SMART WIRELESS BATTERY CHARGER WITH CHARGING MONITER

Pooja Chavan[1] , Shruti Gavhane[2] ,Sakshi Hande [3], Vaishnavi Holkar[4], Sakshi Jadhav[5] , Prof. Sujata Patil[6]

Department of ENTC
Trinity Academy of Engineering Pune, India

ABSTRACT :

Smart wearables for health monitoring are new technologies that enable customers to monitor and track their health. However, as the number of sensors in a wearable device grows, along with continuous monitoring and wireless communications, battery lifetime and charge length become a big concern. This issue is especially relevant for health monitoring of workers in hazardous environments such as emergency response responders, mining, and construction. In this research, we describe a wireless charging system for a health monitoring smart-wear application for workers, taking into account the power consumption needs of sensory hardware, communication technology, and realistic charging scenarios. We also show a functional prototype of a 5-watt wireless charging device utilized in our health monitoring wearable. Our paper describes the design, analysis of the needs, and important components of a 'wireless charging bin' that we are currently prototyping for our application.

I .INTRODUCTION

In today's fast-paced digital age, when our lives are more connected with technology, the need for quick and simple charging solutions is greater than ever. Traditional wired chargers, while functional, have limitations such as tangled connections, portability concerns, and the need to continually watch the charging process. To solve these difficulties, we are pleased to introduce our most recent innovation: the Smart Wireless Battery Charger with ChargingMonitor.
Our Smart Wireless Battery Charger combines modern technology with user-friendly design to ensure a smooth charging experience for all of your gadgets. Gone are the days of fiddling with cords and adapters; simply lay your smartphone on the charging pad and let our advanced technology handle the rest. Whether you're charging your phone or tablet, or wearable device, our charger provides rapid and efficient power without the need for cables.
What distinguishes our charger is its established Charging Monitor function. With real-time monitoring features, you can now follow your device's charging state with remarkableaccuracy. The accompanying smartphone app gives extensive information about charging status, such as battery %, charging speed, and projected time to full charge. Say goodbye to guessing and hello to full control of your charging experience.
converted into electric current by the embedded piezoelectric material.

II. LITERATURE REVIEW :

[1] M. Granovskii, I. Dincer and M. A. Rosen, "Economic and environmental comparison of conventional hybrid electric and hydrogen fuel cell vehicles", *Journal of Power Sources*, vol. 159, no. 2, pp. 1186-1193, 2006.

Published data from various sources are used to perform economic and environmental comparisons of four types of vehicles: conventional, hybrid, electric and hydrogen fuel cell. The production and utilization stages of the vehicles are taken into consideration.

[2] J. K. Nama, M. Srivastava and A. K. Verma, "Modified inductive power transfer topology for electrical vehicle battery charging using auxiliary network to achieve zero-voltage switching for full load variations", *IET Power Electronics*, vol. 12, no. 10, pp. 2513-2522, 2019.

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[3} S. B. Peterson, J. Whitacre and J. Apt, "The economics of using plugin hybrid electric vehicle battery packs for grid storage", *Journal of Power Sources*, vol. 195, no. 8, pp. 2377-2384, 2010.

We examine the potential economic implications of using vehicle batteries to store grid electricity generated at off-peak hours for off-vehicle use during peak hours. Ancillary services such as frequency regulation are not considered here because only a small number of vehicles will saturate that market. Hourly electricity prices in three U.S. cities were used to arrive at daily profit values, while the economic losses associated with battery degradation were calculated based on data collected from A123 Systems $LiFePO_4$/Graphite cells tested under combined driving and off-vehicle electricity utilization

[4] B. Nykvist and M. Nilsson, "Rapidly falling costs of battery packs for electric vehicles", *Nature climate change*, vol. 5, no. 4, pp. 329, 2015.

To properly evaluate the prospects for commercially competitive battery electric vehicles (BEV) one must have accurate information on current and predicted cost of battery packs. The literature reveals that costs are coming down, but with large uncertainties on past, current and future costs of the dominating Li-ion technology 1, 2, 3. This paper presents an original systematic review, analysing over 80 different estimates reported 2007–2014 to systematically trace the costs of Li-ion battery packs for BEV manufacturers.

[5] M. Pahlevaninezhad, P. Das, J. Drobnik, P. K. Jain and A. Bakhshai, "A novel zvzcs full-bridge dc/dc converter used for electric vehicles", *IEEE Transactions on Power Electronics*, vol. 27, no. 6, pp. 2752-2769, 2011

This paper presents a novel ZVZCS full-bridge DC/DC converter, which is able to process and deliver power efficiently over very wide load variations. The proposed DC/DC converter is part of a plug-in AC/DC converter used to charge the traction battery (high voltage battery) in an electric vehicle

[6] B. Nykvist and M. Nilsson, "Rapidly falling costs of battery packs for electric vehicles", *Nature climate change*, vol. 5, no. 4, pp. 329, 2015.

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III.METHODOLOGY :

As we saw in the last chapter, interest in wireless power transmission and receiving has grown from the early 20th century to the present. Ever since Nikola

Since Tesla initially put out the concept of wireless power transfer in 1900, it has taken many different forms.
This chapter includes (1) a continuous test to measure the current flow in an electrical circuit, which is essentially a whole circuit. (2) the strength of the test run to see if the electrical power in the various terminals meets the necessary standards. Using cords to charge mobile phones and cordless appliances is no longer essential. Simply by placing the device next to a designated charging station or wireless power transmitter . Any battery-powered device can have its battery charged with a wireless charger. Consequently, it is possible to completely seal the appliance enclosure. Apart from its inherent convenience, wireless charging has the potential to enhance reliability considerably, as appliances with side-mounted charging ports are vulnerable to mechanical damage and may inadvertently be plugged in with the wrong adaptor. The foundation of wireless charging is the well-known induced voltage law of Faraday, which is

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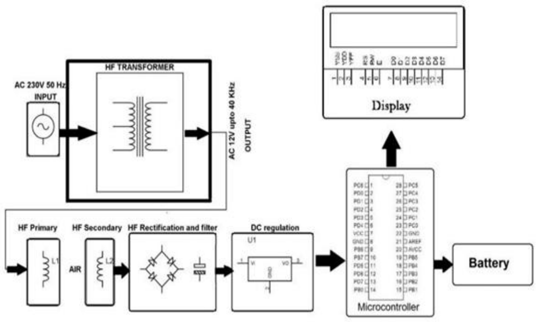
widely used in transformers and motors. Without the need of physical connections, wires, or slip rings, electrical energy can be transmitted to mobile and stationary consumers via contactless inductive power transfer, or IPT. It is necessary to employ a new methodical, modular design approach to lessen the rising development.

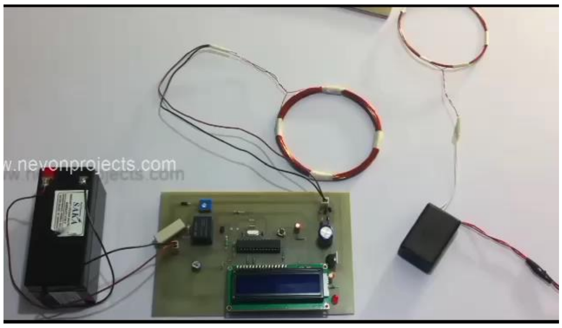
These methods, which are especially included into a simulation software tool, use cutting-edge strategies to enhance the consumer device's placement flexibility and transfer efficiency.



IV. WORKING :

The idea is a device that measures battery charge and transfers power wirelessly, doing away with traditional copper cables and current-carrying wires. Additionally, it uses the wireless power transfer principle to charge the battery until it reaches its full capacity. Thanks to Nikolas Tesla, wireless power transfer became a reality. This electricity can only be moved within a limited area, such as when charging rechargeable batteries, etc. We have a battery that runs on wireless power just for demonstration. This calls for an electronic circuit to convert AC 230V 50Hz to AC 12V, a high frequency, which is then supplied to the air core transformer's primary coil. The transformer's secondary coil produces a high frequency of 12V. Additionally, the system measures

WORKING MODEL:



V.COMPONENTS USED

- Atmega Microcontroller
- Relay
- Relay Driver IC
- Resistors
- Capacitors
- Transistors
- Cables and Connectors
- Diodes
- PCB and Breadboards
- LED
- Transformer/Adapter
- Push Buttons
- Switch
- IC
- IC Sockets

VI. CONCLUSION

This study presents a novel approach for a wireless battery charging circuit. The suggested technique uses a straightforward circuit to detect the flow of a transmitter coil, such as a DC value, in order to measure any wireless connection. The voltage and power of the transmission coil can be found using this method without the need for a high sampling frequency. The battery pack is charged using the suggested wireless battery charging circuit to regulate voltage and power outages. Testing is done on the model circuit for charging a 12-volt battery pack in a range of load resistance and coil steering scenarios. The 13.2V to 17V battery can be wirelessly charged by the system, which runs on 12V. System uses a maximum of 1A of current while operating. It charges at a 6 to 12 watt rate.

The voltage Across batteries, depending on the separation between the coils, is 12.6V to a maximum of 14.4V.
All test and simulation results thereafter demonstrated that the suggested approach is highly appropriate for effectively controlling wireless battery charging.

VII. REFERENCES

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