

DST-DHI Sanctioned Research Project Under FAME-TPEM India Scheme

**K. K. Wagh Institute of
Engineering Education & Research, Nashik-3
Department of Electronics & Telecommunication Engineering**



DST-DHI-FAME-Technology Platform for Electric Mobility (TPEM) Sanctioned Research Project

Name of Project: Technology Pilot for DC Charging of EV Bus (TPEM/2017/035)

Principal Investigators:

1. Dr. Sunita A. Patil (Ugale), K.K.W.I.E.E. & R., Nashik, Maharashtra
2. Mr. Ajinkya S. Joshi, Panva Engineering Pvt. Ltd., Nashik, Maharashtra

Co- Principal Investigators:

1. Dr. Dinesh M. Chandwadkar, K.K.W.I.E.E. & R., Nashik, Maharashtra
2. Mr. Suresh S. Joshi, Panva Engineering Pvt. Ltd., Nashik, Maharashtra

Objective: High Power DC Chargers for EVs ranging up to 1000V systems.

Duration: 2 years.

The proposal was revised after presentation at the IM-TAG Evaluation Group and is now focused on EV Bus Fast Charging System from 100 to 1000 V range.

Unique Value Contribution:

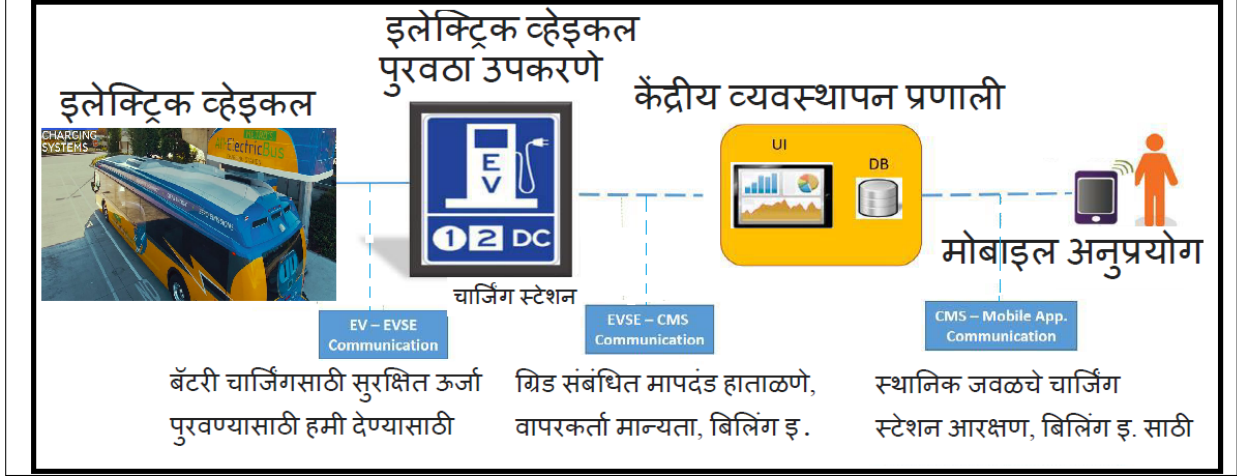
- Low cost solution
- Indigenous & Fully in-house development designed for Indian environmental conditions
- Two charge authorization modes: plug and charge / external payment
- Two types of load balancing: Reactive / Scheduled
- Modular & Scalable design
- Charging Standard & Connector Agnostic
- Dynamic Pricing and Demand Management
- Endless Possibilities in IoT

Total Project Cost : Rs 150.81 lakhs

Grants Sanctioned by DHI : Rs. 90 lakhs

Partners Contribution : Rs. 60.80 lakhs

इलेक्ट्रिक बससाठी डीसी चार्जिंग प्रकल्पाची ठळक वैशिष्ट्ये



The National Electric Mobility Mission Plan 2020 is one of the most important and ambitious initiatives undertaken by the Government of India that has the potential to bring about a transformational paradigm shift in the automotive and transportation industry in the country. This is a culmination of a comprehensive collaborative planning for promotion of hybrid and electric mobility in India through a combination of policies aimed at gradually ensuring a vehicle population of about 6-7 million electric/hybrid vehicles in India by the year 2020 along with a certain level of indigenization of technology ensuring India's global leadership in some vehicle segments. (Ref. <http://dhi.nic.in>)

It is a composite scheme using different policy-levers such as:

1. Demand side incentives to facilitate acquisition of hybrid/electric vehicles
2. Promoting R&D in technology including battery technology, power electronics, motors, systems integration, battery management system, testing infrastructure, and ensuring industry participation in the same
3. Promoting charging infrastructure
4. Supply side incentives
5. Encouraging retro-fitting of on-road vehicles with hybrid kit

Most EV charging solutions are centered on home based AC charging that generally meets the need of a detached family home with direct utility service. However, studies indicate that there is significant number of EV owners living in apartments or town houses wherein dedicated utility service is not available. DC fast chargers provide quick and convenient solutions in such situations where shared EV infrastructure charging is required. **Public charging infrastructure is a critical component in accelerating the adoption of EVs.**

Standardization of charging equipment will help interoperability and facilitate faster adoption by industry and EV users. DC fast charging (DCFC) and Level-2 charging stations installed at

public locations such as: bus stands, railway and metro stations, BRT stops, malls, etc. shall help permeate the EVSE map.

Much like the rest of the world, Electric vehicles in India face barriers on account of consumer perception with regard to charging time, driving range of non-hybrid EVs, battery replacement costs, top speed and acceleration. Some of these challenges can be overcome by vehicle variants based on Li-ion batteries; however, their high capital costs become a barrier in such cases. **Charging speed and range are related to technology and infrastructure for charging.**

It is therefore important to conduct comprehensive planning analysis prior to the rollout of electric vehicle supply equipment (EVSE) in order to ensure that charging stations are optimally sited, providing the best returns on investment while maintaining high service levels. **The focus on cost-effective EVSE deployment is especially important for a developing country like India.**

The project explores this opportunity space and develops solutions that can tackle the aforementioned challenges while creating a win-win business/market model for masses. Combining the technology with optimal sizing and siting of these solutions can help develop a critical element of the EV puzzle and **support the government's initiative to increase EV penetration.**

DST issued the advertisements on Dec. 1, 2016 and two months were provided for submission of the project proposals. 104 project proposals were received under the TPEM,: Lithium ion Battery-29, Charger-26, Motors-28, Traffic Driving Pattern-13, Light weighting-8.

K. K. Wagh Institute of Engineering Education and Research, Nashik has submitted project proposal under charger category in collaboration with Panva Engineering Pvt Ltd (PEPL) Nasik.

Finally only 7 projects are sanctioned after 6 successive meetings conducted.

Chargers for the Electric Vehicles are required in large numbers and needs to be locally produced even if some critical components of the chargers are to be imported. Hence there is an urgent need to bring into market chargers suitable for various types of EVs (two-wheelers, four-wheelers, buses and trucks). In addition the communication and monitoring network between the chargers located all over the city and the power utility supplying power is very important. The projects for novel technology small EV Charger, the **EV Bus Charger and the combined project for back-end communications and vehicle-to-grid technologies are recommended by team of experts.**

The technical details of recommended project are as follows:

Title: “Technology Pilot for DC charging technologies for EV Bus”. It is a collaborative project between the institute and industry.

Objective of project is to develop high power DC chargers ranging from 200V to 1000V for electric buses. It would be an indigenous and fully in-house development designed for Indian environmental conditions. The duration of project will be 2 years.

To meet the requirements, following scheme is under development.

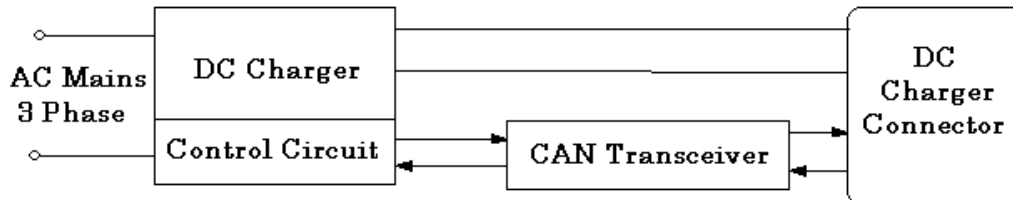


Fig. Architecture of DC charger for Electric Vehicle

Project Investigators: (K. K. Wagh IEER, Nashik)

- 1) PI: Dr. Sunita Aniruddha Patil (Ugale), Associate Professor,
- 2) CO-PI: Dr. Dinesh Madhukar Chandwadkar, Professor and Head of E&TC Dept.,
- 3) Ms. Nisha Gosavi, Junior Research Fellow
- 4) Ms. Ashweeni Jadhao, Junior Research Fellow

Total Project Cost : Rs 150.81 lakhs

Request for TPPEM grant : Rs.90 lakhs

Partners Contribution : Rs.60.80 lakhs.

Unique Value Contribution:

- Low cost solution
- Indigenous & Fully in-house development designed for Indian environmental conditions
- Two charge authorization modes: plug and charge / –external payment
- Two types of load balancing: Reactive/Scheduled
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Expected Outcomes:

Indigenous & Fully in-house prototype of DC charger for EV bus to support the government’s initiative to increase EV penetration, Patents and Research papers.

वाघ कॉलेजला संशोधनासाठी दीड कोटींचे अनुदान

इंधन तुटवड्याच्या समस्येवर पर्याय शोधण्यासाठी भारत सरकारच्या वतीने 'नॅशनल इलेक्ट्रिक मोबिलिटी मिशन प्लॅन २०२०' ही योजना हाती घेतली आहे. या अंतर्गत देशभरातील १०४ पैकी ७ प्रस्ताव मंजूर करण्यात आले. यामध्ये के. के. वाघ इंजिनीअरिंग कॉलेज व अंबड एमआयडीसीतील पनवा इंजिनीअरिंग प्रा. लि. यांनी सादर केलेला प्रस्ताव मंजूर झाला आहे. या प्रकल्पास सरकारने दीड कोटींचे अनुदान जाहीर केले आहे.

'नॅशनल इलेक्ट्रिक मोबिलिटी मिशन प्लॅन २०२०' या योजनेतर्गत इलेक्ट्रिक-हायब्रीड वाहनांची निर्मिती करणे, बॅटरी तंत्रज्ञान विकसित करणे, इलेक्ट्रिक मोटर्स, बॅटरी व्यवस्थापन, बॅटरी चार्जिंग आणि सध्याच्या वाहनांमध्ये हायब्रीड किट बसविणे यासारख्या प्रयोगांना प्रोत्साहन देण्यात येत आहे. या योजनेतर्गत के. के. वाघ इंजिनीअरिंग कॉलेजने पनवा इंजिनीअरिंग प्रा. लि. यांच्यासोबत अवजड वाहनांच्या चार्जिंग

स्टेशनच्या निर्मितीसाठी प्रकल्प प्रस्ताव सादर केला होता. अनेक बैठकी व सादरीकरणानंतर त्यांच्या प्रकल्पाला हिरवा कंदील मिळाला

आहे. 'इलेक्ट्रिक बससाठी डी. सी. चार्जिंग स्टेशनची निर्मिती करण्यासाठीचे तंत्रज्ञान विकसित करणे' या शीर्षकांतर्गत हा प्रकल्प सादर केला गेला. वाघ कॉलेजमधील प्रा. डॉ. सुनीता पाटील (उगले) व प्रा. डॉ. दिनेश चांदवडकर तसेच पनवा इंजिनीअरिंगमधील अजिंक्य जोशी व सुरेश जोशी या प्रकल्पाचे संशोधक म्हणून काम बघणार आहेत. या यशाबद्दल प्रकल्प संशोधकांचे वाघ शिक्षण संस्थेचे अध्यक्ष बाळासाहेब वाघ, विश्वस्त चांगदेवराव होळकर, अशोक मर्चंट, समीर वाघ, प्राचार्य डॉ. केशव नांदुरकर व सचिव के. एस. बंदी यांनी अभिनंदन केले.





Inauguration of Research Project Lab by Mr. Susheel Deshpande, General Manager, General Electric Co., Chennai



Team of Researchers with guest and department faculty