



**Mobility for the Future**

**Energy**

- Utilization
- Storage
- Generation

**Secure**

- Over the air updates for vehicle ECU software
- Secured lock to avoid two wheeler theft
- A four wheeler window Glass which can be broken from inside but not from outside

**Connected**

- Smart phone integration with vehicle
- Urban transport planning

**Shared**

- New designs for vehicle interior to be used as mobile office/ home
- Personal transport
  - Jet pack etc
  - Collapseable bike/ trike

**Roads**

- Quality of roads
  - optimize friction
  - Heat resistance
  - Use of plastic waste
- Infrastructure for Electric vehicles
  - Charging stations
  - Battery swapping models for fast charge

**Safe**

**Road safety improvement**

- Semi Autonomous Vehicle Technology to assist user**
  - Cost effective sol
- Anti Tyre burst technology
- Infrastructure
  - Pot hole reduction, mapping and maintaining road
- Two Wheelers
  - Smart Helmets
  - Self Balancing
- Road surface which absorbs oil spills to avoid accidents

**Clean**

- New Fuels**
  - Bio fuels,
    - New composition
    - Process Innovation
  - Hydrogen
    - Hydrogen from Biomass
      - Increasing efficiency
  - Compressed air
- Alternative Powertrain**
  - Electric Vehicles**
    - Drive train specific for Electric vehicle
    - Off road vehicles for rural areas
    - Next gen power electronics using GAN, SiC
    - Motor design for electric vehicles, SRM, Permanent Magnet w/o rear earth
    - DC Motors for Higher capacity and economic design
  - Hybrid (Fossil fuel- electric)
    - Thermal Challenges in Electric vehicles
      - New air conditioning systems
        - Reducing Ac load , new materials, Emmisivity
      - Minimizing thermal losses in components
      - Waste heat recovery from EV components battery, power electronics, motors etc
  - Magnetic
    - Engine
    - Transmission
    - New Material as a replacement for rear earth