Auto Thrust

When we thrust, we leave everyone in dust.........

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H.O.D'S MESSAGE

It is encouraging to see that the First issue of the Fifth volume of Auto Thrust news letter is here , in spite of facing so many hurdles due to Covid. After facing lot of hardship due to covid, the students are back in campus. Quite a good number of activities are planned for the current academic year, and it is the duty of the association coordinators to ensure that with no further delay, the activities are conducted ,as planned. With lot of thrust given to EVs, it is the right time for the department association to engage the students in workshops, webinars , industry interaction , in this thrust area. Hopefully, the two and four wheeler service camps can be conducted In the upcoming semester, for the benefit of the students. The final year students are advised to complete the major project on time , and publish their findings in the upcoming International Conference—MTIMES 2022 in our institution, on 10th & 11th June,22. I congratulate the editorial committee of "Auto Thrust" e– news letter for bringing out this informative issue on the latest developments in Auto sector and the upcoming new vehicles. Let us work together and build the department and take it to further higher.

Dr. Ramakrishna N. Hegde

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Auto Thrust

When we thrust, we leave everyone in dust..

Imagination is more important than Knowledge

Department of Automobile Engineering

Srinivas Institute of Technology, Mangaluru

Volume 5, Issue 1

March - 2022

Inside this issue:

Motivational Thought

"You define your own life. Don't let other people write your script."

— Oprah Winfrey

GM reveals hydrogen-fueled power generator and EV rapid-charger

General Motors in January announced the expansion of commercial applications for its Hydrotec hydrogen fuel cells with an integrated DC rapid charger. The company currently is developing units intended for applications such as heavy-duty trucks, aerospace and locomotives, but it now is broadening the intended use to include stationary power generation.

GM's Hydrotec-based power generators will be powered by the company's second-generation fuel cell power cubes. GM is supplying Hydrotec power cubes to Renewable Innovations of Lindon, Utah, who will manage the assembly of the mobile power generators.

In addition to mobile EV charging, GM and Renewable Innovations have collaborated to develop the Empower rapid charger. This charger is intended for existing fuel stations seeking the ability to add DC fast charging capability. GM states the Empower rapid charger will help satisfy the growing need for fast charging infrastructure with no additional investment in electrical infrastructure upgrades.

The rapid charger is powered by eight GM Hydrotec power cubes and can supply a DC charge for up to four vehicles simultaneously at a rate of 150 kW. The estimated target for a full charge time of an EV via these units is 20 minutes. GM claims up to 100 or more EVs can be replenished by the rapid charger before the unit would need to be resupplied with hydrogen. Renewable Innovations plans to deploy 500 Empower rapid chargers across the U.S. by the end of 2025.

"Our vision of an all-electric future is broader than just passenger vehicles or even transportation," said Charlie Freese, GM executive director of the global Hydrotec business. "Our energy platform expertise with Ultium vehicle architectures and propulsion components and Hydrotec fuel cells can expand access to energy across many different industries and users, while helping to reduce emissions often associated with power generation."

SOURCE: SAE INDIA

Wheel-hub-motor innovations in ‘flux

The packaging and design of electric motors has, not surprisingly, come under scrutiny in recent years as the pace of vehicle electrification has accelerated. Wheel hub motors [https://www.sae.org/news/2021/07/makingthe-case-for-in-wheel-motors], once dismissed as too costly and dynamically problematic for most automotive applications, are increasingly back in focus for EV use. Vehicle developers recognize that hub motors offer advantages – particularly in all-wheel- drive applications. And hub motors tend to favor the packaging advantages offered by axial-flux motor designs.

The compact dimensions of axial-flux motors make it far easier to package in a hub-mounted application. In addition, the more-powerful axial-flux designs are larger in diameter than comparable radial-flux motors, offering a packaging advantage in line with wheel dimensions: Small-wheeled vehicles such as scooters need smaller, less-powerful motors, while the larger wheel diameters of trucks and buses parallels the larger diameter and more powerful motors needed for these vehicles.

U.K.-based axial-flux motor designer and producer Saietta recently bought the Dutch supplier of electric drivetrains and high-voltage power electronics, e-Traction, from the Chinese Evergrande New Energy Vehicle Group. “I was in Slovenia and suddenly a lot of Dutch friends started texting, “Electric motor company about to go bankrupt in Holland,” noted Saietta CEO Wicher (Vic) Kist. This was shortly after Saietta had been listed on the London Stock Exchange, following earlier investment from the U.K. Enterprise Investment Scheme (EIS).

“I thought, ‘This is an opportunity,’” Kist told SAE Media. “I flew the entire M&A [mergers and acquisitions] team over that delivered the Saietta IPO and four weeks later, we signed”, Kist said. “What I found is it’s almost like the brother we didn’t realize we had. Fifty-five people, very similar to the U.K. team and power electronics, electromagnetics and especially on the power electronics side, an inverter.”

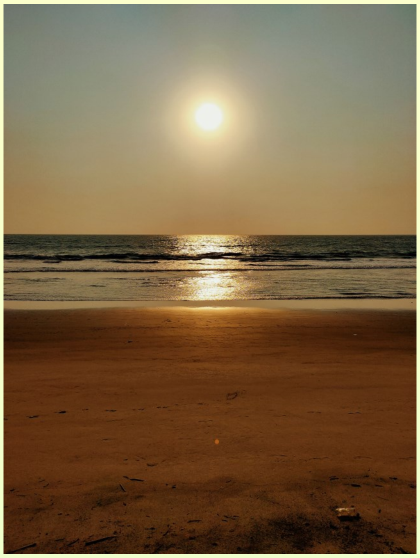
Saietta had developed an axial-flux technology (AFT) motor in response to British rival axial-flux motor designer YASA, which was acquired by Mercedes-Benz in July 2021. Since e-Traction produced an 800-V inverter, it neatly fulfilled Saietta’s need for one. The acquisition also added e-Traction’s e-axle technology to the Saietta portfolio, which will help the company to realize its desire to produce electric drive systems for trucks and buses.

The e-axle designed by e-Traction has the inverter packaged within the drive motors. Kist described it as “a fairly standard outrunner motor” but with direct drive, similar to Saienna’s AFT philosophy the same current,” he said.

SOURCE: SAE INDIA

Photography by Ashwin Kumar

NATURE PHOTOGRAPHY



Electric Vehicle

How Does An Electric Car Work?

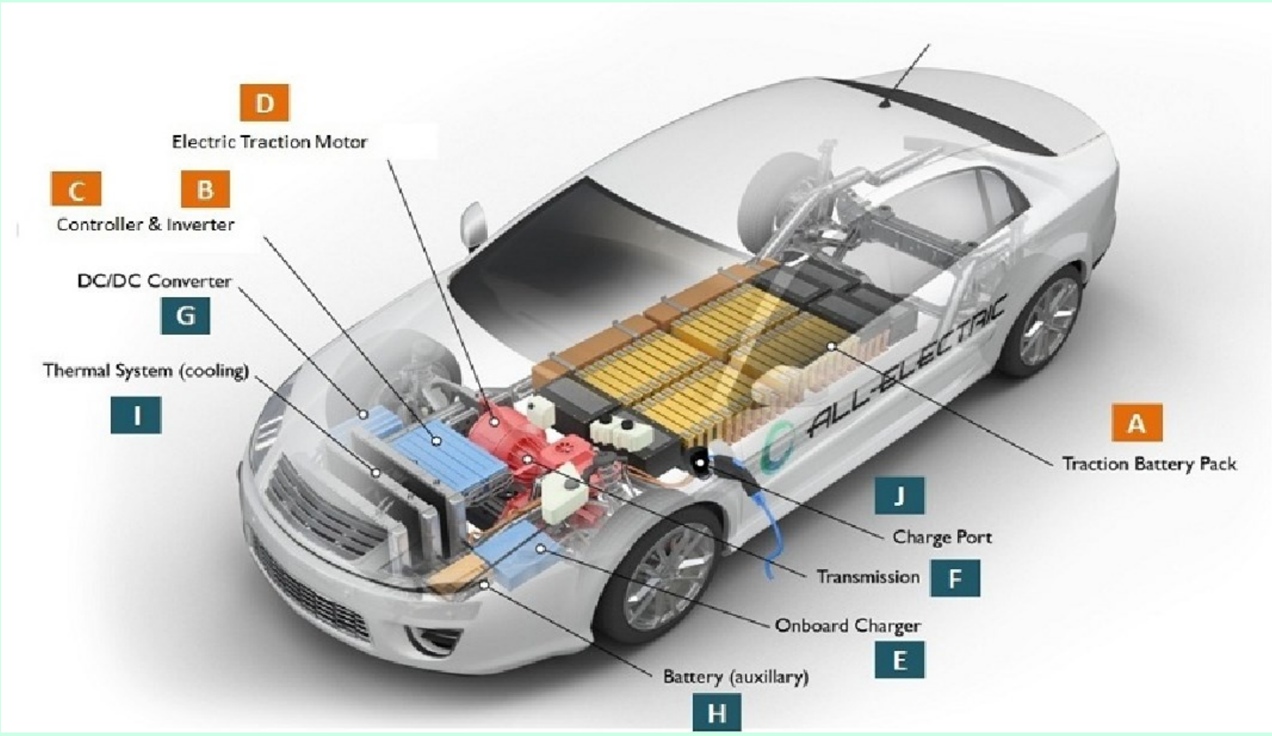
When the car pedal is pressed, then:

- Controller [C] takes and regulates electrical energy from batteries [A] and inverters [B]
- With the controller set, the inverter then sends a certain amount of electrical energy to the motor (according to the depth of pressure on the pedal)
- Electric motor [D] converts electrical energy into mechanical energy (rotation)
- Rotation of the motor rotor rotates the transmission so the wheels turn and then the car moves.

Note: The working principle above is for battery electric vehicle (BEV) type.

Electric Vehicle Components

Basic Main Components of Electrical Vehicle



The basic main elements of electric cars installed in almost all types of electric cars are as follows:

Traction Battery Pack (A)

The function of the battery in an electric car is as an electrical energy storage system in the form of direct-current electricity (DC). If it gets a signal from the controller, the battery will flow DC electrical energy to the inverter to then be used to drive the motor. The type of battery used is a rechargeable battery that is arranged in such a way as to form what is called a *traction battery pack*. There are various types of electric car batteries. The most widely used is the type of lithium-ion batteries. Please read the article "Electric Car Batteries and Their Characteristics" to get a little idea about batteries for electric cars.

Power Inverter (B)

The inverter functions to change the direct current (DC) on the battery into an alternating current (AC) and then this alternating current is used by an electric

Electric Vehicle

motor. In addition, the inverter on an electric car also has a function to change the AC current when regenerative braking to DC current and then used to recharge the battery. The type of inverter used in some electric car models is the bi-directional inverter category.

Controller (C)

- The main function of the controller is as a regulator of electrical energy from batteries and inverters that will be distributed to electric motors. While the controller itself gets the main input from the car pedal (which is set by the driver). This pedal setting will determine the frequency variation or voltage variation that will enter the motor, and at the same time determine the car's speed.
- In brief, this unit manages the flow of electrical energy delivered by the traction battery, controlling the speed of the electric traction motor and the torque it produces. This component will determine how electric car work.

Electric Traction Motor (D)

- Because the controller provides electrical power from the traction battery, the electric traction motors will work turning the transmission and wheels. Some hybrid electric cars use a type of generator-motor that performs the functions of propulsion and regeneration. In general, the type of electric motor used is the BLDC (brushless DC) motor

Other Electric Car Components

- Charger (E) is a battery charging device. Chargers get electricity from outside sources, such as the utility grid or solar power plants. AC electricity is converted into DC electricity and then stored in the battery. There are 2 types of electric car chargers:

- On-board charger: the charger is located and installed in the car
- Off-board charger: the charger is not located or not installed in the car.
- Transmission (F): The transmission transfers mechanical power from the electric traction motor to drive the wheels.
- DC/DC Converter (G): This one of electric car parts that to converts higher-voltage DC power from the traction battery pack to the lower-voltage DC power needed to run vehicle accessories and recharge the auxiliary battery.
- Battery (H): In an electric drive vehicle, the auxiliary battery provides electricity to power vehicle accessories.
- Thermal System – Cooling (I): This system maintains a proper operating temperature range of the engine, electric motor, power electronics, and other components.

Snap shots

AMARA Inauguration

Engineers day Celebration

Snap shots

Ayudha pooja at Automobile Lab

Freshers Day

YEZDI ADVENTURE

Engine Type	Single cylinder, 4 Stroke, Liquid Cooled, DOHC
Max Power	30.2 PS @ 8000 rpm
Max Torque	29.9 Nm @ 6500 rpm
Gear Box	Constant Mesh
Engine CC	334cc
Frame	Double cradle
Front Brake	320mm Disc ABS
Rear brake	240mm Disc ABS
Front & rear suspension	Telescopic fork & coil spring, Mono shock absorbers
Tyre	90/90 – 21" (F) 10/80 – 17" (R)
Seat height	815mm
Wheel base	1465mm
Kerb weight	177kg
Ground Clearance	220mm

TORK KRATOS

Motor Power	7500 W
Motor Type	Axial Flux PMSM
Charging Time	4-5 hrs
Max Power	5.36hp
Max Torque	28 N M
Front Brake	267mm Disc CBS
Rear Brake	220mm Disc CBS
Range	180km
Chassis	Trellis Frame
Wheelbase	1336mm
Kerb Weight	140kg
Battery Type	4kWh Lithium Ion
Transmission	Automatic

Life is 10% what happens to you and 90% how you react to it.

Skoda Slavia 1.5L TSI

Engine	1498cc,4 Cylinders Inline,4 valves/ cylinder,DOHC,Turbocharged
Max Power	148 bhp@ 5000-6000 rpm
Max Torque	250 Nm @ 1600-3200 rpm
Transmission	Manual/ DSG
Suspension	McPherson Strut (Front) Twist beam axle (Rear)
Length	4541 mm
Width	1752 mm
Height	1487 mm
Wheelbase	2651 mm
Kerb Weight	1258 kg
Boot Capacity	521 L
Fuel Tank	45 L
Brakes	Disc(Front), Drum(Rear)
Tyres	205/55 R16 (Front&Rear)

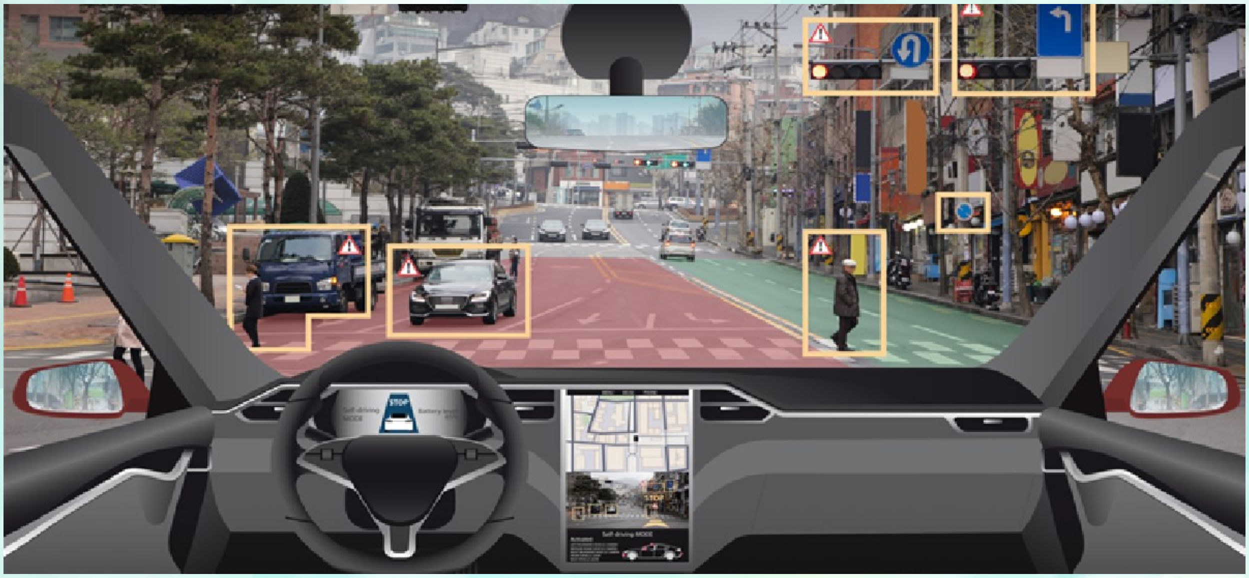
MG ZS EV 2022

Motor Type	Permanent magnet synchronous
Max Power	174 bhp
Max Torque	280 Nm
Transmission	50.3 kWh, Lithium Ion
Suspension	McPherson Strut (Front) Torsion beam (Rear)
Length	4323 mm
Width	1809 mm
Height	1649 mm
Wheelbase	2581 mm
Kerb Weight	1582 kg
Boot Capacity	448 L
Range	461 km
Brakes	Disc (Front&Rear)
Tyres	215/55 R17 (Front&Rear)

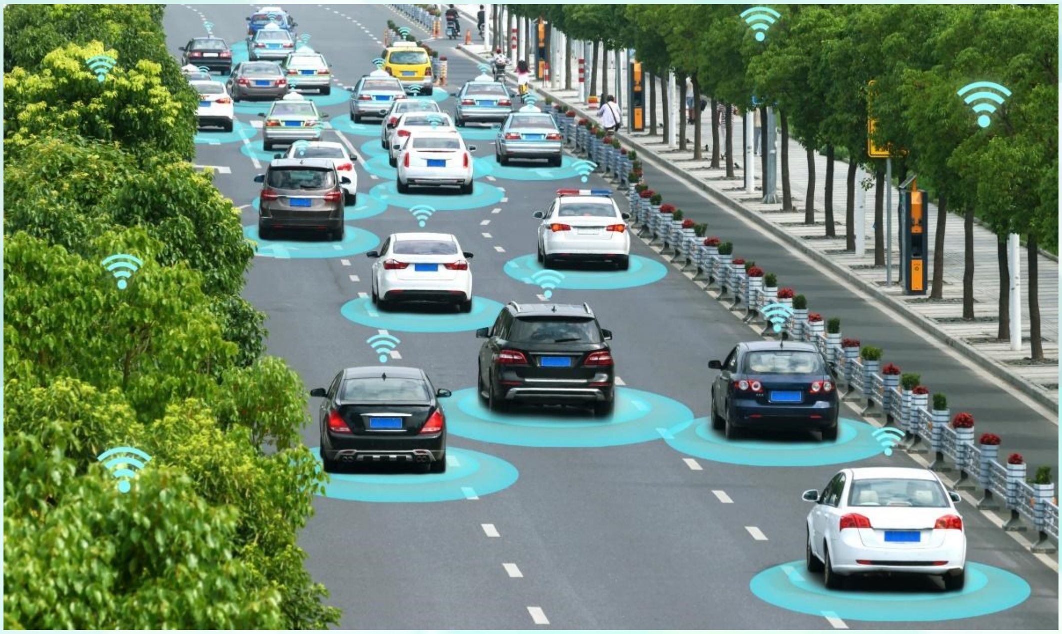
Your talent is God's gift to you. What you do with it is your gift back to God.

The road to affordable autonomous mobility

As autonomous vehicle services roll out and scale, the pace and nature of that transition have significant implications across the mobility value chain. Mobility participants that have already experienced disruption—such as electrification—must consider localized mobility contexts, in addition to the evolution of autonomous-driving technology, in their assessment of autonomous mobility.

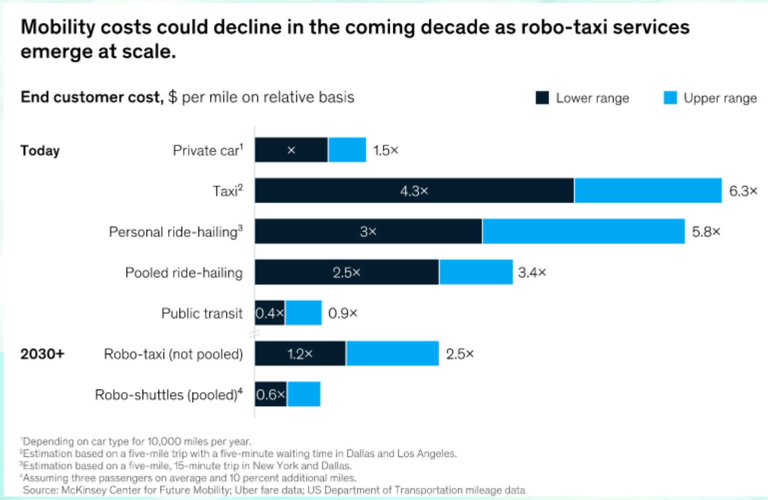


To provide clarity on how the autonomous-vehicle (AV) market could evolve, McKinsey has developed a granular Mobility Market Model that includes numerous modes of transport, using data from more than 2,800 cities and rural areas across more than 110 countries. The model projects miles traveled, light-vehicle sales, installed base, and environmental impact. Furthermore, it estimates the size of the value pools for both private and shared transport through 2030 and beyond and provides detailed insights for individual cities—including scenarios propelled by the COVID-19 crisis. As part of this effort, we also examined various outcomes for autonomous driving.



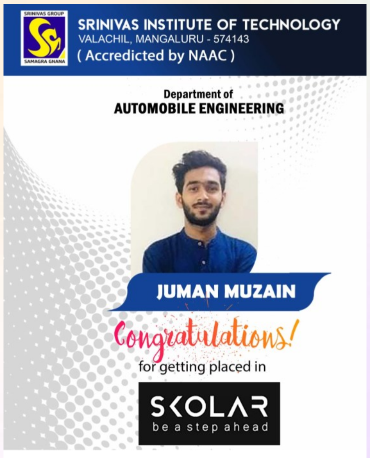
Poised for disruption: Cost per mile for mobility in 2030

The adoption of robo-taxis and robo-shuttles depends on four main drivers: regulations, technology readiness, business-case attractiveness, and customer preference. Customer preference strongly depends on how the cost of these AV services compares with other mobility modes. While fully burdened costs for such services are very high today—because of the high cost of technology, development, and operations—they could decline significantly in the coming decade as AV technology advances and smarter, more seamless, multimodal mobility ecosystems emerge. Despite their additional technology costs, robo-taxis could become price competitive with private nonautonomous cars and even transit services (Exhibit 1).

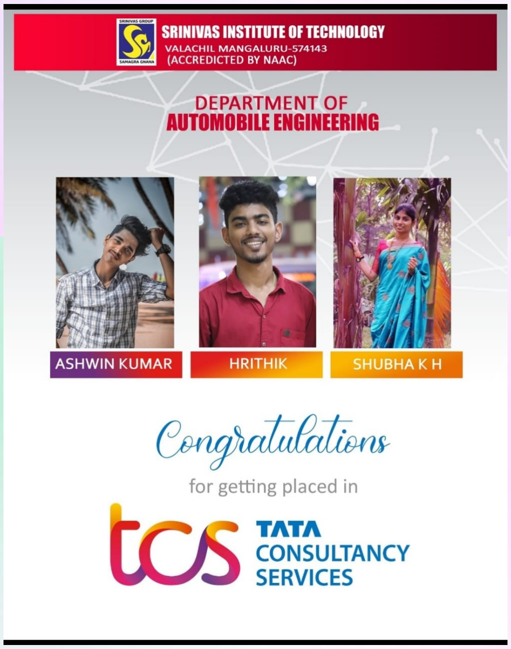


It is estimate that the cost per mile of a robo-taxi trip could be just 20 percent higher than that of a private nonautonomous car in certain contexts, depending on use case, geography, and local conditions such as city archetype (for example, large and sprawling versus dense). Robo-shuttles could be 10 to 40 percent cheaper than private nonautonomous cars, though less convenient. Moreover, depending on the context, the cost per mile for a personal (not pooled) robo-taxi trip could amount to just 40 to 50 percent of a driver-based ride-hailing trip. In addition to price, greater convenience could drive consumer acceptance of robi-taxis, along with the perception of safety if AV performance continues to improve. Furthermore, regulations will play a key role in shaping future mobility outcomes. New regulations that ban private single-rider vehicles from city centers or the imposition of congestion charges might make private cars less attractive and more expensive. Such actions could encourage users to switch to shared autonomous-mobility modes.

Student's Achievements



Placement Details



Graduation Day of 2019 Batch

For feedback - +91 8951225467 (Prakash ST), prakash0435@gmail.com