

Hybrid Vehicle Management System using PLC & SCADA

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ABSTRACT

A prototype development of Hybrid Vehicle Management System using PLC and SCADA. PLC is one of the mostly used controllers as it is easy to operate and controls task according to the program which is already fixed. In today's scenario where maximum people use cars, the biggest question arises if the car would be safe or not, in addition to that the user wants to park the car at ease without facing problem in finding a vacant and safe parking lot. Therefore, the concept of hybrid vehicle management system is appropriate enough to make the city smart at an initial level

Keywords-- PLC, DC Motor, Proximity Sensor

control the car parking and reset it. The opening and closing of gate can also be controlled with the help of PLC and SCADA. There is also an emergency mode which locks the car parking at full scale. This mode can be used in any type of emergency situation. During this mode no one would be allowed to enter or exit the car parking. Besides these features, energy is also used efficiently in this project. All the electric components are in use only when there is a need by any user. At the idle state, these components remain off. So energy consumption reduces. We have used PLC of Siemes, Microwin Sp7. SCADA is made by using RSView32 by Rockwell Automation. Some NPN proximity sensors, Relays,. For 24 V DC motor, we have used Switched mode power supply.

I. INTRODUCTION

A prototype vehicle management system with the help of PLC and SCADA is smart in the sense that there's no need of any human efforts to provide any security or guide lines to the users.

Currently, automatic parking system is one of the major issues in a parking lot due to increase of personal vehicles, shortage of space and to avoid any roadblock. Parking lot is one of the key installations found in most major cities [1]. Parking is an acquired skill many drivers struggle with because of many reasons; for example the traffic jam, the small spots reserved for parking, and poor driving skills [2]. In most of the workplaces, there are small lands or spaces compare to number of vehicles to park their vehicles in the specific places. As a result, it is irritating and wasting the time if someone does not manage to park the car for a long time searching. However, this poor car park management system can be minimized if the user able to know the exact availability of parking space before entering into the car parking lot. Over the past few years a number of research works have done on car parking system. The same security system is installed at the exit. We have also installed a PLC & SCADA display, through which we can control and monitor the car parking. From PLC & SCADA, we can also manually and remotely

II. BASIC APPROACH

The main objectives of our model can be summarized as follows:

To design and develop car parking which is very user friendly & understand the problems associated with the user and to solve them. To make a program, which should be easy to understand by an electrical engineer and electronics & communication engineer? & use the most appropriate hardware components that would make the parking more efficient or develop a user friendly interface on SCADA.

This hybrid vehicle management system is fully automated. There is no need of any kind of human efforts. This is associated with a very user friendly environment for the users. It is energy efficient and economical. PLC is used of 16 I/Os .

PLC: A programmable logic controller, PLC is a digital computer used for automation of typically industrial electromechanical processes, such as control of machinery on factory assembly lines etc. It is a solid state user programmable control system with functions to control logic, sequencing, timing, arithmetic data manipulation and counting capabilities. It can be viewed as an industrial computer that has a central processing unit, memory, input output interface and a programming device. The central

processing unit provides the intelligence of the controller. It accepts data, status information from various sensing devices like limit switches, proximity switches, executes the user control program stored in the memory and gives appropriate output commands to devices such as solenoid valves, switches etc. In this project we have used PLC with 16 I/Os. whole process from the remote end, analysis & record data for large extent.

SCADA (Supervisory Control and Data Acquisition System) :

It is a type of industrial control system (ICS). Industrial control systems are computer controlled systems that monitor and control industrial processes that exist in the physical world. SCADA systems historically distinguish themselves from other ICS systems by being large scale processes that can include multiple sites, and large distances. These processes include industrial, infrastructure, and facility-based processes. Through this we can control our whole process from the remote end, analysis & record data for large extent.

A) Power Supply:

We are using Switched mode power supply. This supply converts the 220V AC into 24V DC with the current rating of 2 Amperes. A regulator is also present with the help of which we can control the output value of SMPS . A switched-mode power supply is an electronic power supply that incorporates switching regulator to convert electrical power efficiently. SMPS transfers power from a source, like mains power, to a load, such as a personal computer, while converting voltage and current characteristics. Unlike a linear power supply, the pass transistor of a switching mode supply continually switches between low-dissipation, full-on and full-off states, and spends very little time in the high dissipation transitions, which minimizes wasted energy.

Ideally, a switched-mode power supply dissipates no power. Voltage regulation is achieved by varying the ratio of on-to-off time. In contrast, a linear power supply regulates the output voltage by continually dissipating power in the pass transistor. This important advantage of a switched-mode power supply. Switched-mode power supplies may also be substantially smaller and lighter than a linear supply due to the smaller transformer size and weight.

B) Proximity Sensor:

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. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive or photoelectric sensor might be suitable for a plastic target. An inductive proximity sensor always requires a metal target. The maximum distance that this sensor can detect is defined "nominal range". Its nominal range is 5mm. Some sensors have adjustments of

the nominal range or means to report a graduated detection distance. Proximity sensors can have a high reliability and long functional life because of the absence of mechanical parts and lack of physical contact between sensor and the sensed object.

C. Working of Sensors:

These sensors are being used in the lots of parking & for entry & exit. It is a sensor able to detect the presence of nearby objects without any physical contact.

D. DC Motor:

A DC motor is a class of electrical machines that converts direct current electrical power into mechanical power. This DC motor works on the principle, when a current carrying conductor is placed in a magnetic field, it experiences a torque and has the tendency to move . We have used 2 DC motors having 5 rpm and suitable for a DC supply of 24V.

III. PLC PROGRAMMING

Ladder logic is the most common programming language used to program a PLC Ladder logic was one of the first programming approaches used in PLCs because it borrowed heavily from the relay diagrams that plant engineers already knew. The Software are used for programming is Microwin Sp7.

IV. BLOCK DIAGRAM OF OUR MODEL

The basic block diagram of Vehicle management system is shown in Fig. 1

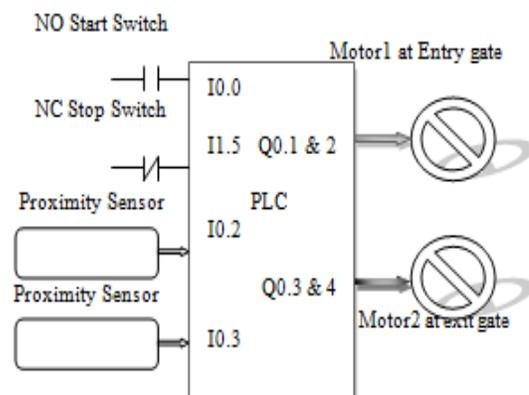


Fig 1. Block diagram

V. SCADA DESIGNING

We have used RS View32 software for SCADA designing. This software is the product of 'Rockwell Automation'. The SCADA program is interfaced with PLC programming to work accordingly with it fig 2. Show the interface of vehicle management system.

SCADA contains a feature of emergency lock from a remote location. This lock is designed for abnormal emergency conditions. If vehicle management system any type of uncertainties.

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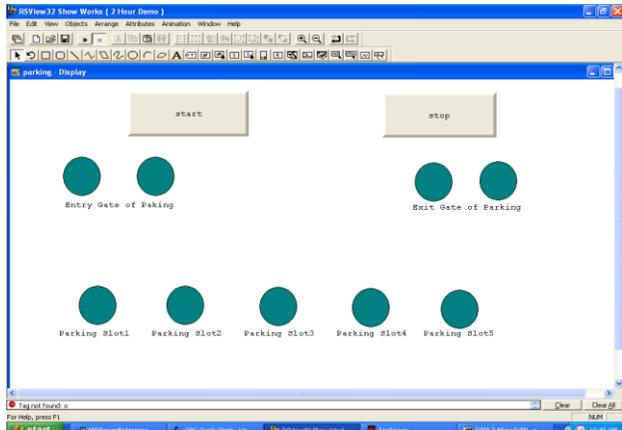


Fig 2. SCADA interface of Vehicle management System

VI. RESULTS AND CONCLUSION

Hybrid Vehicle Management System completes the demands of Smart India very efficiently. It provides smart work, energy SCADA can be connected to the internet consumption control, security and ease at the same time. SCADA can be implemented for accessing and monitoring from remote location. Thus it is a completely smart and fully automated.

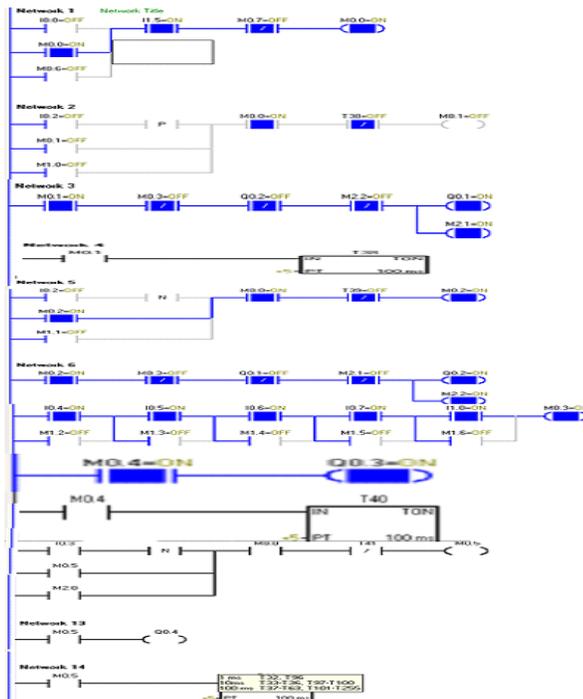


Fig.3 Ladder Logic Programme for Vehicle management system