

# **SONAE E-Bike Design Challenge**

**By IIT Bombay E-cell**

SONAE EV is an electric mobility company working towards providing electric two wheelers, charging stations & swapping stations to consumers.

## **❖ About the Design Challenge:**

This challenge will test the skills and thinking powers of participants with regards to a workable Electric Commuter Bike design. We expect the participants to be high on research across the world and then put their knowledge, skills and innovations to create an Electric Bike design that fits best for Indian roads which have international standard.

Bike should be designed for daily commute of working professionals, students and delivery executives.

Organizing committee reserves the right to revise the schedule of the challenge and/or interpret or modify the competition rules at any time and in any manner that is in their sole judgement required for the efficient operation of the Challenge.

Intellectual Property created in challenge will be owned by SONAE EV Pvt. Ltd. students will be given credit as researcher.

## **❖ Vision of the Challenge:**

To create a Commuter Electric Bike from scratch and make it commercially viable for the market. This will be a live experience for the participants that will make them industry ready and productive in their professional endeavors.

## **❖ Timeline of the Challenge:**

- Registration opens & Teams starts work: 15th December'21, 10am
- Introduction Session: 9th January 2022, 2pm

- Registration & members addition closes:16th January'22, 2pm
- Education Session: 16<sup>th</sup> January'22 2pm
- Feedback to teams: 22<sup>nd</sup> & 23<sup>rd</sup> January'22
- Submission Deadline: 30<sup>th</sup> January'22 11pm
- Top 10 teams to be announced on 1<sup>st</sup> February'22
- Presentation of Top 10 teams at E-Summit'22 on 5<sup>th</sup> February'22
- Top 10 teams will work with the SONAE Research Team for February'22 & March'22. Submission Details for Top 10 teams will be provided.
- Final Results to be declared on 27<sup>th</sup> March'22

#### ❖ **Technical Details:**

Specification to work on Commuter Electric Bike.

- Top speed:75-85 Kmph
- Range:150-200 Km
- Gradient: 15 Degree
- Kerb weight: 125kg- 150kg
- Payload capacity: 150-200 kg
- Motor Specification:
  - Motor Type : Mid-Drive
  - Maximum Rated Power: 2.5KW-4KW
  - Maximum Rated Voltage: 60V/72V
- Battery Specification:
  - Maximum Rated Voltage: 60V/72V
  - Battery Type: Li-ion (NMC/LFP)
- Frame: Tubular Lightweight (Steel/Aluminum)
- Brakes: Both Disc & ABS enabled.
- Suspension: Telescopic/Macpherson
- Wheel base  $\leq$  1400 mm
- Ground Clearance: More than 150mm.

#### ❖ **Prizes & Rewards.**

- First team will get Cash Prize of Rs.100000 and second winner will get Rs.50000 as prize money.
- 5 to 10 Students will be hired in Research Team.
- All participating team members will get branded merchandise and participant certificates.

### ❖ **Team Composition**

The team can have 1 member to 5 members from mix of various backgrounds of Mechanical, Electrical, Electronics, Computer Engineering and Product/Industrial Design. Participants from any other background who have basic knowledge and passion for electric bike are allowed to be part of team.

The team may have 1 mentor from college or Industry for guidance.

The meaningful and inspirational team name is required to distinguish the team in the challenge. Every team must appoint a team captain. Captain will be solely responsible for all communication with organizing team.

## **Submission Details**

### ❖ **Table of Content: 200 Points**

#### **1. Team Introduction: 10 Points**

Team Members Name, Education Background, projects details and Mentor details.

#### **2. Abstract :10 Points**

An abstract that provides a quick overview of report.

#### **3. Masters Layout of the Vehicle: 25 Points**

Overall Vehicle Dimensions and weight. 2D sketches of vehicle including all components. Bill of material.

#### **4. Electric Powertrain : 30 Points**

- a. Objective.
- b. Flow chart of Electric Powertrain.
- c. Functioning of electric power train.
- d. Battery pack calculations & selection.
- e. Motor and Controller selection.
- f. Range calculation.
- g. Electrical circuit diagram.
- h. Transmission Details

**5. Chassis: 15 Point**

- a. Objective.
- b. 2D sketch and dimensions (Front view, Top View, and side view).
- c. Material Specification and reasoning for selecting a particular material.
- d. Calculation for selection of Pipe and tube.

**6. Brakes: 15 Points**

- a. Objective
- b. Selection of brakes
- c. Stopping distance calculations
- d. Regenerative Braking.

**7. Body Panels: 10 Points**

- a. Objective
- b. Material comparison, specification and reasoning for selecting a particular material
- c. Sketch.

**8. Suspension: 10 Points**

- a. Objective
- b. The reasoning for selecting a particular type of suspension system (Monoshock, Twin damper system etc.)
- c. Technical Specifications.

**9. Electrical Systems: 10 Points**

- a. Wiring harness of electric bike (main and auxiliary).
- b. Connectors
- c. Switches Design

**10. Lighting System: 10 Points**

- a. Objective.
- b. Lighting system selection
- c. Design of the system

**11. Wheel & Tyre system: 10 Points**

- a. Objective.
- b. The reasoning for selecting a particular type of wheel rim (Alloy/steel)
- c. Tyre size, material specification.

## **12. Vehicle Ergonomics: 10 Points**

- a. Objective.
- b. Ergonomic triangle calculations. (Rider's seating position, handlebar position and footrest.)
- c. Seats design.

## **13. Dashboard: 10 Points**

- a. Objective.
- b. Dashboard selection
- c. Dashboard features

## **14. IOT Features & Innovations : 25 Points**

- a. IOT features
- b. Mobile app Integration
- c. Data Flow

### ➤ **Report Format: PDF**

Font style: Times New Roman.

Font size: 14.

Teams can add photos, graphs, calculations, tables in the report.

### ➤ **Guideline**

Details under component in table of content is given as overview. Team can add further more information which they find to be important. Team who have expertise in 3D drawings can submit 3D files in submission.

Team should take design and engineering decisions considering following priorities.

1. Rider Experience & Safety
2. Innovation
3. Reliability
4. Cost
5. Availability.

Teams can submit their queries on mail at [research@sonaneev.com](mailto:research@sonaneev.com)