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News Release

SMART launches first Singapore-developed driverless car designed for operations on public roads

- Electric car converted into an autonomous vehicle at low cost

1. Singapore – In an ongoing effort to help Singapore develop innovative transport solutions, the Singapore-MIT Alliance for Research and Technology (SMART) [新加坡-麻省理工学院科研中心] launched Singapore's very first locally-developed driverless car that is designed for operations on public roads.

2. Adapted from its prototype driverless golf cart, this driverless car dubbed SCOT (Shared Computer Operated Transport) is operationally-ready for the public roads. Unlike other driverless cars which are retrofitted with expensive 3-D laser sensors, SCOT relies on low-cost off-the-shelf LIDAR sensors which enable the car to drive autonomously, independent of the Global Positioning System (GPS). This unique feature allows it to drive even in tunnels and places where GPS signals would be hindered.

3. A collaborative project between SMART and the National University of Singapore (NUS), this driverless car aims to resolve the "first- and last-mile problem", which is especially pertinent in view of Singapore's ageing society. It also aims to help promote car-sharing as the driverless car is able to resolve the 'rebalancing' issue (i.e. getting the car to the next car-sharing customer once the previous customer drops off the car) when cars are shared (See Factsheet).

4. Professor Emilio Frazzoli, SMART Lead Investigator for the Future Urban Mobility (FM) Interdisciplinary Research Group (IRG), said: "SCOT is a testimony of the researchers and students' talent, innovation and dedication considering that we converted the electric car into a driverless car in just six months at no more than S$30,000 for the sensors and onboard computer. Our demonstration today takes us one step in making driverless cars a reality in Singapore. "

5. NUS collaborator Professor Marcelo Ang, added, "Going forward, we hope to be able to deploy a mobility-on-demand system in controlled areas such as resorts. This will not only help us to learn and improve the system, but also provide a visible platform to increase public awareness and government support in our endeavour to create better transport solutions for urban cities."

6. The research was funded by the Singapore National Research Foundation (NRF) through SMART at the Campus for Research Excellence And Technological Enterprise (CREATE).

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FACTSHEET: AUTONOMOUS VEHICLES

About our research

To allow a fleet of autonomous vehicles to provide Mobility-on-Demand which will complement the existing transportation system, so as to reduce the overall commuting time by solving the "first- and last-mile problem". This solution will thus reduce the traveling time from the starting location (e.g. commuter's house) to the start of the transportation network (e.g. MRT station) and reduce the traveling time from the end of the transportation network to the final destination (e.g. commuter's workplace).

Our research integrates existing technologies with fresh methodologies to allow driverless vehicles to intelligently provide Mobility-on-Demand, with the goal of making this future transportation paradigm a reality.

A fleet of driverless golf buggies is used to demonstrate the Mobility-on-Demand system. To show that the system is also "road-worthy", work is also done on an autonomous electric car.

The SMART autonomous vehicle is a collaborative project between the Singapore-MIT Alliance for Research and Technology (SMART) and NUS; and has been running driverlessly on the NUS campus since 2011.

Mobility-on-Demand

1. Fleet of lightweight Electric Vehicles
2. Strategically distributed charging stations throughout city
3. Solve the "first and last mile" problem of public transit

Advantages of Mobility-on-Demand

1. Does not require fixed infrastructure
2. Fewer vehicles meeting the needs of many
3. Solution to peak hour periods
4. Personalized mobility whenever and wherever you need it
5. Vehicles are better utilized

Autonomous Vehicles

Safety - Traffic accidents are the leading cause of death in the 20-30 year old range. Most accidents occur due to human errors. With automation, the vehicle can perform in the following manner:

1. React quicker
2. Require shorter braking time
3. Has a wider field of view
4. Does not get distracted
5. Is not affected by fatigue
6. Does not drive in an aggressive manner
7. Allows for bad driving behaviours to be corrected easily

Accessibility - Provide mobility to people who cannot, should not, or prefer not to drive (elderly, youth and disabled).

Productivity - "Commodity" driving is a chore that absorbs a large fraction of people's time, which can be better used.

Efficiency/Throughput - Automated vehicles can cooperate to minimize the effects of congestion. Routes can also be planned to minimise energy wastage, i.e. unnecessary braking/acceleration.

Environment - Automated driving can reduce emissions by 20-50%, and efficiently interface with smart power grids.

Better User Experience

1. Routes can be planned to make the ride smoother
2. Users can be doing other things and not worry about road conditions
3. Possible location aware services

Golf Cart Specifications

1. Max speed: 24 km/h
2. Current max. autonomous speed with crowds: 7 km/h
3. Current max. autonomous speed without people: 10 km/h
4. Vehicle localization using laser sensors, and not dependent on GPS
5. Vehicle works well in poor lighting as well as indoors
6. Obstacle detection using laser sensors
7. Real-time path planner
8. Dynamic safety zone

Electric Car Specifications

1. Max speed: 130km/h
2. Current max. autonomous speed on roads: 25 km/h
3. Vehicle localization using laser sensors, and not dependent on GPS
4. Vehicle works well in poor lighting as well as indoors
5. Vehicle works well in moderate rain
6. Obstacle detection using laser sensors
7. Total mileage on a full charge: 100-130 km
8. Time for full charge: 6-8 hours