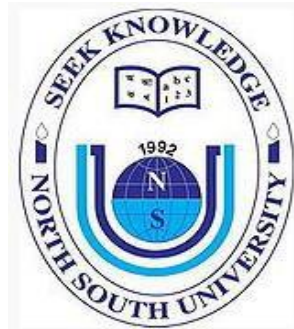


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# Senior Design Project Report

CSE/EEE/ETE 499

## Wireless Power Transfer for Electric Vehicle



### Submitted By

| Name                       | ID         |
|----------------------------|------------|
| Md Shahidul Islam Mozumder | 1530994043 |
| Khairul Alam               | 1721386043 |
| Md. Mahfuzzaman            | 1621748042 |

### Supervisor

Dr. Shahnewaz Siddique – SNS1

Assistant Professor

**ELECTRICAL AND COMPUTER ENGINEERING**

**NORTH SOUTH UNIVERSITY**

**SUMMER 2021**

## **Declaration**

This is to certify that this Project is our original work. No part of this work has been submitted elsewhere partially or fully for the award of any other degree or diploma. Any material reproduced in this project has been properly acknowledged.

### **Declared By:**

.....  
Name: Md Shahidul Islam Mozumder  
ID: 1530994043

.....  
Name: Khairul Alam  
ID: 1721386043

.....  
Name: Md. Mahfuzzaman  
ID: 1621748042

## **Agreement Form**

We take great pleasure in submitting our senior design project report on “**Wireless Power Charging for Electrical Vehicle**” by Md Shahidul Islam Mozumder(ID: 1530994043), Khairul Alam(ID: 1721386043) and Md. Mahfuzzaman(ID: 1621748042). This report is prepared as a requirement of the Capstone Design Project CSE/EEE/ETE 499 A & B which is a two semester long senior design course. This course involves multidisciplinary teams of students who build and test custom designed systems, components or engineering processes. We would like to request you to accept this report as a partial fulfillment of Bachelor of Science degree under Electrical and Computer Engineering Department of North South University.

### **Approved By:**

Dr. Shahnewaz Siddique 24/10/21 (E-signature)  
.....

Supervisor  
Dr. Shahnewaz Siddique  
Assistant Professor  
Department of Electrical and Computer Engineering  
North South University, Dhaka, Bangladesh

.....

Dr. Rezaul Bari  
Chair & Associate Professor  
Department of Electrical and Computer Engineering  
North South University, Dhaka, Bangladesh

# ACKNOWLEDGEMENT

By the grace of almighty we have completed our senior design project named “**Wireless Power Transfer System for Electric Vehicles**”.

We would like to express our sincere gratitude to our project supervisor Dr. Shahnewaz Siddique, Assistant Professor for his endless support, patience and guidance throughout the whole EEE/CSE 499A and 4999B. The integrity of this project would not have been achieved without his inspiration and valuable suggestions.

We would like to express our sincere gratitude towards North South University’s Department of Electrical Engineering and Computer Science for providing us with the platform to showcase our design capability and implementation of our theoretical knowledge as part of our curriculum for the undergraduate program.

Finally, we are thankful to our families and everybody who guided us and provided facilitation.

## Abstract

In the future transport area, electric vehicles are considered as replacement of oil powered internal combustion engine driven vehicle to achieve environmentally-friendly transportation. Even though electric vehicle (EV) usage is currently increasing, a technology breakthrough would be required to overcome battery related drawbacks. To address battery related limitations, the concept of Wireless Power Transfer (WPT) enabled EV has been proposed. Wireless Power Transfer system transfer electric energy from power source to load without wired connection conveniently. WPT is achieved through the affordable inductive coupling between two coils termed as transmitter and receiver coil. In EV charging applications, transmitter coils are buried in the road and receiver coils are placed in the vehicle. Wireless Power Transfer has the potential to overcome the drawbacks of wired chargers and eliminate some hurdles towards vehicle electrification and sustainable mobility. Even though inductive coupling has been applied in some applications of WPT, it is still not efficient enough to transfer high power at the kilowatts level due to weak coupling between the transmitter and the receiver. Using optimally-specified resonant circuits along with inductive coupling can enhance the coupling and make the system more efficient for practical applications. This research aims to design and analyze the performance of a WPT circuit. The optimal specification of a resonant circuit is studied and discussed. Theoretical calculations are performed to find the component values in the circuit to reach. The WPT system is verified by performing simulation tests in the MATLAB/SIMULINK environment. From the sustainability perspective, performance is defined in terms of energy, environmental, and economic metrics, and policy drivers and issues of health and safety are also examined.

### **Keywords:**

Wireless power transfer (WPT), electric vehicle (EV), induction power transfer (IPT), resonant circuit.