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Hydraulic Jack System Installed in Footpath for Reducing Traffic in Case of Emergency, Automatic Street Light Control System Based On LDR (Light Dependent Resistor) For Minimize the Electricity Consumption

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Abstract - *India is one of the fastest growing economies in the world. The average income of Indians is growing and thereby the number of privately owned vehicles is rising. Hence traffic control problems are arising. Hydraulic Jack System Installed in Footpath for Reducing Traffic in Case of Emergency, Automatic Street Light Control System Based On LDR (Light Dependent Resistor) For Minimize the Electricity Consumption. This is the one of best solution to control the traffic. Highway paving materials, under normal operating conditions, are subjected to various forces. Motor vehicles, of necessity, have at least one set of driving wheels which exert tractive forces on the surface of the paving. The remaining wheels do not exert this tractive force but merely roll on the surface of the paving.*

Key Words: Hydraulic Jack System, LDR, Highway paving materials, traffic control.

1.INTRODUCTION:

1.1 Hydraulic Jack System:

The hydraulic jack is a device used for lifting heavy loads by the application or applying of much smaller force. It is based on Pascal's law, which states that intensity of pressure is transmitted equally in all directions through a mass of fluid at rest. Hydraulic jacks are devices that have countless applications. This type of jack is used in the automotive industry to lift cars above ground level so they can be tooled. Many tools in the construction industry utilize hydraulic jacks to complete tasks.

1.2 Automatic Street Light Control Systems:

Many people have a phobia of darkness, so to assist them in such situations; we have explained a simple circuit that will automatically turn on the street light consisting of LEDs or bulb coupled with relay. It is lit well enough to see the objects nearby. This circuit is very easy to work around and also it is battery operated. The power consumed by the circuit is very low because of the very few components used in the circuit. The whole circuit is based onBC547, which is basically an operational amplifier that is configured in a voltage comparator. LDR (Light depending resistor), whose resistance is based upon the quantity of the light falling on it, is the main component for sensing the light. Along with these, a few more components are also used.

2. PROBLEMS BEHIND HEAVY TRAFFIC ON ROADS AND WASTAGE OF ELECTRICITY IN STREET LIGHT SYSTEM:

2.1 Problems Behind Heavy Traffic On Roads:

1. India is one of the fastest growing economies in the world. The average income of Indians is growing and thereby the number of privately owned vehicles is rising.

2. Though public transport is widely available in India, still it is not sufficient for the population of India. Especially in Metro cities, often public transport services are crowded. So, to travel peacefully people are opting for commuting in

their own vehicles. And as a result more vehicles are coming on roads.

3. Due to lack of footpaths in many places pedestrians are forced to walk on the edge of roads which further increasing traffic issues.

4. In case of any circumstances, emergency vehicles have also suffered just because of heavy traffic congestion problem.

Fig-1. Heavy Traffic On Road

2.2 Problems Behind Wastage of Electricity in Street Light System:

1. In Manually handled street lights operating system, there are more chances of electricity wastage as compared to automatic street light control system.

2. And in manually handled street light control system have no any fix or proper timing of on and off, it is also a major reason behind wastage of electricity.

Fig-2. Street Light Still On In Morning

3. HYDRAULIC JACK SYSTEM IN FOOTPATH AND AUTOMATIC STREET LIGHT CONTROL SYSTEM BASED ON LDR (Light Dependent Resistor):

3.1 Hydraulic Jack System in Footpath:

Every common people faced traffic congestion problem every day in their daily life and because of this problem everybody regularly fails to reach at their destination like offices, schools and colleges etc. but still physically fit and mentally stable people can wait for few minutes or may be for the couple of hours but emergency vehicles would not be able to wait until and unless traffic gets cleared, because they have the responsibility to save lives of those people who are physically ill and may be stuck in trouble.

For minimizing the traffic in case of unstable circumstances and giving a proper way or path to emergency vehicles I have introduced new concept of hydraulic jack system installed in footpath to control upward and downward movement of footpath surface. In case of any emergency, area of footpath can be used as same as road surface for just temporary time and when the emergency vehicle passed out easily from footpath then with the help of hydraulic jack, footpath will get at its original position.

Fig-3. Model of Hydraulic Jack System Under Footpath

3.2 Automatic Street Light Control System Based On LDR (Light Dependent Resistor):

Street light controllers are smarter versions of the mechanical or electronic timers previously used for street light ON-OFF operation. They come with energy conservation options like twilight saving, staggering or dimming. Also many street light controllers come with an astronomical clock for a particular location or a Global Positioning System (GPS) connection to give the best ON-OFF time and energy saving. Automatic Street Light Control System is a simple and powerful concept, which uses transistor as a switch to switch ON and OFF the street light automatically. By using this system manual works are removed. It automatically switches ON lights when the sunlight goes below the visible region of our eyes. It automatically switches OFF lights under illumination by sunlight. This is done by a sensor called Light Dependent Resistor (LDR) which senses the light actually like our eyes.

By using this system energy consumption is also reduced because now-a-days the manually operated street lights are not switched off properly even the sunlight comes and also not switched on earlier before sunset. In sunny and rainy days, ON time and OFF time differ significantly which is one of the major disadvantage of using timer circuits or manual. This project exploits the working of a transistor in saturation region and cut-off region to switch ON and switch OFF the lights at appropriate time with the help of an electromagnetically operated switch.

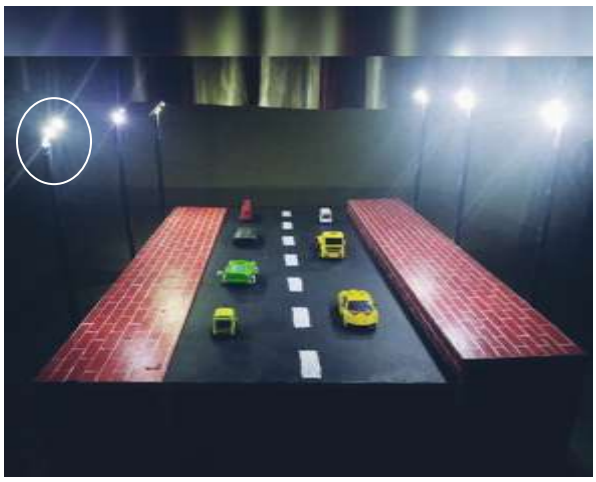

Fig-4. Model of automatic street Lights control system

4. METHODOLOGY:

4.1 Hydraulic Jack System Based of 'Pascal's Law':

"Pascal's law basically states that any pressure applied to a fluid inside a closed system will transmit that pressure equally in all directions throughout the fluid"

Working Principle: The working principle of a hydraulic jack may be explained with the help of figure. Consider a ram and plunger, operating in two cylinders of different diameters, which are interconnected at the bottom, through a chamber, which is filled with some liquid.

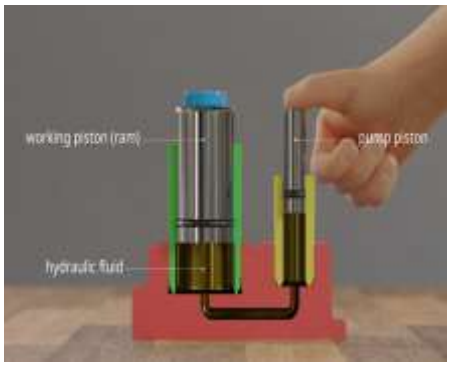

Fig-5. Hydraulic Pump

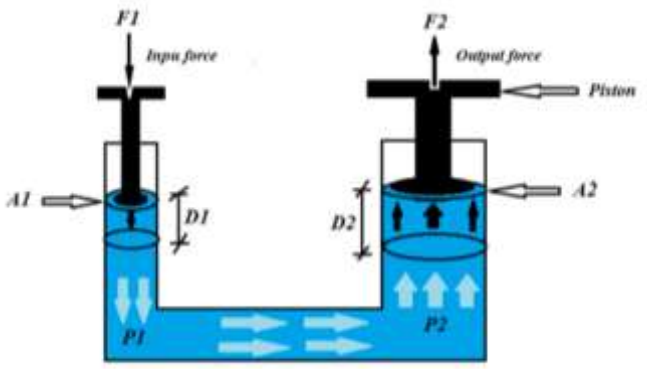

Fig-6. Working of Hydraulic Jack

Let,

F = External Force Applied

P = Pressure Created

D = Distance Moved

V = Volume of Water

A = Cross-Section Area

Sol^{n}:

$V_1 = A_1V_1$ (Input force) ----1

$V_2 = A_2V_2$ (Output force) ----2

Now we can say,

$A_1D_1 = A_2D_2$

Calculate work $_{(IN)}$ and work $_{(OUT)}$

Work = force x displacement

$W_{(IN)} = W_{(OUT)}$

$F_1D_1 = F_2D_2$

F_1D_1 ---- (a)

F_2D_2 ---- (b)

Therefore, calculate D1 & D2 from eqn 1 & 2

$V1 = A_1D_1$ ----1

$D1 = V_1/A_1$

$V2 = A_2D_2$ ----2

$D2 = V2/A2$

Put value of D_1 & D_2 in eq^{n} (a) & (b)

F_1D_1 ---- (a)

$F_1 \times V_1/A_1$

F_2D_2 ---- (b)

$F_2 \times V_2/A_2$

Therefore,

$F_1 \times V_1/A_1 = F_2 \times V_2/A_2$

↓

Force / Area = Pressure = P_1 & P_2

$P_1V_1 = P_2V_2$

$\mathbf{P_1 = P_2}$

It means the whatever amount of force we will apply on 1st point, it will create pressure & it will give same amount of force in the form of pressure on 2nd point with proper pressure & it also means that if we will take any incompressible liquid, apply external force create pressure & equally distribute or apply on every single drop of liquid & gives required pressure to lift the footpath.

4.2 Working Principle of LDR (Light Dependent Resistor):

LDR works on the principle of photo conductivity. It is nothing but, when the light falls on its surface, then the material conductivity reduces and also the electrons in the valence band of the device are excited to the conduction band. These photons in the incident light must have energy greater than the band gap of the semiconductor material. This makes the electrons to jump from the valence band to conduction.

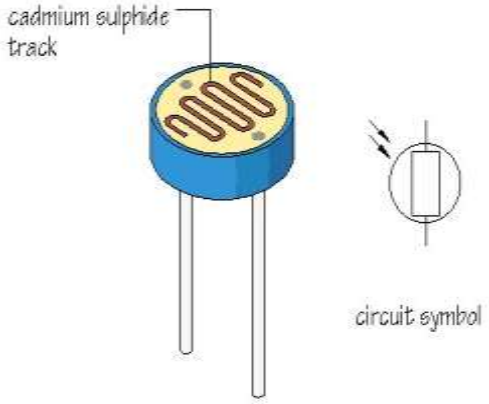

Fig-7. LDR (Light Dependent Resistor)

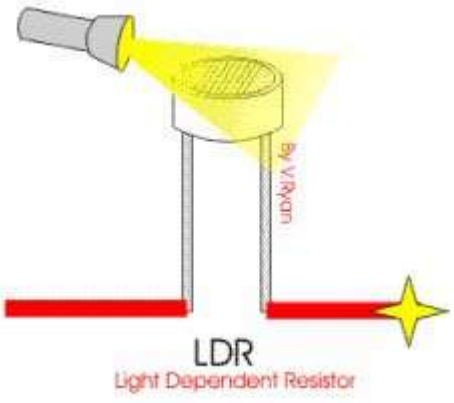

Fig-8. Working Principle of LDR

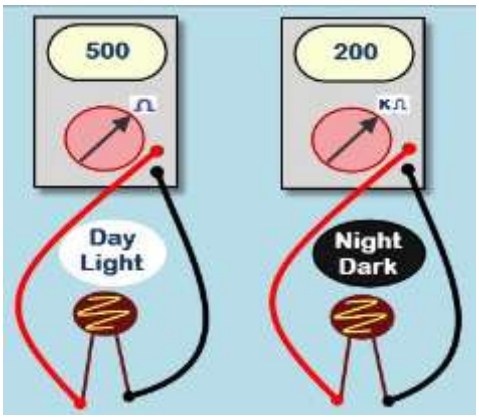

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Fig-9. Variation of LDR Resistance with Variation in Light Intensity

3. CONCLUSIONS:

During our study we have conclude that the hydraulic jack system in footpath with less area of construction is very innovative idea in construction world and importantly there is no need to construct any special type of construction to installation of hydraulic jack system which will helps to reduce construction cost, it will also save the cost of land. this system helps during emergency such as road accident, traffic jam.

One more concept we have introduce, automatic street light control system based on LDR (light dependent resistor) which is very useful to minimize the consumption or wastage of electricity because LDR system is totally automatically controlling system and it is also less costly as compare to other street light control system.

4. FUTURE SCOPE:

4.1 Hydraulic Jack System:

In future when we will construct any new road so we can think about installation of hydraulic jack system in footpath and introduce as new concept of two in one uses of footpath, within less land requirement. It will also create a great impact of our country in new construction technology world.

4.2 Automatic Street Light Control System Based On LDR (Light Dependent Resistor):

We can save the energy for the future use and we can control the losses of the power. We can implement this project for the home lamp or night lamp of the room. This is also used for the signals.

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"Success isn't just about what you accomplish in your life; it's about what you inspire others to do."

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REFERENCES:

For Hydraulic Jack System:

[1] Thomas L Speer, TRAFFIC SIMULATOR APPARATUS @Ww-fee y Jan. 28, 1964 T. 1 SPEER 3,119,257

[2] Cano, C., Galita, W., Samoranos, E.I. and De Leon, A.A., 2019. Design and Fabrication of a Hydraulic Motorcycle Lifter. *Available at SSRN 3469969*.

[3] Hart, J., Asl, A. and Fletcher, J., 2017, April. Bridge bearing replacement using flat jacks. In *Austroads Bridge Conference, 10th, 2017, Melbourne, Victoria, Australia*.

For LDR System:

[1] Sivaiah, M.N., Prasanna, C.L., Tejaswini, C., Manisha, C. and Yasaswini, D., 2018. Automated Street Light Controlling System.

[2] Krishna, M.M., 2019. Automatic Street Light Control and Fault Detection Using Node-MCU.

[3] Rajasekhar, T. and Rao, K.P., 2017. Solar powered led street light with auto intensity control. Int. J. Tech. Innov. Mod. Eng. Sci, 3, pp.1-4.

[4] Ahmmed, M.S., Chowdhury, T.Z. and Ghosh, S.K., 2018. Automatic Street Light Control System using Light Dependent Resistor and Motion Sensor. Global Journal of Research In Engineering.