Driver-less car in high-speed rally assault

November 2 2009, by Rob Gloster

Imagine driving at top speed on a steep, winding mountain pass in the Alps, or the Himalayas, or the Rocky Mountains.

Now, take your hands off the steering wheel and cover your eyes. Or grab a camera and take some pictures of the snowy mountain peaks. Or send a text message to a friend describing the scenery.

You'd skid off the road and plunge into a deep ravine within seconds, right?

Not if a group of graduate students at Stanford University can program the car to drive itself.

The mechanical engineering students are creating an autonomous -- or driverless -- car that they plan to race up and down the treacherous Pikes Peak highway in the Rocky Mountains next year.

The vehicle is the latest creation of a Stanford team, funded in part by Volkswagen, that in recent years has won awards for speed and manoeuvrability in competitions among unmanned cars.

The students say programming a car to run by itself up a curving mountain road is more than simply an engineering exercise -- it's a way of creating and testing safety systems they hope one day will be used in all vehicles.

"If we can design a car that can autonomously go up Pikes Peak, we can

design a car that can take over when a driver falls asleep," said Kirstin Talvala, one of the students.

The car being programmed for the mountain run is an Audi TTS. It has been named "Shelley" in homage to former French rally driver Michele Mouton, who in 1985 became the first woman to win the Pikes Peak race in Colorado.

Shelley would not be the first autonomous car to climb Pikes Peak, a challenging 12.4-mile (20-kilometre) ascent that includes 156 turns and ends more than 14,000 feet (4,300 meters) above sea level.

But those earlier unmanned cars went at about 25 mph (40 kph), while the Stanford team plans to run Shelley -- whose top speed in the desert is 130 mph (208 kph) -- at close to race speed.

Winning drivers in the Pikes Peak International Hill Climb, which has been run each summer since 1916, have come close to breaking the 10-minute mark in recent years.

Japan's Nobuhiro Tajima has won the last four years, while earlier winners have included American Mario Andretti.

Except for a couple of mushroom-like knobs on its roof, Shelley looks just like any white Audi TTS. It has a standard engine that runs on regular fuel, as well as standard brakes and steering systems and a black leather interior.

The big difference is in the trunk, which is filled with computer gear and a 100,000 dollar GPS system.

Shelley's software is developed at Stanford's Dynamic Design Lab, which is run by mechanical engineering professor Chris Gerdes. The lab

looks like a hybrid between a college classroom and a Formula 1 pit garage, with tyres sitting beside laptops. A red Ferrari flag hangs from the ceiling.

Gerdes got his masters in robotics, then became increasingly interested in cars. He rebuilt the engine of his Chevy Cavalier while getting his doctorate in 1996, then worked on heavy trucks for Daimler before joining the Stanford faculty. Gerdes teaches machine design and control systems, and working on car projects has now become his full-time focus.

"In the long term, I think we can look ahead to cars that won't crash. Can we avoid all accidents? That's really where this work is heading," Gerdes said.

"I think it's going to be a big challenge, because people seem to be doing things other than driving in their cars."

The team of four graduate students includes some from a more theoretical background, such as Talvala, but also car enthusiasts such as Krisada Kritayakirana -- a Thai native who grew up dreaming of being a race car driver and then moved into automotive engineering. He got his masters at Cambridge before joining England's Lotus Cars.

He then sold auto parts in Bangkok before coming to Stanford to do his doctorate on vehicle controls.

"Building an autonomous racing car -- how cool is that?" he asked with a huge smile.

Gerdes said Shelley will do its first high-speed tests at Pikes Peak with a driver, so the team can monitor human reactions on the curving road and programme that into the car's software. Then it will be time for the

ultimate test of the autonomous car.

"In my lab, we're really trying to drive at the limits of handling and safety systems. With Shelley, we are looking at what we can do to emulate race car drivers," he said. "There's no room for error. If you don't know what's going to happen, you shouldn't try it, because it's a long way down."

(c) 2009 AFP