UNIVERSE SIMPLIFIED FOUNDATION

Empowering For Innovation

# Electric Car

## Conventions used in this document:

Blue: Questions from facilitator to children
Maroon: Children's anticipated response
Black: Comments, notes, and plan for the facilitator

## Session flow

| Sr. No. | Activity | Talking points | Time allotted |
|---|---|---|---|
| 1 | Introduction | • We are going to build an electric car<br>• How do you think the electric car will work? | 15 mins |
| 2 | Group formation and worksheet distribution | Assuming you have already explained to them how to use the worksheet. If not please refer 'General instructions for the facilitator'. | 15 mins |
| 3 | Ideation and Material gathering | Students will come up with the design of the project and list of the material required for the completion of the challenge. Here children should fill the worksheet till the material list. | 15 mins |
| 4 | Project making | During this time, children will build the project. For this challenge encourage children to complete minimum up to challenge 2. | 150 mins |
| 5 | Worksheet completion | It will be difficult for children to complete the worksheet while making the project. So give them extra time to complete the worksheet once the project is completed. | 15 mins |
| 6 | Final Discussion | Ask the children what they have observed.<br>How do they think the car is moving? | 15 mins |

The above mentioned is the minimum time you need to give children. Feel free to change the time allotted as per the requirement of the class. This is typically a 4 hr project. You can extend it up to 5 or 6 hrs.

## Introduction

Ask them to go through the instruction sheets first. They will read the following:

***Challenge 1***

*Design a car that works on electricity and doesn't use any other kind of fuel.*

What do you understand from the instructions? Which project are we going to work on today?
Car working on electricity.

What do cars and other modes of transportation use now?
Petrol, diesel, and natural gas.

So today we will make a car which works on electricity and no other fuel. Let us start working on the project.

## How to help children when they are stuck using the Inquiry driven approach:

1. Making a chassis

They might find it difficult to attach the motor to the chassis (cardboard) since the motor is heavy. You can encourage them to try different things to make the motor stay on the chassis.

2. Speed of the motor

If you have more than one type of gear motor present in the space, there are chances that children will end up using both the motors with different RPM (Rotation Per Minute - It is the measure of how many rotations a shaft makes in one minute, more the RPM; faster the shaft rotates).

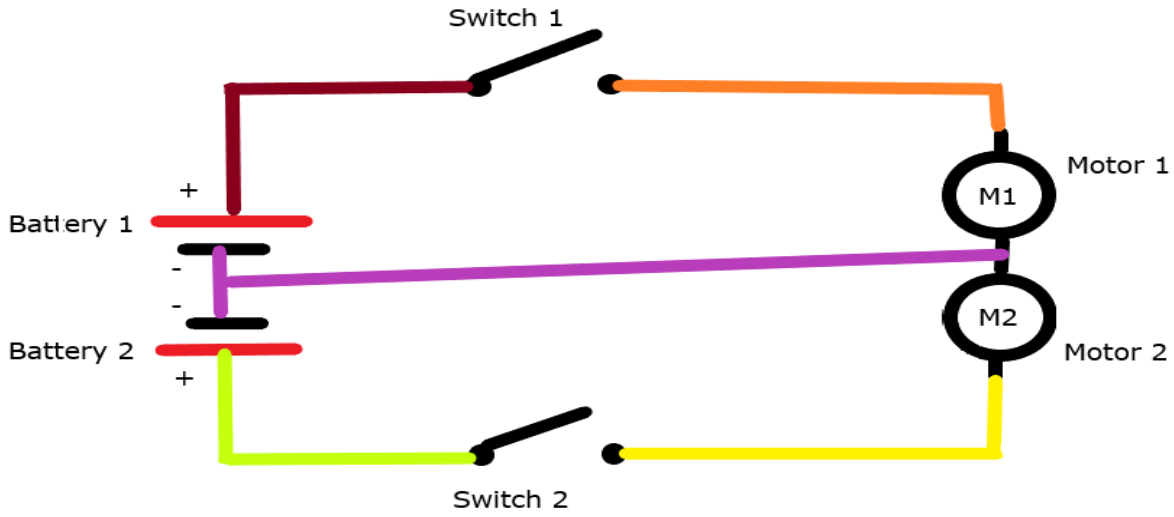
You can ask them to attach wheels to the motor and then the battery to each motor. They can then observe if the speed of the wheels are the same or different.

3. Motor connection

Motors connected in a way that the wheels are rotating in different directions. Ask children to hold their car and observe if the wheels are rotating in the same direction or opposite directions. They can either choose to change the way the motor is attached or simply change the polarity by changing the connections on the battery. This can be done by exchanging the wires of the motor connected.

Please refer to how to make it document the connections in detail.

4. Connections for your reference,
    1. Connect the Negative of Battery 1 and Battery 2
    2. Connect the positive of Battery 1 to one terminal of the Switch 1
    3. Connect the positive of Battery 2 to one terminal of the Switch 2
    4. Connect the second terminal of Switch 1 to one terminal of Motor 1
    5. Connect the second terminal of Switch 2 to one terminal of Motor 2
    6. Connect the remaining terminals of Motor 1 and Motor 2 to each other and then connect it to the negative terminals of the Battery1 and Battery 2 from the first step.




## Why the project may not work:

1. Check the contact points between tire and chassis (Cardboard frame). Make sure that the wheel is free to move and not get stuck on the cardboard. You can check this by trying to move the wheels with your hands. If you have to apply an excessive force that means that something is stopping the wheels from moving freely.
2. Check if the motor is working properly by attaching it to the battery.
3. Make sure that the car isn't too heavy.
4. The battery is drained. You can either use a fresh battery or you can use a Digital Multimeter (DMM) to check the voltage on the battery to be sure if it still has more than 6 V.
5. For challenge 2 and 3 connections are tricky so you will have to check again if the connections are proper.
6. Both the wheels are connected to move in the same direction.

## Working

There are various companies that manufacture and sell electric cars. A few pictures of the electric cars are attached below. You can print them and show them to children. You can also show them the videos of Electric Car by clicking the link Electric Car and Electric Car Charging.

Similar to your mobile phones, electric cars can be charged by plugging it into the charge point. It requires much more power than mobile phones. Once charged this car stores energy in their rechargeable battery which powers the car.

Electric cars accelerate faster than vehicles with traditional fuel engines like petrol and diesel thus making it lighter to drive.

In the case of the car which we have designed, we use the battery that powers a motor to rotate making the wheels turn.

Advantages of Electric Cars:

- Runs on a clean source of energy thus not causing air pollution
- Lesser fuel cost as electricity is less expensive than gasoline
- Safer to drive
- Low maintenance
- Less noise pollution

Disadvantages of Electric Cars:

- Availability of recharge stations

- High initial investment
- Cost of electricity
- Cannot be used for very long journeys without recharging multiple times
- Recharge takes a long time

## Final Discussion:

How did your project work?
The battery is connected to the motor. Wheels are connected to the motor. The battery makes the shaft of the motor rotate, this, in turn, rotates the wheel.

Do you think these cars are better than traditional fuel cars?
Yes, they do not cause air pollution.

What will happen if you add more weight to the car?
The car will become slow.

At this point, you can show them the videos and pictures of the electric car. You can also ask them what their thoughts are about the electric car.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