SIMULATION OF PLC BASED CAR PARKING SYSTEM

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ABSTRACT

In this work, a system which will be use In multilevel parking this system will show the driver exact place to park at the entry point of parking in the screen outside of the parking Also it counts the total number of car parking is available and show it to the display outside of the parking so it will help the driver to park vehicle At the entrance will see the spot number which is empty so driver will park car at that particular spot so it saves the time of the driver to find the spot and park the vehicle this project is based on "INDUSTRIAL **AUTOMATION** TECHNOLOGY software is DELTA_IA_PLC_WPL_V 2 50 _ 202011191

1. INTRODUCTION

Vehicle ownership is at high percentage in the world today, parking has become a contradictory and perplexing anomalous for many people (Asiyanbola & 2012 The problems of parking are an

everyday occurrence whether at churches/mosques, bus stations and shopping malls Current parking design practices are unproductive and often ineffective at solving parking problems The objective is to develop an Car Parking System based on PLC using proximity sensors, Light Dependant Resistor (and solar panels for power consumptions The Car Parking System simply uses the input module from proximity Sensors and LDRs to provide it to the Programmable Logic Controller to ensure easy, reliable and effective car parking management. A Research Paper on Automotive parking systems based on parking Scene recognition 2017 By Shidian Ma, Haobin Jiang, Mu Han, Ju Xie, and Chenxu L Provides following merits and demerits Merits Research on automatic parking systems based on ultrasonic sensors was developed Demerits Only the sensors with less power technology were found. A research paper on Visual methods so that we can detect available parking

slots in 2018 By Jian Yu Chen, Chih Ming Hsu* Provides following merits and demerits Merits Automatic parking systems designate target positions using a free space based approach that involves the use of ultrasonic sensors Demerits Ultrasonic sensors are not flexible to implement.

2. COMPONENTS

1.PLC 2.PROXIMITYSENSIORS 3.DCMOTOR 4.LADDERDIAGRAM 5.BATTERY 6.TIMER 7.COUNTER 8.PUSHBUTTON

3. PROGRAMMABLE LOGIC CONTROLLER(PLC)

Delta DVP14SS2 8 inputs 6 outputs PLC

Plc is an industrial digital Computer which has been Ruggedized and adapted For the control of manufacturing processes. Such As assembly lines, or robotic devices, or any activity that requires high reliability. Control and ease of programming And process fault diagnosis.

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Figure 1. Programmable Logic Controller

No of inputs (Analog) Analog):8 No of outputs(Analog) Analog):6 Temperature: 50 55 Rated power supply :100-240 VAC

PROXIMITY SENSOR

A proximity sensor is a sensor able to detect the presence of nearby objects without

any physical contact A proximity sensor often emits an electromagnetic field or a beam of electromagnetic Radiation(infrared, for instance), and looks for changes in The field or return signal

BATTERY

A container consisting of one or more cells, in which chemical energy is converted into

electricity and used as a source of power.

TIMER

A timer is a PLC instruction measuring the amount of time elapsed following an event Timer instructions come in two basic types on delay timers and off delay timers Both "on delay" and "off delay" timer instructions have single inputs triggering the timed function.

COUNTER

A counter is a PLC instruction that either increments (counts up) or decrements (counts down) an integer number value

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when prompted by the transition of a bit from 0 to 1 (" to " Counter instructions come in three basic types down counters and up/down counters.

PUSH BUTTON

ELCOM Push button on/off switch PBS 2 GREEN

ELCOM Push button switch in a Round head type, momentary/ ON OFF type as per requirement.



4. BLOCK DIAGRAM FOR PLC CAR PARKINGSYSTEM

Figure 2. Block Diagram for PLC Car Parking system

Picture for during parking



Figure 3. During Parking





5. LADDERDIAGRAMS

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Description

X0 is sensor1 Y0 is entry gate If sensor is on counter will be on then start the counting and enter gate will open then incrementing the cars upto6cars.

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Discription:-x3 is sensor2 Y4 is exit gate. If sensor2 is on counter will be on then start the counting and also exit gate will open then decrementing the cars upto empty.

Conclusion

This system was successfully implemented using DELTA_IA_PLC_WPL_V2.50_SW_2 0201119-1. Well use of land area Parking space monitoring, Saves time, Saves fuel, Driver less parking and Less traffic.

Reference

REFERENCES

1. Abdalla, O., (2007). Design and Development of a Low Cost

Programmable Logic Controller Workbench for Education Purposes. Proceedings of the International Conference on Engineering Education ICEE-2007, Coimbra, Portugal.

 Asiyanbola R.A and Akinpelu A.A (2012). The challenges of on- street parking in Nigerian Cities' transportation routes. International Journal of Development and Sustainability. Volume 1 Number 2 (2012), Pages 476-489.

- Barrett M. (2008). The design of a Portable Programmable Logic Controller (PLC) Training System for Use Outside of The Automation Laboratory. International Symposium for Engineering Education, Dublin City University, Ireland.
- 4. Birbir, Y and Nogay, H.S (2008).Design and Implementation of PLCBased Monitoring Control System for Three-Phase Induction Motors Fed by PWM Inverter. International Journal of Systems Applications, Engineering & Development Issue 3, Volume 2.
- 5. Bolton, W. (2011). Programmable Logic Controllers, 5th ed. Elsevier Science, pp. 112.
- 6. Dickinson A, & Johnson D.M (2006). A Low-Cost Programmable Logic Control (PLC) Trainer for use in a University Agricultural Electricity Course. Journal of Agriculture Technology, Management and Education, Vol.21. 116 123.
- E' Yilmaz, M. & Çobantepe (2010). The Design of PLC Education Set, BSc Project.
- 8. Grwal M. (2012). Comparative implementation of automatic car

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parking system with least distance parking spaces in wireless sensor network. International Journal of Scientific and Research Publications, vol. 2, iss. 10.

- Hackworth J. R and Hackworth F.D (2006). Programmable Logic Controllers: Programming Methods and Applications, 1st ed.Pearson, pp. 128-138.
- 10. Khan B. H. (2009). Non-Conventional Energy Resources,2nd ed. Tata McGraw-Hill Education, pp. 159-177.
- 11. Kheiralla, A. F, Siddig O, Elhaj Mokhtar, A., A., Esameldeen, M, Linganagouda R, Pyinti R., & Anusuya P. (2016). Automatic Intelligent Traffic Control System. International Journal of Research Advanced in Electrical. Electronics and Instrumentation Engineering, Vol. 5, Issue 7, July 2016.
- 12. Sarayu, S. Rajendra, S. S. & Bongale V. V. (2013). Design and fabrication of prototype of automated smart car parking using programmable system logical controllers (PLC), International Journal of Scientific Engineering and Technology, vol. 2, iss. 9, pp. 857-860