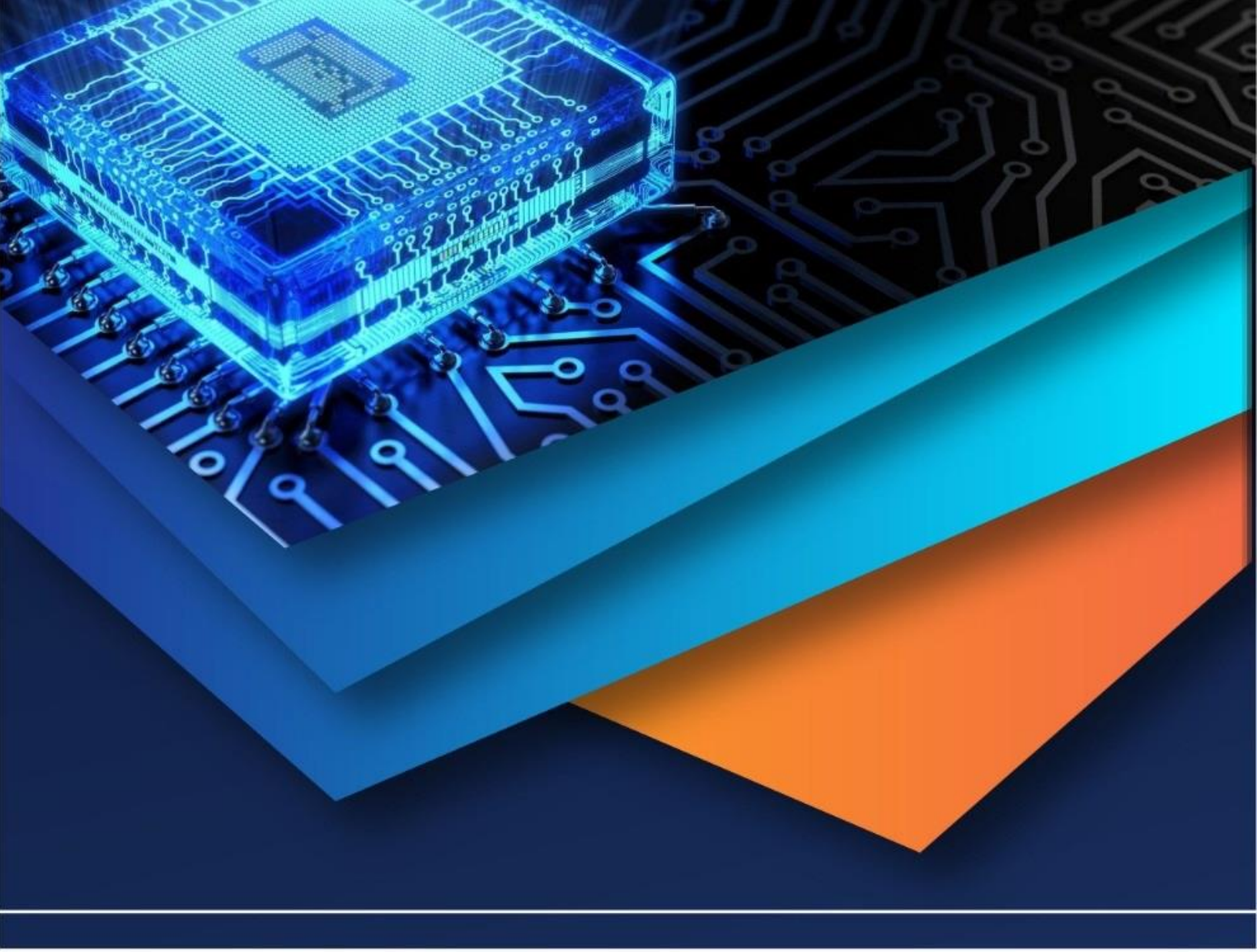
The system has been tested to serve automatically. The humidity detectors measure the humidity position (water content) of the different plants. However, the humidity detector sends the signal to the Arduino board which triggers the Water Pump to turn ON and supply the water to separate factory, if the humidity position is plant to be below the asked position. When the asked humidity position is reached, the system halts on its own and the Water Pump is turned OFF. Therefore, the functionality of the entire system has been tested completely and it's said to function successfully.

The project aims were to scale back the aspect effects of this street lighting system, and notice an answer to save lots of power. during this project the primary issue to try and do, is to arrange the inputs and outputs of the system to regulate the lights of the street. The example as shown in Fig. nine has been enforced and works for sure and can influence be terribly helpful and can fulfill all this constraints if enforced on an outsized scale.

The inputs within the streets lighting system square measure LDR and physical phenomenon sensors, when twilight the sunshine sensing element can activate the system, to be able to sight any object by physical phenomenon sensors, on the road to show ON the streetlights. Lamps can be used as streetlights during this paper.

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