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Advanced Charging Station for Electric Vehicles

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Abstract - *Nowadays, due to the increase in prices and the environmental pollution of fossil fuels, individuals and governments are tending towards the concept of electric vehicles. Therefore, the popularity of electric vehicles is increasing. With the development of technologies, the number of electric vehicles raised the required quantity of charging stations. This paper shows an intelligent system which aims to manage all the system using automation technology. It is designed using the complete automation technology which includes PLC (Programmable Logic Controller) and HMI*

(Human Machine Interface). This deals with automated charging systems for electric vehicles. In order to realize tethered charging a fully automated system supports the complete process.

Key Words*: *Electric Vehicle-Spikes-PLC-HMI-Buzzer-Payment

1.INTRODUCTION

The word Automation means doing the particular task automatically in a sequence with faster operation rate. This requires the use of PLC together with communication network and some relevant software programming. Automation plays an increasingly important role in the global economy and in daily experience.

This paper is developed with only aim to control the components (e.g., a charging station for EV) more smartly using the Automation technology. This study includes the modernization of the conventional system by designing a control panel that contains command parts like relays and PLC to run the programs that is designed to control and monitor the system. HMI is used to control and monitor which helps to assure the charging process. The main aim of upgrading the system is to overcome the problem of human requirement at charging places. The implementation of this project allows hassle-free operation and efficient system. A PLC is a computer based system for controlling mechanical and electrical/electronic processes. It offers the following features as advantages: 1.Vibration and impact resistant.

2. Availability of many input and output modules or ports.

2.LITERATURE REVIEW

Fuel vehicles account for the largest proportion of the transportation sector. Due to increase in prices of fuel and environmental consideration development of the electric vehicle is an important measure to reduce greenhouse gas emissions and reduce dependence on fossil fuels [1].

With the advance of EV technology, especially the development of battery technology, and the strong policy support in some countries, EVs have developed rapidly over the past decade [2].

Recently, the development of electric vehicles (EVs) makes contributions to alleviating global energy crisis and reducing CO2 emissions. However, it also introduces the EVs charging issue [3].

With the rising number of electric vehicles the demand for customer friendly and innovative solutions for the charging infrastructure is growing steadily [4].

Automation plays an increasingly important role in the globa l economy and in daily experience. So this also serves design and implementation of an intelligent car parking system at the charging station [5].

3.METHODOLOGY

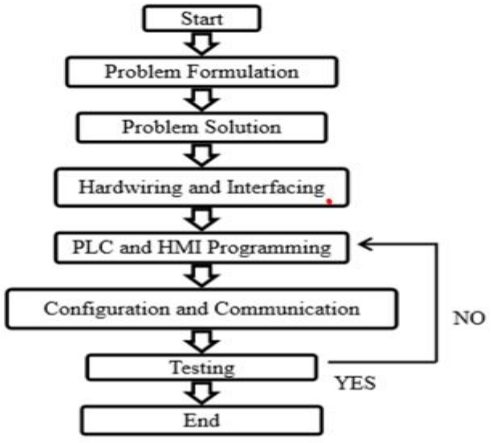

Fig.3.1 : Methodology

The advanced charging station is a smart system which uses a set of PLC & HMI to ensure effective and safe charging for the plug in Electric Vehicles. The intelligent charging system works in two modes such as ON, OFF.

The ON mode of a system gets activated when any car comes at the station. As soon as the vehicle comes for the charging the spikes will open and the vehicle gets locked at the located place. The driver of the vehicle comes out and plug the charger to the vehicle and the charging starts. When the charge will be completed, the buzzer will sound. It will notify to the driver of the vehicle. Then driver has to put the coin and to assure the payment. As soon as the payment is completed the spikes will be removed & the vehicle will be unlocked. Now the driver will be allowed to take his car.

The OFF mode gets activated when there is no vehicle all the components will be moved to inoperative condition.

4.SYSTEM DESCRIPTION

This section gives detailed explanation of the advanced charging station. The operation is as shown in fig. 4.1

Fig 4.1: Charging process at station

A. BLOCK DIAGRAM

The block diagram of the system is shown in fig. below. The diagram shows various components connected to the PLC.

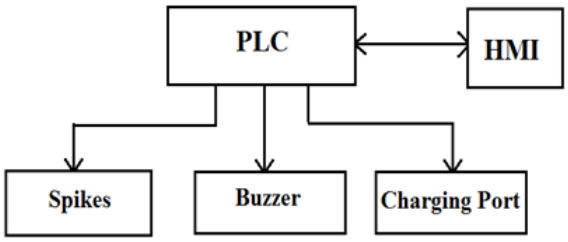

Fig 4.2: Block Diagram

B. COMPONENTS

1] PLC (Programmable Logic Controller)

A Programmable Logic Controller, PLC or Programmable Controller is a digital computer used for automation of electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. The PLC was designed to provide flexibility in control based programming and executing logic instruction. PLC allows for shorter installation time and faster commissioning through programming rather than wiring.

2] HMI (Human Machine Interface)

A human machine interface (HMI) is a platform which permits interaction between users and automation equipment. Delta's HMI products provide various communication ports for fast communication and convenient control of a diverse range of machines, systems and facilities. The color touch screen enables intuitive parameter entry and a variety of ways to display variable data, including trend graphs and alarm elements. The high resolution LCD display visualizes operating, monitoring and efficient control in real time.

3] SPIKES

A spike system is a device or incident weapon used to imede or stop the movement of wheeled vehicles by puncturing their tires. A spike system is used for various application like consoling traffic on road with help of vehicle density sensor also used in BRT for avoiding the entering non permitted vehicles used for security in industries and in one way road.

4] BUZZER

A buzzer is a small yet efficient component to add sound features to our system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications.

5.CONCLUSIONS

Conductive advanced charging systems using PLC are a new emerging topic in the electric vehicle industry. We considered this paper as a journey where we acquired knowledge and also gained some insight into the subject which we have shared in this report. This system was designed in order to avoid human labour at the charging station.

6.REFERENCES

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