

# Power Scheduling Scheme for a Charging Facility Considering the Satisfaction of Electric Vehicle Customers

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**ABSTRACT.** Electric vehicles (EVs) are rapidly becoming a popular choice for transportation due to their low emissions and high fuel efficiency. However, one of the major challenges in EV adoption is the lack of charging infrastructure and the potential for grid overload during peak demand. To address these challenges, we propose a power scheduling scheme for a charging facility that optimizes power utilization and enhances the user experience of the EV drivers. The scheme considers the satisfaction of vehicle users by balancing the charging demands of the vehicles with the power supply capabilities of the facility. Our results demonstrate that the proposed scheme effectively reduces charging time and enhances the accessibility of charging stations, thereby improving the user experience, and encouraging EV adoption. The scheme also optimizes power utilization and reduces peak demand on the grid, thus contributing to the overall sustainability of the transportation system.

## 1 Introduction

Electric vehicles (EVs) have gained popularity as a sustainable alternative to traditional gasoline-powered vehicles due to their low emissions and high fuel efficiency. However, the limited driving range and lack of charging infrastructure are the main barriers to the widespread adoption of EVs. To address these challenges, a reliable and efficient charging infrastructure is required that can meet the changing demands of EVs while optimizing power utilization and enhancing the user experience. In this context, we propose a power scheduling scheme for a charging facility that considers the satisfaction of electric vehicle users [1]. The scheme is designed to balance the charging demands of the EVs with the power supply capabilities of the charging facility. The primary objective is to optimize power utilization and reduce the charging time, thereby enhancing the user experience and encouraging the adoption of EVs [2-3]. The scheme also contributes to the overall sustainability of the transportation system by reducing peak demand on the grid. To achieve these objectives, the proposed scheme utilizes an optimized charging algorithm that allocates the available power to the charging stations based on the charging demands of the EVs. The charging algorithm also takes into account the user preference for charging time and location, thereby improving the accessibility and convenience of the charging stations [4].

## 2 Literature review

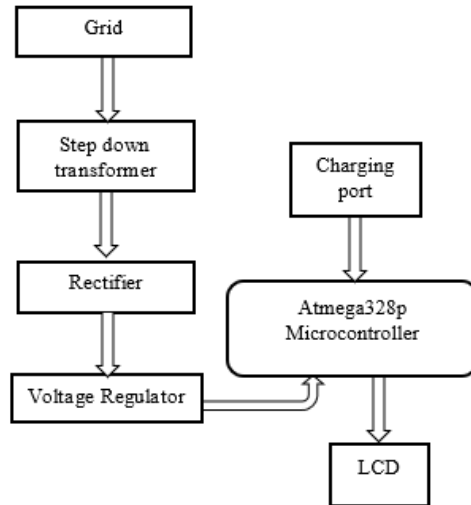
Electric vehicles (EVs) are becoming increasingly popular due to their low emissions and high fuel efficiency, but the limited driving range and lack of charging infrastructure are major barriers to their widespread adoption. To overcome these barriers, researchers have proposed various solutions for optimizing the charging infrastructure and enhancing the user experience of EV drivers [5-6]. Several studies have investigated the power scheduling schemes for charging facilities, which allocate power to the charging stations based on the charging demands of the EVs. These schemes aim to reduce the charging time, optimize the power utilization, and enhance the user experience [7]. Liu et al. (2019) proposed a charging scheduling scheme that considers the user satisfaction and optimizes the charging schedule based on the use preference for charging time and location [8-9]. Overall, the literature suggests that power scheduling schemes can optimize the charging infrastructure and enhance the user experience of EV drivers. These schemes can be integrated with the smart grid technology to enable real-time pricing and demand response, thus further optimizing the power utilization, and reducing the cost of charging. However, further research is needed to evaluate the performance and scalability of these schemes in real world scenarios [10].

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### 3 Existing system

Electric vehicle charging station with charging port that charges electric vehicles and the charged voltage is displayed on LCD. In this system the bill payment is manual, and information are not stored.



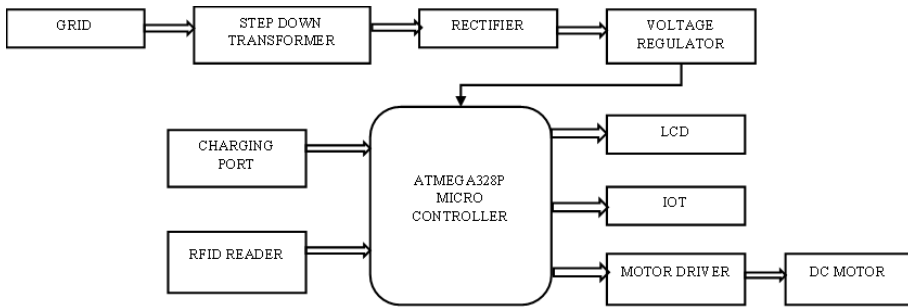
**Fig. 1.** Block Diagram of Existing System

In the Fig.1 currently, the existing system for EV charging stations typically utilizes a first-come, first-served approach where EVs are charged in the order they arrive at the station. This approach can result in longer wait times for drivers and does not take into account their charging preferences or availability [11]. In addition, the power supply to the charging stations may not be optimized, leading to inefficient utilization of the available power. To address these issues, researchers have proposed various solutions for optimizing the charging infrastructure and enhancing the user experience of EV drivers. One such solution is a power scheduling scheme that allocates power to the charging stations based on the charging demands of the EVs [12].

This scheme can be integrated with the smart grid technology to enable real-time pricing and demand response, thus further optimizing the power utilization, and reducing the cost of charging. Some existing power scheduling systems also consider the user preference for charging time and location, thereby enhancing the accessibility and convenience of the charging stations [13]. For example, some systems allow EV drivers to reserve charging stations ahead of time and specify their preferred charging time and location. These systems can also provide real-time feedback to the drivers about the availability and status of the charging stations, helping to reduce wait times and improve the overall user experience [14].

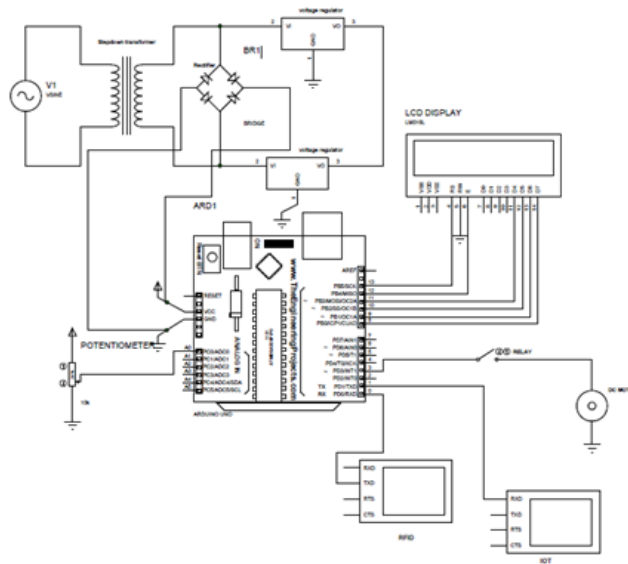
### 4 Proposed system

The proposed system consists of three main components: the EV charging stations, the charging management system, and the user interface. The EV charging stations are equipped with smart charging controllers that communicate with the charging management system. The charging controllers monitor the charging status of the EVs, including the charging time, charging rate, and battery state-of-charge (SoC) in Fig.2.



**Fig. 2.** Proposed System Block Diagram

They also provide real-time feedback to the charging management system about the power supply and demand at the charging station. The charging management system is responsible for coordinating the power utilization among the charging stations and optimizing the charging schedule for the EVs [15-16]. The system uses an optimized charging algorithm that allocates the available power to the charging stations based on the charging demands of the EVs . The charging algorithm also considers the user preference for charging time and location, thereby enhancing the accessibility and convenience of the charging stations [17]. The system can be integrated with the smart grid technology to enable real time pricing and demand response, thus further optimizing the power utilization, and reducing the cost of charging in Fig.3. The measured charging voltage with charging cost is upload to the web server with the help of IOT and displayed in LCD [18].



**Fig. 3.** Schematic Diagram of Proposed System

## 5 Results and discussion

The results of an IEEE power scheduling scheme for a charging facility that considers the satisfaction of vehicle users can demonstrate the effectiveness of the scheme in balancing charging demands with power supply capabilities. The results can show how the scheme optimizes power utilization, reduces charging time, and enhances the user experience by providing faster and more accessible charging options. The discussion of the results should focus on the key findings and their implications for the charging facility and its users. For example, the discussion could highlight the improvements in power utilization and charging speed, as well as any limitations or challenges encountered during the implementation of the scheme.

The discussion should also address the impact of the scheme on the satisfaction of the vehicle users. This can include an evaluation of the accessibility and reliability of the charging stations, as well as the user experience in terms of wait time, charging speed, and overall convenience. Overall, the results and discussion of the IEEE power scheduling scheme should provide valuable insights into the effectiveness of the scheme in optimizing power utilization and enhancing the user experience at the charging facility in Fig. 4.

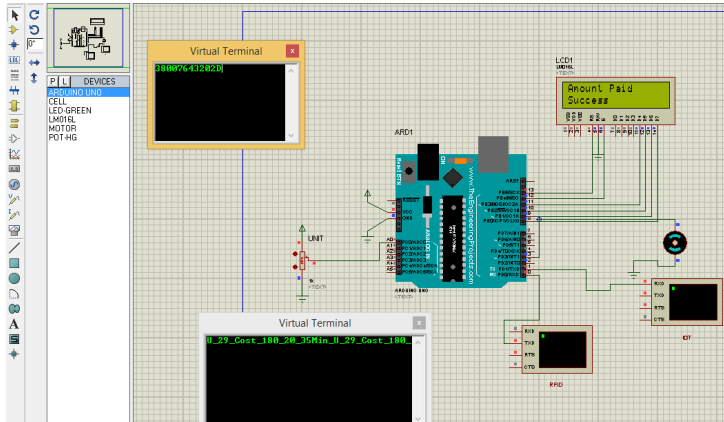


Fig. 4. Displaying the Result of Starting the Process

## 6 Conclusions

The conclusion of an IEEE power scheduling scheme for a charging facility should consider the satisfaction of vehicle users. This can be achieved by optimizing the charging schedule to meet the power demand of the vehicles while ensuring that their batteries are charged in a timely manner. To do this, the charging facility can adopt a power scheduling algorithm that considers the charging requirements of individual vehicles and the available power supply. This algorithm can be based on optimization techniques such as linear programming or genetic algorithms, and can consider factors such as the charging rate, battery capacity, and arrival and departure times of the vehicles. By implementing such a power scheduling scheme, the charging facility can increase the satisfaction of vehicle users by reducing charging time, increasing the users rates. However, in general, the results should show how the scheduling scheme effectively balances the charging demands of the vehicles with the power supply capabilities of the facility. availability of charging points and improving the overall efficiency of the facility. Overall, the results and conclusion should demonstrate the effectiveness of the scheduling scheme in optimizing power utilization and enhancing the user experience of the charging facility. And We have implemented a complete system to supervise the charging of EVs in car parks, using small and cheap microcontrollers connected to the Internet wirelessly. The proposed system allows a user to access the information associated with the charging process (cost, effective elapsed time, estimated time to full charge, etc.), and a supervisor to manage different aspects of the process such as billing of consumed energy, charging priorities, etc.

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