

HERE COME THE PODS

The UK is playing a big role in the development of autonomous vehicles. Matt Burt heads to Milton Keynes to find out more



The future has finally arrived, in Milton Keynes at least. Any day now the Lutz Pathfinder, an electric-powered two-seater that is capable of driving autonomously, will start driving trials in the town, sharing the pavements with pedestrians.

The pavements? Yes. Pathfinder will perambulate at a 'brisk walking pace' and has a simple remit: to deliver passengers from Milton Keynes rail station to the town's shopping area via a predetermined route. The project has two overarching goals: to prove that driverless technology can work in real-life environments and to assess how the public reacts to sharing space with autonomous vehicles.

So how can Pathfinder contribute to a low-carbon future? It could reduce the amount of cars trying to access town centres, and free up land space currently given over to car parks. It could also lead to more efficient 'on-demand' journeys, blurring the line between private and public transport and ensuring we use the most efficient methods of travel.

Pathfinder's potential is far-reaching, especially with predictions suggesting that the global autonomous vehicle market could be worth £81bn within 10 years. Not surprisingly, the UK government wants our industry to be well placed to exploit that lucrative market, hence the reason it has been encouraging development.

"It is about setting up the UK as a test bed for companies around the world to come here, use the light-touch regulation there is and bring that investment and innovation into the UK," says Toby Hiles, head of strategy and planning at the Transport Systems Catapult, which is co-ordinating the Pathfinder project. "So the investment comes into the UK because this is a place that is supportive of this technology and supportive of the public and legislative acceptance."

To give the industry a kick-start, in 2014 the government set up a £19 million competition via Innovate UK to encourage delivery of driverless cars to UK roads.

UK Autodrive in Milton Keynes and Coventry (a consortium of local authorities, technology businesses, insurance companies, academic institutions, the likes of Ford, JLR and Tata, as well as the Transport Systems Catapult) was one of three winning bids, and received a portion of the prize fund.

Pathfinder was designed and manufactured by Coventry-based firm RDM. It has a top speed of 15mph, can run for about 40 miles on a single charge and uses an array of stereo cameras, radar and laser-scanners (lidar) to identify obstacles on its route.

The sensor and navigation technology has been developed by the University of Oxford's Mobile Robotics Group. Pathfinder will drive within a pre-mapped environment, using the sensors to work out where it is, rather than GPS-based systems to navigate.

A stipulation of the Innovate UK funding is that the learnings must be accessible, so much of the Pathfinder's technology is open platform, meaning others could adopt it for their own trials.

With public opinion still undecided on the issue of autonomous vehicles, safety is of paramount importance. The Department for Transport recently drew up a code of conduct for the safe operation of driverless vehicles, and Pathfinder will build up to autonomy via a series of controlled tests.

Milton Keynes's forward-thinking local authority worked with the DfT to unlock the legislative barriers that make it possible for Pathfinder to take to the pavements.

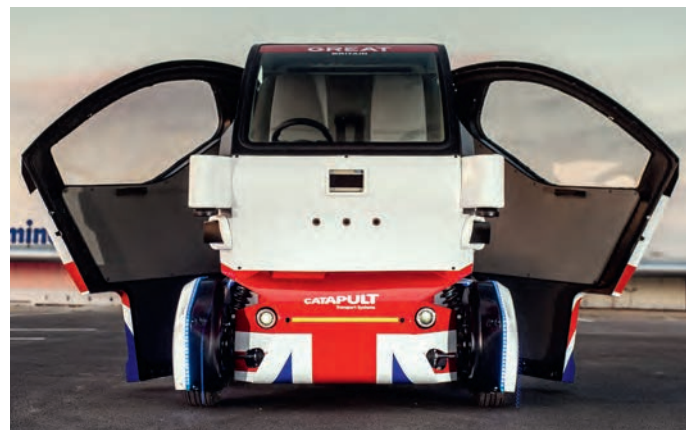
"To be able to test the technology, public acceptance, legislative and insurance issues are collectively a big challenge," says Hiles. "A lot of the technology already exists. It is about how you use that in a practical application, how that's interacting with the public and other less connected or non-autonomous vehicles."

Pathfinder will begin its trials under the control of a trained human driver, using a steering wheel and pedals. That might seem somewhat perverse for →



Pods are fitted with multiple cameras

'Pathfinder will deliver passengers from the rail station to the town's shopping area'



There's room for two occupants; the 'driver' gets a steering wheel and pedals

← such a project, but as well as offering a failsafe, the theory is that seeing a person at the controls will also help the public get used to sharing the pavements with the pods. Every journey – on a short course to begin with – will be recorded and used to check if the safety systems are identifying hazards correctly. Over the course of the project the pod will assume greater responsibility, still with the operator on board.

The vehicle has been ‘over-engineered for safety,’ and as the project progresses the systems will be scaled down as the team ascertains which ones are most effective at helping Pathfinder navigate.

There’s a feeling among project leaders at the Transport Systems Catapult that the vehicle might be ‘like a shy puppy’ when it first drives autonomously, with its cautious systems potentially making it timid when confronted by obstacles. More assertiveness can subsequently be calibrated into the control systems.

The issue of cyber security, and whether the pod could be hacked for subversive means, will be discussed behind-the-scenes, but is “being worked on very hard because it is a huge part of the public acceptance”.

To begin with, pods won’t communicate with each other or the infrastructure, although when the project becomes more widespread larger fleets will exchange information.

Further ahead, it’s possible to envisage driverless vehicles of different shapes and sizes that could ferry patients to hospital, haul freight or provide efficient transport to ageing inhabitants in remote rural areas.

Although Pathfinder is only now taking to the pavements, the next phase in the UK’s driverless cars evolution is already taking shape. Findings from the pod project will be fed into a larger-scale UK Autodrive scheme, which in 2017 will deploy a larger fleet of 40 pods across Milton Keynes, as well as seven ‘regular’ self-driving cars in Coventry.

Pathfinder has to walk before it can run, however, and the results of this year’s initial Milton Keynes trial will provide a fascinating insight into how the public and autonomous vehicles can get along.

Micro machines

The five ‘sticky technologies’ being pursued by the UK’s automotive industry (p14-15) are, roughly, taking current ideas and developing them for a fuel-saving future.

Further improving the efficiency of internal combustion engines, work on making structures lighter and more rigorous management of energy use is being pursued across a wide range of projects under the guidance of the Advanced Propulsion Centre.

However, there’s another project the Low Carbon Vehicle Partnership is looking into: the ‘environmental and economic benefits of L-Category vehicles’. L-Category covers ‘powered two- and three-wheel vehicles, quadricycles and micro cars’.

There are multiple classifications for bikes and mopeds, but the lightweight four-wheelers are known as L6e, an example of which is the G-Wiz.

These vehicles have been widely used in France for many years. Models from Axiom and Ligier typically use 500cc diesel engines with an output capped at around 5.3bhp. Empty, these vehicles typically weigh 350kg and have a top speed of 28mph.

The largest ‘quadricycles’ under the EU regulations (the L7e-C) are called ‘heavy quadrimobiles’. They have a 20bhp rating, a 56mph top speed and a maximum weight of 550kg.

It’s the L7e-Cs that are exciting interest among UK institutions and government,



Student Tong Wu thinks that future EU L-Cat vehicles would also be ideal for crowded Asian mega-cities, and proposes a city commute vehicle for Shanghai

Queen’s Belfast and Warwick.

The authors of the report are aiming to make a case for these smaller vehicles through lower emissions of CO₂ and pollutants, and how they would reduce congestion in built-up areas.

Huw Davies of Cardiff University says that “the pressure on cutting energy consumption, improving local air quality and reducing local congestion means that we should perhaps be looking at downsizing the vehicle itself”.

Davies also thinks that not only should the UK auto industry be looking closely at

Richard Barrett, associate head of Industrial Design at Coventry, says that although there have been a handful of mass-maker L-vehicle future concepts (including the Opel RAKe, Audi Urban Spyder and VW Nils) these cars are still characterised in the UK by the battery powered G-Wiz.

Barrett says that it might be possible to ‘catch’ 16-year-olds with some type of premium L-Vehicle, which might prevent them ever ‘upgrading’ into a full-size conventional car.

“They are ideal for urban and suburban situations,” he says.

‘Coventry University has briefed its Masters students to come up with L-vehicle concepts’

especially as the EU regulations will also require ‘front and rear protective structures... and vehicle structure integrity’, which could push this most niche of transports into the mainstream.

A study into the potential of the L-Category market for the UK automotive industry is being carried out by six universities: Loughborough, Cardiff, Coventry, Oxford Brookes,

being first into what could be a new trend, he believes that the country’s thriving motorsport sector is ideally placed to use its lightweight engineering skills to re-think the heavy quadricycle.

Even while the universities are working on the outline for action, Coventry University has already briefed its Masters students to come up with ideas and concepts for new-generation L-vehicles (as pictured here).

“We will have to overcome a perceived problem of safety with these much smaller vehicles, but we should be able to design L-vehicles that are seen as desirable and aspirational. BMW managed to shrink the idea of what was a ‘premium’ car with the Mini.”

Barrett adds: “We have the capability in the UK to develop such vehicles and even export them to Asia and China.”



Sultan Lohar imagines the two-seat electric L-Car of 2025 would offer more space than a Twizy but have a similar price



Nicholas Lette's M100AD proposed a 'lightweight, low-impact vehicle to service the isolated rural communities of 2035'



Timothy Friar's Transforming Commuter Vehicle is an original take on a motorcycle-style vehicle, but with four wheels for car-like stability



Joscha Wasser says his L-Car was influenced by a year in Paris and the city's Autolib car sharing scheme



Chao Wang's Urban Easy Come Easy Go takes the styling cues of the BMW i3 and translates them into a much smaller vehicle



Paul Raszewski's 2020 C-Zero Cactus takes inspiration from today's conventional Citroën C4 Cactus hatchback