

Electric Three-Wheeler Project 2023

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1. Introduction

Electric vehicles (EVs) have been introduced in the transport sector as a solution to the depletion of fossil fuels, increasing transport costs and emissions of harmful gases by fossil fuel burning vehicles. However, one of the severe shortcomings of state of the art EVs is the relatively shorter range between two consecutive charges. Under test conditions, they are in the range of 250 km, but practically they reduce to 150 km and in the case of traffic jams, it can be as low as 100 km per charge, or even less. Therefore, customers are a bit hesitant to invest in EVs.

An already progressing solution to this problem is to increase the number of charging stations so that the EVs can be charged more frequently within the journey. However, it takes time (at least 20 minutes per charge in the best case) and is associated with a charging fee. Another more efficient solution is wireless charging, while the vehicle is on the move at low speeds, especially in traffic jams. However, wireless charging systems are still in the development stage and it will take some more years for such technologies to be available to passenger vehicles on roads.

Here the battery sweeping method is introduced to overcome the above issue for an electrical three-wheeler. Specification and test data of the prototype of the electrical three-wheeler are included in this report.



Figure 1. Electric Three-Wheeler

2. Motor Specifications

Motor type	Brushless DC motor
Voltage	60 V
Power	3000 W
Phase	Dual mode

The brushless DC motor is operated using Zion Chi intelligent Brushless High Power Controller.



Figure 2. Brushless DC motor and the power controller



Figure 3. Brushless DC motor

3. Battery Specifications

The used Nissan Leaf 8 battery modules is used for the battery pack.

Battery capacity	30 Ah (Original capacity – 65 Ah)
Module count	8
Cells in one module	2 parallel and 2 series
Maximum cell voltage	4.2 V
Minimum cell voltage (Setting in BMS for protections)	3.0 V
Using BMS type	JK – BMS (JK-BD6A20S10P)



Figure 4. Battery Pack with three-wheeler



Figure 5. Battery Pack (8 series battery modules)

4. Display Features

The following features can be displayed in the display up to now.

- Speed (kmph)
- Distance can be drive (km)
- Battery SOC
- Battery SOH
- Drive distance
- Nearest charging centers (Map)

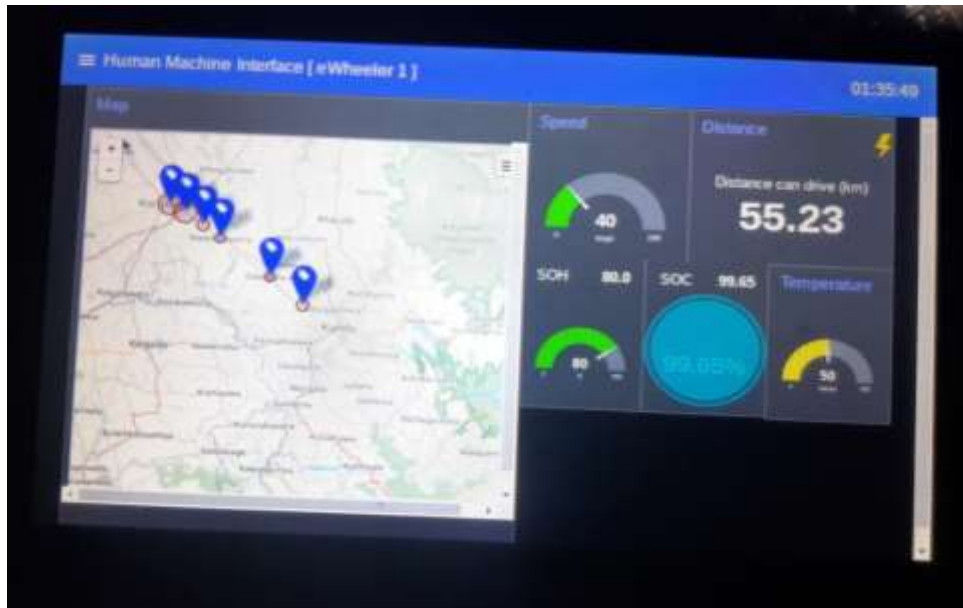


Figure 6. Display

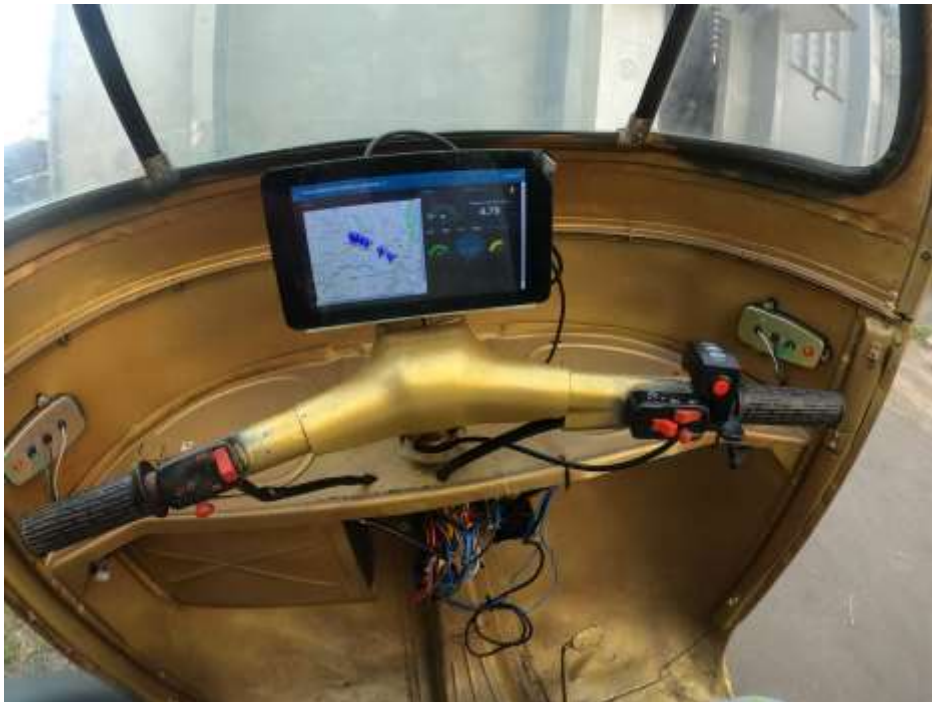


Figure 7. Three-wheeler with display

5. Test Run results

According to the test run, about 30km can be drive from one battery charge (Using above 30Ah battery). Test run is done in a flat surface.



Figure 8. Side view of Electric Three-Wheeler

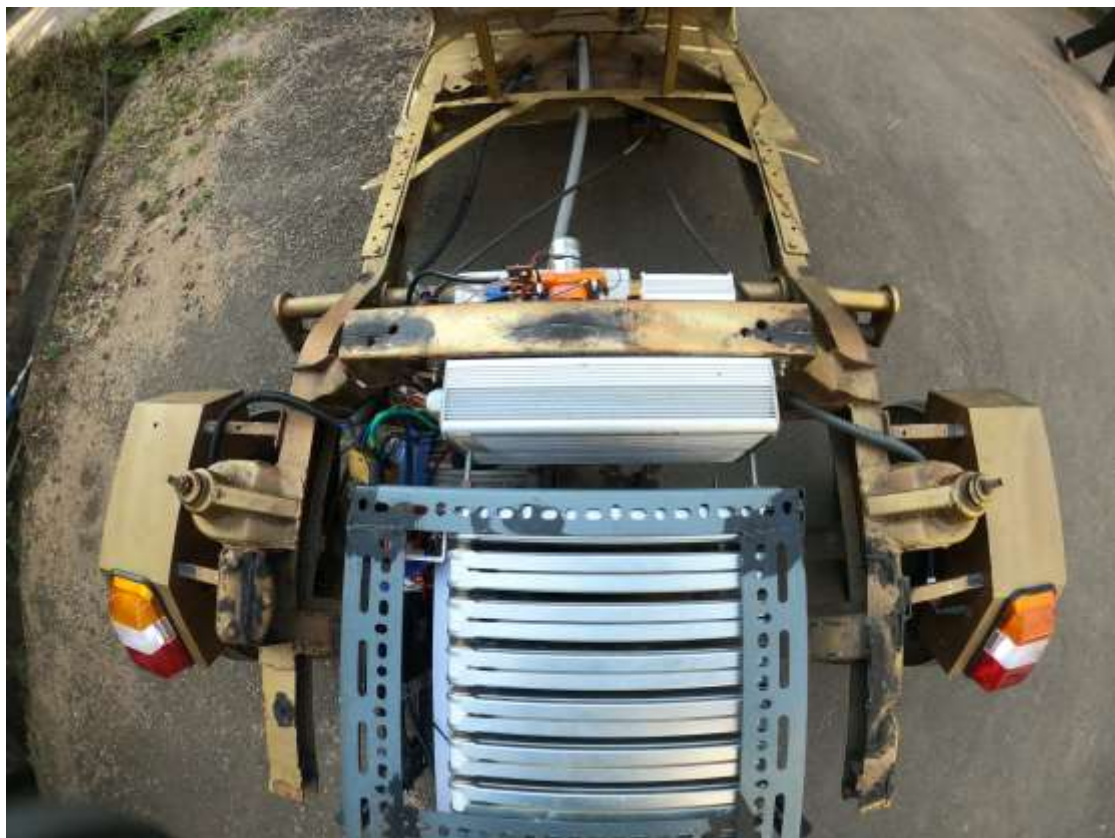


Figure 9. Plan view of Electric Three-Wheeler