Often seen as futuristic, and maybe a bit silly, robots are already changing urban life.

Over the past couple of weeks, tech news outlets all seem to be talking about one thing – robots in our cities. Some of these are really interesting, and others a bit hype-filled. And then there are those robots that have been quietly transforming the city for decades. So, I thought that now was a good time to talk about some of the autonomous systems that are roaming the urban jungle:

A 20 foot tall Optimus Prime figure stands amidst the Hong Kong skyline at the Transformers movie premier in 2014. Well, actual urban robots don't look QUITE as cool as this. (Image credit: Philippe Lopez/AFP/Getty)

Transport

When it comes to transport, autonomous systems are at various stages of maturity all over the world. Take Copenhagen's metro for example. Its trains are driver-free and the system is run by a fully automated computer, which analyzes terabytes of data in real time and makes decisions based on it. A team of just four people work at the city's Control Centre, acting as backup, and monitoring the system. Copenhagen is not alone either. Specific train lines in Paris, Vancouver, Sao Paulo, Barcelona, London, Singapore, Tokyo, Seoul, and Honolulu also run (at least partially) autonomously. While many concerns have been expressed about driverless train services, they've repeatedly been shown to compare very favorably to those services run by humans.

Of course, driverless cars are continually in the spotlight these days too. I've written about them on multiple occasions (eg1, eg2, eg3), and I'm planning a much bigger feature on them

soon, so I won't go into detail here. But when it comes to transforming the city we live in, few technologies will have a bigger impact.

And then there are Amsterdam's 'ROBOATs', which have been developed by MIT and the Amsterdam Institute for Advanced Metropolitan Solution. Prof Carlo Ratti from MIT said that "This project imagines a fleet of autonomous boats for the transportation of goods and people that can also cooperate to produce temporary floating infrastructure, such as on-demand bridges." The ROBOATs are loaded with environmental sensors too, to measure water and air quality. While they seem like a high-tech PR stunt – and I think they are, a bit – there's a logic to developing systems like ROBOATs. Waterways have long acted as the veins and arteries of a city's cardiovascular system, moving goods to where they are needed. But as our cities have gotten bigger, so too have the boats that carry our goods. Multiple, small craft like these could offer an additional, low-cost way to once again integrate local canals and rivers into the urban landscape.

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ROBOATs will soon be servicing Amsterdam's canals (Image credit: MIT Senseable City Lab)

Logistics

That leads us on to another industry that continues to embrace autonomous technology: freight. A truck automation start-up called Otto (which has just been acquired by Uber) recently completed a 120-mile autonomous beer (well, Budweiser) delivery in Colorado. The truck had a driver – he was needed to drive the roads close to the distribution center and again at the delivery point – but for the highway part of the journey, he sat in the sleeper compartment. Don't believe me? Watch the video.

In Amazon warehouses, 45,000 robots now manage goods (video), with only occasional human input. Their 'small' Kiva robots can move at 5 mph, hauling units that weigh upwards of 300 kg, and large robotic arms can move entire pallets. Amazon employs a lot of people worldwide too – more than 230,000 on last count – but there's no doubt that robots are now central to their business. Other shipping companies are also increasingly moving to autonomous systems – DHL's Toru robot can even take individual items off shelves, which is something that Amazon's robots can't do.

Automation is increasingly common in shipyards too. If you imagine your local port to be full of dockworkers pulling chains and ropes, I'm afraid you are many years out of date. Huge ports such as Rotterdam and Sydney have already moved to fully automated systems on-shore. There, automated straddles – small, box-shaped cranes on wheels – remove containers from trucks and drive them to a pre-specified storage bay, all without human intervention. They navigate using similar technologies to driverless cars, i.e. lasers and radar. Offshore, automation also seems to be calling. Rolls Royce are investing many millions of dollars into developing crewless container ships, referred to as 'ghost ships' by pretty much every journalist who's written about them (including me now!).

There are multiple projects at the other end of the scale too; from Amazon's drones and Starship food deliveries, to Boston Dynamics newest creation, Handle. Whether they'll catch on very much remains to be seen, but for major logistics challenges, we're already totally reliant on robots.

Inspections

Not to freak you out, but crawling and floating robots will soon be exploring subterranean networks in your city. Developed for use in water and sewer pipes, these robots can take images to aid with inspections, as well as measure water quality and pressure, and detect the presence of various gasses. All without a human getting their feet wet. Examples include HiBot's THESBOT and AcePipes's RAFT. Flying drones are already being used to inspect streams and landfills, subsea drones are now on the market, and researchers at the University of Manchester are beginning to develop inspection robots for use on offshore windfarms.

Food

Highly-instrumented, refrigerated shipping containers, nicknamed 'reefers', are a central component in the world's food supply network. They allow fresh produce to be kept at a constant, low temperature, even when it's being shipped to the other side of the globe. Reefers get their electricity from the power supply of the container ship, truck or train they're loaded onto. But all the while, sensors measure the temperature, humidity and air quality inside the reefer. The data is continuously sent via satellite link back to the exporter so that they can be sure their cargo is in peak condition.

In every major food factory in the world, multiple robots manage everything from mixing ingredients and coating chocolate bars to wrapping the final product and barcoding it for shipping. This technology has become so central to food production that multiple TV shows have been made about it, including Food Factory (Canada and US) and Inside the Factory (UK). And perhaps more interesting to those of us on a short lunch break is Sally the salad-making robot. Launched by Chowbotics this month, Sally will be trialed in a series of restaurants and workplace cafeteria in the US later this year. And as we've discussed previously, we are already seeing more use of autonomous systems in farming too.

Security

I'll admit up front that this next topic is the weirdest one for me – the robocops are coming. According to Gulf News, the first police robot will join Dubai Police in May, and officials have said that *"robots will make (up) 25% of the force by 2030."* The exact role that these robots will play is a bit vague (publicly at least) but we know that a touchscreen on the robot's body can be used to report crime and pay fines for traffic violations. RT.com also reported that Dubai Police are working with IBM and Google to add a virtual assistant system to the robot so that it can follow voice commands. It can also scan faces. This is apparently part of a wider move to make the region's police service 'smarter', which includes many more computer-controlled (i.e. unstaffed) police stations.

AnBot performs security checks at Shenzen International Airport (Image credit: People's Daily Online / IC)

In China too, robots are now being rolled out at numerous train stations and airports. A 1.6m tall E-Patrol Robot Sheriff has been on-duty at Zhengzhou East Railway Station in Henan for a month, and it has already used its on-board sensors to detect a small fire. It also has the ability to recognize faces, which lets it "track and follow potential criminals or suspicious people", according to Mashable. This follows the launch of a similar robot, called 'AnBot' at Shenzhen International Airport last year. It uses four on-board cameras to carry out security checks, and official photos show that it is armed with a Taser (or more officially, an "electrically charged riot control tool"). In November, a much cuter robot, called Sanbot was trialed in Gongbei Customs, a huge port on mainland China's border with Macau. It can translate questions in 28 languages and uses a touchscreen, speakers and LEDs to communicate with the public.

While I can totally appreciate the novelty factor of having robots' for tourists to engage with, and I love the idea of mobile environmental sensors roaming busy transport hubs, my issue is with robots as security 'staff'. Good policing is really about building trust with people, especially with those more vulnerable members of society. In my mind, it really needs to maintain a human face in order to do that. So, as cool as they are, maybe in this case, 'smarter' shouldn't equate to 'more robots and fewer humans'.

Regardless of any cynicism I may have for robots as crime-fighters, autonomous systems are already incredibly valuable urban citizens. And if they do eventually rise up, this is my public statement, that, I for one, welcome our robotic overlords :)

* * This article featured small excerpts from my book, *Science and the City.*