Audio file

118946-Science&SocietyRethinkingAutonomousVehicles.mp3

Transcript

Thanks, Martin. Hello, everybody. I am going to be doing something a bit unusual today. I'm going to be talking to you about an area of science and technology, but I'm not a scientist. I'm not a technologist. I'm a sociologist. My department at UCL is the Department of Science and Technology Studies. We are people who are interested in the place of science and technology in society. We think that science and technology are more and more important parts of living in the modern world, and that we should ask important questions about them. And in my case, the thing I'm interested in is helping governments make decisions about science and technology. So that's what I'm going to be doing today, is basically talking about self-driving cars as a sort of case study, as an example of a new technology where a lot of people are excited, some people are concerned. And the question for governments, for society, is what do we do about that technology? I will explain in a bit the various angles that I'm going to come at this from, but crucially, I want you to take part in this lecture. Okay? So I'll be asking you, because this is one of those areas where when it comes to new technologies, there's loads of uncertainty, right? Very few right answers. This is not the sort of, you know, true or false multiple choice type subject. And I want you to give me your thoughts, right? Because a lot of what we do in science and technology studies is done as a conversation. Okay, so this is what I'm going to be doing. I'm going to be covering, let me see, this is too far away. We're going to be covering questions of responsibility when it comes to science and technology. We're going to be looking at some history. We're going to be looking at hype and what we do about hype. And if there's time, we might have a bit of a discussion on ethics and philosophy as it relates to technology. Okay, before we get there, let me just say a bit about who I am. So I've been thinking about self-driving cars for a while. which means that sometimes when journalists want to know about self-driving cars, or at least want somebody to talk to about self-driving cars, I get asked to go on the news. In particular, when something goes wrong, right? And in this class, I'm going to be focusing on what happens when things go wrong. Because my sense as a sociologist is that when things go wrong, we as a society can learn a huge amount, right? So. The first part of this lecture is going to be a sort of whodunit, right? It's going to be a question of responsibility. I'm going to be telling you about a real life incident with warnings that this incident involves a tragic death and it's quite grim. But the reason I'm going to be telling you about that is so that you can help

me talk about questions of responsibility and we can see what we can learn about, uh, from examples like this to inform how we think about the technology. Okay. Um, so this, incident that we're going to be talking about took place in 2018. 2018, quite a few years ago, the technology of self-driving vehicles was very new. There were very few of these things on the roads anywhere in the world. This is a memorial to a woman, Elaine Hertzberg, who was killed by a self-driving vehicle. She was killed while crossing the road in Phoenix, Arizona. And she was the first person, other than some people inside self-driving vehicles, she was the first person, the first bystander to be killed by a self-driving vehicle. Okay, so the question we're gonna ask ourselves is who's responsible, right? Who killed Elaine Hertzberg? I'm just going to give you a few of the details of the case, and you're going to tell me, okay, where you think we should point the finger. So this was the immediate aftermath. This was nighttime, a summer's night in Phoenix, Arizona, a town in the middle of the desert in southern United States of America. This car, you can see, is a normal Volvo, except that it's got a bunch of stuff attached to the top, which are sensors that the company, Uber, who were testing their self-driving vehicles, have added to the car so that the car can see, can sense its surroundings. Okay, so that's why the car looks a little bit unusual. The details of this case are that you can just see a little dent here in the front of the car, where a car smacked into a woman, Elaine Hertzberg, who was walking her bicycle across the road at the time. The car didn't slow down. The car didn't stop. It just went straight into her, and I'm afraid she died almost instantly. right? At about 45 miles an hour, this car ran over Elaine Hertzberg. This was another picture from the police report at the time. I'm giving you a little bit of information. Let me also just give you a map, if that helps you. Okay, so this was From the investigation of the crash afterwards, you can see that's Elaine Hertzberg walking across the road. The car's driving along the road. It was in self-driving mode, right? Doesn't slow down, goes straight into her, kills her. Okay, so where do we look if we're trying to find out who's responsible? What are people's immediate thoughts? And your first tip is that there are multiple possible answers to this question. Go for it.

People are supposed to keep the public safe.

So they're responsible. Which people are you thinking about?

I'm thinking maybe policy deciders, because the fact that something like this is on the road is their fault.

Okay, so thank you, that's a great first answer. One of the people that we might point the finger at, we might ask, why was this car on the road doing this thing at the time? Right? Because somebody allowed it to be, and those people might be policy makers. Yeah? What do you think? I would.

Say that the service provider is also to be blamed, because obviously you initially said that these sound devices were just made. So to put them to the test or to be very risky

putting them into the road is something that should make you accountable as the Uber company.

So Uber the company. Yeah. Okay. So who have we got so far? We've got Uber the company. Uber are the company who are operating the self-driving vehicles. So you're saying we should ask why they are doing what they're doing and whether that was the right way of doing things. And the earlier suggestion was that we might ask questions about the policymakers that allowed the cars on the road. So here's an example of a policymaker. This guy is the governor of Arizona, right? We don't need to worry about who this guy is. This is the governor of Arizona. Okay, the governor of Arizona invited Uber to come and test their cars on the streets of his state, right? Because he thought that it would be a good thing to have this innovative company testing their technology in his state, right? That it would look good for his state and it might bring jobs with it and those sorts of things. Okay, so we have two possible people or groups of people here, who else? There's lots more that we could point to, let's go for you first. And when you say the people, you mean specifically what the scientists, the engineers? the people doing the, if you like, the people behind the technology. So if the company are the company that is operating, we might also look at a particular bit of the company and say, well, what about the scientists, the engineers who are developing the technology, right? The technology that, in your words, should have been able to recognize the obstacle in the road. So this was part of the investigation after the crash, right? And one of the odd things about artificial intelligence systems like this is that it's sometimes really hard to know why they do what they do, right? So it's hard to understand how an AI came to think the way that it thought. In this case, they were able to work out that the system basically had real problems working out what Elaine Hertzberg was. So initially it thought she was a person, then it thought she was a bicycle. And as it tries to classify these things, it got confused and ended up doing nothing, right? In effect, keeping on going. So that would seem to be a big engineering problem, right? An engineering mistake. Good. Who else? Who else might be blamed? What were you going to say?

I think AI will consider that everybody is obeying the traffic rules and it actually consider that maybe the object on the road, it's not a human because the pedestrian should be walking on the pavement.

Right.

So as you can see on the map, the pedestrian was jaywalking.

So the pedestrian was jaywalking, does that mean if you were to point the finger of blame, should we be blaming the pedestrian?

I mean, it's not about blaming her. It's about, it's not totally the company's fault because we are stupid developing the AI.

Yeah. So it's a really interesting point that one of the things that we might look at in this map, we might ask is why she was crossing the road there. So jaywalking, which is crossing the road where you're not supposed to, is not, that's perfectly legal in London, right? You won't get stopped by the police. In America, you can get stopped by the police for jaywalking, right? It is against the law. Elaine Hertzberg here was crossing the road where she shouldn't have. And one of the things, because self-driving vehicles have lots of sensors around them, they also have lots of evidence when something like this happened. So this was the camera right at the front of the car right before the moment that she was hit, right? So she was walking her bike across the road where she shouldn't have been, and the police, their immediate instinct was to say, well, she shouldn't have been there, and she came from nowhere. So actually it would have been difficult for anybody to see Elaine Hertzberg.

Right.

Now, this follows a pattern, a fairly common pattern of what we might call victim blaming, right? It happens quite a lot. It probably happens more in the United States that pedestrians get blamed for being in the wrong place when they are killed by cars. But you also mentioned that the software might have had something programmed into it that meant that the software had found it particularly hard to understand what was going on, right? And actually that exact, so this is rather too small, sorry, this is from the crash investigation, but it found basically exactly that. It found that the engineers had to make their lives easier, basically said, it's only going to be a pedestrian if it's in a pedestrian crossing.

Right.

So because this thing wasn't in a pedestrian crossing, the software had assumed that it wasn't a pedestrian. Which you might think sounds a bit dodgy. Right? Or you might think, well, that's just one of those shortcuts that engineers need to take. Here it says, the system design did not include a consideration for jaywalking pedestrians. Right? So it wasn't able to understand that that's what was in front of it and able to take the action. Who else might we blame? Does it change things if I say that there was a person in the car? If there.

Was a person in the car at the time when he was on auto-silence, it should be his responsibility to.

Look at the road and ensure that nobody's okay. Right. You can just about make that, sorry, these are rather dark. So this was the woman in the car whose job it was to keep her eyes on the road and check that the car was driving safely. And I can sort of tell from your reaction that you think that looks bad because she's not looking at the road, all right? In fact, the crash investigation found that she was looking at her phone while the car was driving along at 45 miles an hour. Now the car was driving itself, it was

supposed to be driving itself. She was there in order to take over if anything went wrong. Does this change things? Yes. So this is what the American legal system thought. They thought, yes, this does change things, right, clearly this woman is to blame. And she is now in jail for the crime of involuntary manslaughter. Now, it was quite interesting, though, the crash investigation didn't blame her. Because the crash investigation said, well, the reason why, I mean, what would we want to know? Because the, I guess the easy thing to do is just to blame her, right? And to say, well, it was her job, and she failed to do her job. Yeah.

Like, I think it still depends, like, as you say, it's At night in summer. Well, so playing with her phone is absolutely not acceptable. But what if she is not looking at her phone? Well, it's still nice, right? It's unexpected. It's unexpected object on the road. So it's very hard to say if she wasn't looking at her phone.

So had she been.

Yeah, she detected.

So one of the questions that we might ask, especially if we're interested in what's new about self-driving cars, is to say, if she was looking at the road or if she was just driving normally, right, would she have been able to see Elaine Hertzberg? Now, right, you can see what sort of road it is. And they did the investigation afterwards and found out that actually, yes, the visibility was fine and any normal driver looking at the road would have been able to stop in time, right? So, yes, but it's an important question to sort out, certainly. Is it enough just to blame her, though? What do you think?

I think we should also blame the people who engineered the sensors. Because, okay, yes, she was jaywalking, but I don't think her jaywalking is the actual issue. What if something else came into the road and it made a pretty nasty dent in the car when it hit the bike? What if it was, I don't know, an animal cross the road, or I don't know, another car, or any other object? The sensors should be programmed to stop if they come in contact with anything like that.

Yeah, I mean, you would, I think that's entirely reasonable, and I think most people would expect, yes, that any relatively safe system was able to understand what a thing in the road was and take evasive action. And maybe to err on the side of caution, right? If you don't know what something is, then maybe it's best to slow down and, or at least slow down, but probably to stop while you work it out, rather than just keep on going. So there might also be sense, now that I think the people who made the censors did actually say this is what They said, so these are the people that make the LIDAR, the laser sensors, right? Laser sensors are actually much better than human eyes, they can see much further. And they said, it's nothing to do with us, right? The LIDAR works perfectly, it's all about the software that makes a decision based on those signals, right? So they said it's nothing to do with us. There was a lot, after this crash, there was

a lot of people saying it's nothing to do with us, right? It's their fault. Um, as you can imagine, right? Um, because, uh, there's a, there's a, there's a dead person, uh, involved here. Um, so for them it was about a, a, a software decision rather than a, uh, a hardware, uh, issue. Is there any, are there any other groups that we might think about when we are trying to work out who's responsible for the death of Elaine Hertzberg? Yeah, at the back.

You said that jaywalking is illegal in the United States. And the United States, most cities in the US are mainly non-walkable cities. So cars are-- car traffic is obviously prioritized in the US. So I don't see anybody to blame other than El herself. Because if she's getting on that road by her owner, then she's accepting the fact to get hit by an object that is obviously applied to the speed limits.

Yeah, so there is, I mean, it's a fairly brutal argument, but it's an argument to say that if you do what she did, you are taking your life into your own hands, you need to know the risks. I think that argument does change if you consider what would have happened had a human driver seen Elaine Hertzberg, right? They would have stopped. Every human driver would have stopped. They wouldn't have just carried on going, crashed into her, killed her, and said it's her own fault.

Right.

So that, I mean, the argument is a bit more complicated, but where you started that argument was very, very interesting, which is to say that in the United States, the balance of power between pedestrians and cars does mean that if you're a pedestrian, you are putting yourself at more risk, which is a really interesting, it's quite a difficult position, but it means that one of the things that we should look at in the event of a crash like this, is not just what happens in the seconds before the crash, but also what are the conditions around it. Right? Why is the car going at 45 miles an hour? Why are there so many lanes on this road going through a city? Why are there no places for pedestrians to cross the road? And one of the issues that the crash investigation looked at was also the road itself, right? The town of Phoenix, Arizona is known to be very hostile if you're a pedestrian. It's very car friendly, one of the most car friendly places in the world. It's a very difficult place to be a pedestrian. This sign, for example, saying no walking across the road is turned the wrong way. So there's Elaine Hertzberg was walking along here, didn't see that sign and set off, right? And Phoenix, Arizona has one of the worst pedestrian death rates in the United States. So one of the things that we should think about is about the balance of power that is built into the environment as well, right? So in science and technology studies, we talk a lot about infrastructure. We talk a lot about why places look the way that they do. We take infrastructure for granted, but those of you that have come from cities outside London will know that London looks different from where you're from, right? All cities do look different. And you can, one of the ways that you can look at infrastructure is by looking at, well, who has the power in

this particular arrangement? Is it cyclists? Is it drivers? Is it pedestrians? Is it buses? Right? There is a battle constantly going on on city streets. I think we've got almost every possible-- have we missed anybody? Anybody that we might think about when we're asking who killed Elaine Hertzberg? Yeah.

I think it's obvious by now to say urban planners as well.

Urban planners, right? Because somebody decided that the world should look like this and not like something else. So sometimes in crash investigation, we distinguish between those sorts of conditions and what we might call proximate causes. The proximate causes are what happened in the seconds beforehand, but there might be all sorts of other things that are causes that we might also want to take into account, but also we might want to learn from, right? The crucial thing is that we might want to understand how things are the way that they are and try and avoid these things happening in the future. And that's what crash investigators are trying to do. Right, the lawyers might come in and say, we need somebody to blame, somebody needs to be sued, and money needs to change hands, right? And that did happen in this case. So Uber took some responsibility. They paid the family of Elaine Hertzberg a figure, but we don't know what that figure was because that was all done in private. The crash investigators want us, rather than hushing it and keep pushing it under the rug, right, they want us to learn from this so that we don't make these mistakes again. And that's the crucial thing. But it means that there isn't one right answer to the question of who killed Elaine Hertzberg, right? These things are complicated. There are new technologies involved. New technologies are always incomplete, right? They're always flawed. Mistakes do happen. But there are also people. There are people involved at all parts of the system, and the interactions between the technologies and the people can contribute to the sorts of risks that we see. So the sorts of questions that I'm interested in, in terms of how we might learn from this sort of crash, are not just who gets the blame, but who should get the blame. What would it mean to be more responsible in this case if you are, say, Uber, or if you're the policymakers trying to make decisions about this? And we might have a set of other questions that are basically sociological questions about how we think about technology. Now, fast forward a few years, where are we? are now in a situation where for some people in some parts of the world, self-driving vehicles have become a sort of everyday occurrence. Has anybody been to San Francisco in the last couple of years? Yes? Have you seen some of these things?

I drew this car in LA.

You had a go in one, did you? Yeah, brilliant. So these things, Right? If you'd told me 10 years ago that we would be in a situation where you had cars, and when you were in your car, it didn't have anybody behind, so nobody was behind the wheel. So that's amazing. If you'd told me that you would have, in difficult cities like San Francisco and Los Angeles, cars moving around the city with nobody behind the wheel, right, that

would have seemed pretty magical. But this is now, for some people in some places, a reality. A month ago, the British government announced that it wanted Waymo to come to London. So we might see in the coming year these things appearing on the streets of London. One of the things that I do is that I'm a member of the government's expert committee on self-driving cars. And it's our job to work out what the rules should be so that when these cars do come to London, the way that they are put onto the streets is more responsible, and we try and reduce the risks, increase the benefits. There is a small company called Wave that is already testing its vehicles in London. Waymo are a much, much bigger company, and they now have hundreds, thousands of vehicles. The fact that they have lots of vehicles has also meant that they now have a huge amount of data which they use to claim that their self-driving vehicles are much, much, much safer than human-driven vehicles, right? So this is from a recent paper that came out last year that says the green bars are what are how many events human beings get involved in when they're driving. The blue bars are how many events Waymo cars get involved in when they are driving. And you can see different sort of categories of incidents. And Waymo would claim that their cars are, on average, much safer, right? Which would seem to be a good thing, but we might still ask, how safe is safe enough, right? How much risk is society willing to take when it comes to the risks of self-driving cars relative to the risks of human-driven cars? Right, it's a really interesting balancing act that for policy makers, right, they have to decide those levels of acceptable risk, recognizing that human-driven cars are a massively beneficial technology, right, but they are also massively risky. London is one of the safest cities in the world in terms of cars, right? But around the world, how many people die every year as a result of that technology, as a result of cars? Who wants to have a guess? The total death rate from cars every year in the world. What do we think? 10,000? 100,000. 100,000. 10 million. 10 million is big, but it's not ridiculously big. The actual answer is 1.2 million, right? 1.2 million people every year. die as a result of the technology that is the motorcar. Yes, there are a lot of motorcars, and yes, those have a lot of benefits, but that is a big public health problem, right? So, the self-driving car companies say, our vehicles have got really good, and they don't get drunk, they don't get distracted, they're always looking at the road, and now that they work, because we've learned our lessons, we can make things much safer. Which doesn't mean that they're perfect, right? One of the things that we've seen in American cities as these things move out is that Self-driving vehicles engage in all sorts of activity that might not be catastrophically dangerous, but might be annoying, right? So they might make mistakes, they might come to a stop in the middle of a junction, they might drive the wrong way down a street and then have to reverse. They might block up traffic and generally make a nuisance of themselves. And it means that for some people, Some people really don't like self-driving cars. This is, right? We have no idea why this guy is attacking a self-driving car with a hammer. Right? But technologies do incite forms of opposition. And you can think about why people might be opposed to this technology. Right? I mean, maybe this guy just wanted to smash

something up, and the self-driving car was the first thing, and had it been a car, or a, you know, a trailer, or somebody's window. It might have been exactly the same situation. But there might be reasons why people are opposed. There might also be incidents that are that get public attention, even though they're not nearly so dramatic as the case that I started with. So this is the case of a Waymo a month ago that ran over a very famous cat. This is a cat in San Francisco whose name apparently is Kit Kat and belonged to a shop. And Kit Kat got killed by, ran out in front of one of these things which didn't have time to see it or stop, killed it, and a lot of people in the local community have gathered to say how disastrous this is, right? The reality of technologies in society is that their introduction and their scaling up is complicated, right? It's messy. People who make new technologies don't necessarily anticipate that people are going to get really, really concerned about the death of a cat. But this is the reality. Now, if we want to understand self-driving cars, the other thing that we can think about is we can try and understand their history, right? We can try and understand where they came from. This might help us to understand where they might go next. It might help us to understand why the people that are developing the technology want to develop the the technology. And so we can think back to the history of self-driven cars, right? So this, if you ask a self-driving car company, where did things begin, they might point to this. This is a competition that was organized by the American government in 2007, and it was basically a sort of race. They said, we're going to put some robot cars in a fake town in America, right? A town without any pedestrians, without anything in the way. And the car that wins the race by being able to drive around the town, we'll get a prize. And what you can see is a few of these cars crashing into each other, right? Mostly at low speed. But in this case, a few of the cars did complete the track. And lots of the people that were in the winning teams went on to create the company that became Waymo. Right, so this was the early days of innovation in this area. And what it's showing you is that the robots didn't work very well, but then they got good really, really quickly. And then Google, a few years later, started driving their self-driving cars in California, but didn't tell anybody. Right, so they were doing this in secret until A New York Times journalist found out about it in 2010 and it went public. But this was still only 15 years ago. So we're talking about pretty rapid, pretty rapid innovation. However, when tech companies tell us a story, their own history, right? we shouldn't necessarily believe them. We should think about whether there are other histories that we might tell. So the story that's going on in this example, sorry, is a story of artificial intelligence in action. This is, you know, this is basically dropping a computer into a car, taking out a human driver, putting in a computer, and isn't this amazing? This is a display of computer driving that seems to be really, really impressive. One other thing that we can do is go back much further and look at how cars in the past imagined self-driving technology. So this is an advert from 1956. This is the company General Motors, still around, imagining what the world would look like in 1976. And what you can see is this technology has its own lane, which is quite interesting, right? So this is a technology

that is built around its own infrastructure. Another thing that you can see is that even though the technology is really advanced, right, the social roles are exactly as they were in 1956. You've got a man and his son at the front. You've got two women in the back of the car. So the man, even though he's not driving, is still in the driving seat because that was what was expected of men in the 1950s. For some reason, this car also has an ice cream maker, right? But this was how the future of self-driving was imagined by car companies in the 1950s. And the ideas go back even earlier. So this is General Motors imagining a similar sort of thing in the 1930s. But what they're doing is imagining the whole world being rebuilt so that robots could drive in it, right? Because this was a different time, this was a time of technological optimism, but also it was a time when America was rebuilding its roads. It had a national highway program that was building roads across the whole country. So it seemed possible to think about building infrastructure for self-driving vehicles. Now we're in a very different time where America has basically stopped spending money on rebuilding roads. And so if you're an AI company, you sort of think, well, we've got to deal with the roads as they are, right? We can't expect the roads to be rebuilt around us. But if we're interested in what transport might look like in the future, history can be a very, very useful guide. So this is San Francisco. In 1906, I think, 1906, roundabout there. It was before a big earthquake anyway, destroyed quite a lot of the buildings in the middle of San Francisco. What can you see in this...

The camera is actually attached to what we would in this country call a tram, going along the main street. It also looks like chaos, right? It's messy, it's dangerous, it's slow. And one of the questions that we can ask is what happened after this? This is a situation of sort of shared space where you have different forms of transport using the road together. One of the things that happened after this film was made is that the motor car, people who made motor cars very successfully campaigned for their technology to take precedence over other forms of transport, right? So afterwards, American cities were basically redesigned around the motor car. which meant getting rid of trams. It meant telling pedestrians to keep the sidewalks. It meant the creation of jaywalking as a misdemeanor. Jaywalking did not exist at all this time. And there were public campaigns to get people off the roads, to embarrass people by telling them that they were jaywalkers, to get people off the roads and onto the sidewalks. Horses that were previously allowed on roads were told to keep clear. And that had benefits for people who were in cars, right? For people who were driving, people who wanted to get from A to B and get there pretty quickly, this had enormous benefits. It also led to the creation of some unintended consequences, right? As technologies always do. Cities after this time became extremely car dependent, right? This is Los Angeles a few years ago, pretty much this time of year because it was Thanksgiving, one of the biggest traveling weekends of the year in the United States. And what you can see is a city built around the motor car, right, in which Yes, lots of people are going from A to B in the motor car. If

you don't own a car in that environment, it becomes very hard to get by, right? This is a car dependent place. It also created the unintended consequence of traffic, a collective action problem in which lots of people, all wanting to do the same thing, creates a problem of traffic which slows down everybody. Right? It becomes a classic unintended consequence of a very, very successful, very successful technology. So let's just start wrapping up. When we're thinking about what self-driving cars might mean for the future of transport, for the future of cities, and the future of our society, we might ask questions about risk. Right. How can we ensure that the technology is safe and can we trust companies on their own to deliver that safety? Or does there need to be government involvement? But we also might ask questions about what happens if and when this technology is amazingly successful, right? If the technology does what it's intended to do, what sort of issues might that create for society? Is a world of self-driving vehicles a world that we want to live in? Does it solve some of our problems? Perhaps. But then does it cause other problems? Well, perhaps also, you might end up rebuilding the world around self-driving vehicles and then realising the problems with that only in hindsight. So I'll finish up there. Thank you all very much for you for listening and for participating briefly. I really enjoyed it. Thanks.

Audio file

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Transcript

00:00:00 Speaker 1

Thanks, Martin.

00:00:02 Speaker 1

Hello, everybody.

00:00:04 Speaker 1

I am going to be doing something a bit unusual today.

00:00:09 Speaker 1

I'm going to be talking to you about an area of science and technology, but I'm not a scientist.

00:00:16 Speaker 1

I'm not a technologist.

00:00:18 Speaker 1

I'm a sociologist.

00:00:20 Speaker 1

My department at UCL is the Department of Science and Technology Studies.

00:00:25 Speaker 1

We are people

00:00:27 Speaker 1

who are interested in the place of science and technology in society.

00:00:32 Speaker 1

We think that science and technology are more and more important parts of living in the modern world, and that we should ask important questions about them.

00:00:45 Speaker 1

And in my case, the thing I'm interested in is helping governments make decisions about science and technology.

00:00:56 Speaker 1

So that's what I'm going to be doing today, is basically talking about self-driving cars as a sort of case study, as an example of a new technology where a lot of people are excited, some people are concerned.

00:01:14 Speaker 1

And the question for governments, for society, is what do we do about that technology?

00:01:22 Speaker 1

I will explain in a bit

00:01:26 Speaker 1

the various angles that I'm going to come at this from, but crucially, I want you to take part in this lecture.

00:01:36 Speaker 1

Okay?

00:01:37 Speaker 1

So I'll be asking you, because this is one of those areas where when it comes to new technologies, there's loads of uncertainty, right?

00:01:47 Speaker 1

Very few right answers.

00:01:49 Speaker 1

This is not the sort of, you know, true or false multiple choice type subject.

00:01:56 Speaker 1

And I want you to give me your thoughts, right?

00:02:00 Speaker 1

Because a lot of what we do in science and technology studies is done as a conversation.

00:02:06 Speaker 1

Okay, so this is what I'm going to be doing.

00:02:08 Speaker 1

I'm going to be covering, let me see, this is too far away.

00:02:12 Speaker 1

We're going to be covering questions of responsibility when it comes to science and technology.

00:02:20 Speaker 1

We're going to be looking at some history.

00:02:23 Speaker 1

We're going to be looking at hype and what we do about hype.

00:02:30 Speaker 1

And if there's time, we might have a bit of a discussion on ethics and philosophy as it relates to technology.

00:02:38 Speaker 1

Okay, before we get there, let me just say a bit about who I am.

00:02:44 Speaker 1

So I've been thinking about self-driving cars for a while.

00:02:52 Speaker 1

which means that sometimes when journalists want to know about self-driving cars, or at least want somebody to talk to about self-driving cars, I get asked to go on the news.

00:03:06 Speaker 1

In particular, when something goes wrong, right?

00:03:11 Speaker 1

And in this class, I'm going to be focusing on what happens when things go wrong.

00:03:17 Speaker 1

Because my sense as a sociologist is that when things go wrong, we as a society can learn a huge amount, right?

00:03:28 Speaker 1

So.

00:03:32 Speaker 1

The first part of this lecture is going to be a sort of whodunit, right?

00:03:38 Speaker 1

It's going to be a question of responsibility.

00:03:42 Speaker 1

I'm going to be telling you about a

00:03:45 Speaker 1

real life incident with warnings that this incident involves a tragic death and it's quite grim.

00:03:56 Speaker 1

But the reason I'm going to be telling you about that is so that you can help me talk about questions of responsibility and we can see what we can learn about, uh, from examples like this to inform how we think about the technology.

00:04:11 Speaker 1

Okay.

00:04:11 Speaker 1

Um, so this,

00:04:15 Speaker 1

incident that we're going to be talking about took place in 2018.

00:04:20 Speaker 1

2018, quite a few years ago, the technology of self-driving vehicles was very new.

00:04:27 Speaker 1

There were very few of these things on the roads anywhere in the world.

00:04:31 Speaker 1

This is a memorial to a woman, Elaine Hertzberg, who was killed by a self-driving vehicle.

00:04:41 Speaker 1

She was

00:04:43 Speaker 1

killed while crossing the road in Phoenix, Arizona.

00:04:48 Speaker 1

And she was the first person, other than some people inside self-driving vehicles, she was the first person, the first bystander to be killed by a self-driving vehicle.

00:05:01 Speaker 1

Okay, so the question we're gonna ask ourselves is who's responsible, right?

00:05:06 Speaker 1

Who killed Elaine Hertzberg?

00:05:10 Speaker 1

I'm just going to give you a few of the details of the case, and you're going to tell me, okay, where you think we should point the finger.

00:05:22 Speaker 1

So this was the immediate aftermath.

00:05:26 Speaker 1

This was nighttime, a summer's night in Phoenix, Arizona, a town in the middle of the desert in southern

00:05:38 Speaker 1

United States of America.

00:05:40 Speaker 1

This car, you can see, is a normal Volvo, except that it's got a bunch of stuff attached to the top, which are sensors that the company, Uber, who were testing their self-driving vehicles, have added to the car so that the car can see, can sense its surroundings.

00:06:02 Speaker 1

Okay, so that's why the car looks

00:06:04 Speaker 1

a little bit unusual.

00:06:06 Speaker 1

The details of this case are that you can just see a little dent here in the front of the car, where a car smacked into a woman, Elaine Hertzberg, who was walking her bicycle across the road at the time.

00:06:22 Speaker 1

The car didn't slow down.

00:06:24 Speaker 1

The car didn't stop.

00:06:28 Speaker 1

It just went straight into her, and I'm afraid she died almost instantly.

00:06:33 Speaker 1

right?

00:06:34 Speaker 1

At about 45 miles an hour, this car ran over Elaine Hertzberg.

00:06:42 Speaker 1

This was another picture from the police report at the time.

00:06:48 Speaker 1

I'm giving you a little bit of information.

00:06:51 Speaker 1

Let me also just give you a map, if that helps you.

00:06:56 Speaker 1

Okay, so this was

00:06:59 Speaker 1

From the investigation of the crash afterwards, you can see that's Elaine Hertzberg walking across the road.

00:07:06 Speaker 1

The car's driving along the road.

00:07:09 Speaker 1

It was in self-driving mode, right?

00:07:14 Speaker 1

Doesn't slow down, goes straight into her, kills her.

00:07:18 Speaker 1

Okay, so where do we look if we're trying to find out who's responsible?

00:07:25 Speaker 1

What are people's immediate thoughts?

00:07:27 Speaker 1

And your first tip is that there are multiple possible answers to this question.

00:07:34 Speaker 1

Go for it.

00:07:35 Speaker 2

People are supposed to keep the public safe.

00:07:40 Speaker 1

So they're responsible.

00:07:42 Speaker 1

Which people are you thinking about?

00:07:43 Speaker 2

I'm thinking maybe policy deciders, because the fact that something like this is on the road is their fault.

00:07:50 Speaker 1

Okay, so thank you, that's a great first answer.

00:07:55 Speaker 1

One of the people that we might point the finger at, we might ask, why was this car on the road doing this thing at the time?

00:08:03 Speaker 1

Right?

00:08:04 Speaker 1

Because somebody allowed it to be, and those people might be policy makers.

00:08:10 Speaker 1

Yeah?

00:08:12 Speaker 1

What do you think?

00:08:12 Speaker 1

I would.

00:08:13 Speaker 3

Say that the service provider is also to be blamed, because obviously you initially said that these sound devices were just made.

00:08:20 Speaker 3

So to put them to the test or to be very risky putting them into the road is something that should make you accountable as the Uber company.

00:08:29 Speaker 1

So Uber the company.

00:08:31 Speaker 1

Yeah.

00:08:31 Speaker 1

Okay.

00:08:32 Speaker 1

So who have we got so far?

00:08:34 Speaker 1

We've got Uber the company.

00:08:37 Speaker 1

Uber are the company who are operating the self-driving vehicles.

00:08:41 Speaker 1

So you're saying we should ask why they

00:08:47 Speaker 1

are doing what they're doing and whether that was the right way of doing things.

00:08:53 Speaker 1

And the earlier suggestion was that we might ask questions about the policymakers that allowed the cars on the road.

00:09:02 Speaker 1

So here's an example of a policymaker.

00:09:05 Speaker 1

This guy is the governor of Arizona, right?

00:09:10 Speaker 1

We don't need to worry about who this guy is.

00:09:12 Speaker 1

This is the governor of Arizona.

00:09:15 Speaker 1

Okay, the governor of Arizona invited Uber to come and test their cars on the streets of his state, right?

00:09:25 Speaker 1

Because he thought that it would be a good thing to have this innovative company testing their technology in his state, right?

00:09:33 Speaker 1

That it would look good for his state and it might bring jobs with it and those sorts of things.

00:09:37 Speaker 1

Okay, so we have two possible people or groups of people here, who else?

00:09:44 Speaker 1

There's lots more that we could point to, let's go for you first.

00:09:53 Speaker 1

And when you say the people, you mean specifically what the scientists, the engineers?

00:10:04 Speaker 1

the people doing the, if you like, the people behind the technology.

00:10:08 Speaker 1

So if the company are the company that is operating, we might also look at a particular bit of the company and say, well, what about the scientists, the engineers who are developing the technology, right?

00:10:19 Speaker 1

The technology that, in your words, should have been able to recognize the obstacle in the road.

00:10:24 Speaker 1

So this was part of the investigation after the crash, right?

00:10:28 Speaker 1

And one of the odd things about artificial intelligence systems like this

00:10:34 Speaker 1

is that it's sometimes really hard to know why they do what they do, right?

00:10:41 Speaker 1

So it's hard to understand how an AI came to think the way that it thought.

00:10:48 Speaker 1

In this case, they were able to work out that the system basically had real problems working out what Elaine Hertzberg was.

00:10:59 Speaker 1

So initially it thought she was a

00:11:02 Speaker 1

person, then it thought she was a bicycle.

00:11:05 Speaker 1

And as it tries to classify these things, it got confused and ended up doing nothing, right?

00:11:10 Speaker 1

In effect, keeping on going.

00:11:13 Speaker 1

So that would seem to be a big engineering problem, right?

00:11:16 Speaker 1

An engineering mistake.

00:11:21 Speaker 1

Good.

00:11:22 Speaker 1

Who else?

00:11:26 Speaker 1

Who else might be blamed?

00:11:27 Speaker 1

What were you going to say?

00:11:29 Speaker 4

I think AI will consider that everybody is obeying the traffic rules and it actually consider that maybe the object on the road, it's not a human because the pedestrian should be walking on the pavement.

00:11:46 Speaker 1

Right.

00:11:47 Speaker 4

So as you can see on the map, the pedestrian was jaywalking.

00:11:51 Speaker 1

So the pedestrian was jaywalking, does that mean

00:11:57 Speaker 1

if you were to point the finger of blame, should we be blaming the pedestrian?

00:12:01 Speaker 4

I mean, it's not about blaming her.

00:12:03 Speaker 4

It's about, it's not totally the company's fault because we are stupid developing the AI.

00:12:10 Speaker 1

Yeah.

00:12:11 Speaker 1

So it's a really interesting point that one of the things that we might look at in this map, we might ask is why she was crossing the road there.

00:12:22 Speaker 1

So jaywalking, which is crossing the road where you're not supposed to,

00:12:26 Speaker 1

is not, that's perfectly legal in London, right?

00:12:30 Speaker 1

You won't get stopped by the police.

00:12:32 Speaker 1

In America, you can get stopped by the police for jaywalking, right?

00:12:37 Speaker 1

It is against the law.

00:12:40 Speaker 1

Elaine Hertzberg here was crossing the road where she shouldn't have.

00:12:46 Speaker 1

And one of the things, because self-driving vehicles have lots of sensors around them, they also have lots of evidence when

00:12:55 Speaker 1

something like this happened.

00:12:56 Speaker 1

So this was the camera right at the front of the car right before the moment that she was hit, right?

00:13:04 Speaker 1

So she was walking her bike across the road where she shouldn't have been, and the police, their immediate instinct was to say, well, she shouldn't have been there, and she came from nowhere.

00:13:18 Speaker 1

So actually it would have been difficult for anybody to see Elaine Hertzberg.

00:13:25 Speaker 5

Right.

00:13:25 Speaker 1

Now, this follows a pattern, a fairly common pattern of what we might call victim blaming, right?

00:13:32 Speaker 1

It happens quite a lot.

00:13:32 Speaker 1

It probably happens more in the United States that pedestrians get blamed for being in the wrong place when they are killed by cars.

00:13:52 Speaker 1

But you also mentioned

00:13:55 Speaker 1

that the software might have had something programmed into it that meant that the software had found it particularly hard to understand what was going on, right?

00:14:11 Speaker 1

And actually that exact, so this is rather too small, sorry, this is from the crash investigation, but it found basically exactly that.

00:14:19 Speaker 1

It found that the engineers had

00:14:23 Speaker 1

to make their lives easier, basically said, it's only going to be a pedestrian if it's in a pedestrian crossing.

00:14:30 Speaker 5

Right.

00:14:31 Speaker 1

So because this thing wasn't in a pedestrian crossing, the software had assumed that it wasn't a pedestrian.

00:14:37 Speaker 1

Which you might think sounds a bit dodgy.

00:14:42 Speaker 1

Right?

00:14:43 Speaker 1

Or you might think, well, that's just one of those shortcuts that engineers need to take.

00:14:47 Speaker 1

Here it says, the system design did not include a consideration for jaywalking pedestrians.

00:14:54 Speaker 1

Right?

00:14:55 Speaker 1

So it wasn't able to understand that that's what was in front of it and able to take the action.

00:15:03 Speaker 1

Who else might we blame?

00:15:05 Speaker 1

Does it change things if I say that there was a person in the car?

00:15:08 Speaker 1

If there.

00:15:10 Speaker 3

Was a person in the car at the time when he was on auto-silence, it should be his responsibility to.

00:15:16 Speaker 1

Look at the road and ensure that nobody's okay.

00:15:20 Speaker 1

Right.

00:15:25 Speaker 1

You can just about make that, sorry, these are rather dark.

00:15:30 Speaker 1

So this was the woman in the car whose job it was to keep her eyes on the road and check that the car was driving safely.

00:15:42 Speaker 1

And I can sort of tell from your reaction that you think that looks bad because she's not looking at the road, all right?

00:15:49 Speaker 1

In fact, the crash investigation found that she was looking

00:15:53 Speaker 1

at her phone while the car was driving along at 45 miles an hour.

00:15:58 Speaker 1

Now the car was driving itself, it was supposed to be driving itself.

00:16:02 Speaker 1

She was there in order to take over if anything went wrong.

00:16:09 Speaker 1

Does this change things?

00:16:10 Speaker 1

Yes.

00:16:13 Speaker 1

So this is what the American legal system thought.

00:16:15 Speaker 1

They thought, yes, this does change things, right, clearly this woman is to blame.

00:16:21 Speaker 1

And she is now in jail for the crime of involuntary manslaughter.

00:16:29 Speaker 1

Now, it was quite interesting, though, the crash investigation didn't blame her.

00:16:34 Speaker 1

Because the crash investigation said, well, the reason why, I mean, what would we want to know?

00:16:40 Speaker 1

Because the, I guess the easy thing to do is just to blame her, right?

00:16:43 Speaker 1

And to say, well, it was her job, and she failed to do her job.

00:16:46 Speaker 1

Yeah.

00:16:46 Speaker 4

Like, I think it still depends, like, as you say, it's

00:16:51 Speaker 4

At night in summer.

00:16:53 Speaker 4

Well, so playing with her phone is absolutely not acceptable.

00:16:59 Speaker 4

But what if she is not looking at her phone?

00:17:03 Speaker 4

Well, it's still nice, right?

00:17:05 Speaker 4

It's unexpected.

00:17:07 Speaker 4

It's unexpected object on the road.

00:17:10 Speaker 4

So it's very hard to say if she wasn't looking at her phone.

00:17:15 Speaker 1

So had she been.

00:17:16 Speaker 4

Yeah, she detected.

00:17:21 Speaker 1

So one of the questions that we might ask, especially if we're interested in what's new about self-driving cars, is to say, if she was looking at the road or if she was just driving normally, right, would she have been able to see Elaine Hertzberg?

00:17:35 Speaker 1

Now, right, you can see what sort of road it is.

00:17:38 Speaker 1

And they did the investigation afterwards and found out that actually, yes, the visibility was fine and any normal driver looking at the road would have been able to stop in time, right?

00:17:50 Speaker 1

So, yes, but it's an important question to sort out, certainly.

00:17:57 Speaker 1

Is it enough just to blame her, though?

00:18:01 Speaker 1

What do you think?

00:18:01 Speaker 6

I think we should also blame the people who engineered the sensors.

00:18:06 Speaker 6

Because, okay, yes, she was jaywalking, but I don't think her jaywalking is the actual issue.

00:18:11 Speaker 6

What if something else came into the road and it made a pretty nasty dent in the car when it hit the bike?

00:18:16 Speaker 6

What if it was, I don't know, an animal cross the road, or I don't know, another car, or any other object?

00:18:24 Speaker 6

The sensors should be programmed to stop if they come in contact with anything like that.

00:18:29 Speaker 1

Yeah, I mean, you would, I think that's entirely reasonable, and I think most people would expect, yes, that any relatively safe system was able to understand

00:18:42 Speaker 1

what a thing in the road was and take evasive action.

00:18:46 Speaker 1

And maybe to err on the side of caution, right?

00:18:49 Speaker 1

If you don't know what something is, then maybe it's best to slow down and, or at least slow down, but probably to stop while you work it out, rather than just keep on going.

00:19:03 Speaker 1

So there might also be sense, now that I think the people who made the censors did actually say this is what

00:19:11 Speaker 1

They said, so these are the people that make the LIDAR, the laser sensors, right?

00:19:16 Speaker 1

Laser sensors are actually much better than human eyes, they can see much further.

00:19:21 Speaker 1

And they said, it's nothing to do with us, right?

00:19:24 Speaker 1

The LIDAR works perfectly, it's all about the software that makes a decision based on those signals, right?

00:19:31 Speaker 1

So they said it's nothing to do with us.

00:19:33 Speaker 1

There was a lot, after this crash, there was a lot of people saying it's nothing to do with us, right?

00:19:37 Speaker 1

It's their fault.

00:19:39 Speaker 1

Um, as you can imagine, right?

00:19:41 Speaker 1

Um, because, uh, there's a, there's a, there's a dead person, uh, involved here.

00:19:46 Speaker 1

Um, so for them it was about a, a, a software decision rather than a, uh, a hardware, uh, issue.

00:19:55 Speaker 1

Is there any, are there any other groups that we might think about when we are trying to work out who's responsible for the death of Elaine Hertzberg?

00:20:07 Speaker 1

Yeah, at the back.

00:20:11 Speaker 2

You said that jaywalking is illegal in the United States.

00:20:15 Speaker 2

And the United States, most cities in the US are mainly non-walkable cities.

00:20:23 Speaker 2

So cars are-- car traffic is obviously prioritized in the US.

00:20:27 Speaker 2

So I don't see anybody to blame other than El herself.

00:20:34 Speaker 2

Because if she's getting on that road by her owner, then she's accepting the fact to get hit by an object that is obviously applied to the speed limits.

00:20:46 Speaker 1

Yeah, so there is, I mean, it's a fairly brutal argument, but it's an argument to say that if you do what she did, you are taking your life into your own hands, you need to know the risks.

00:21:04 Speaker 1

I think that argument does change if you consider what would have happened had a human driver seen Elaine Hertzberg, right?

00:21:13 Speaker 1

They would have stopped.

00:21:15 Speaker 1

Every human driver would have stopped.

00:21:17 Speaker 1

They wouldn't have just carried on going, crashed into her, killed her, and said it's her own fault.

00:21:22 Speaker 5

Right.

00:21:24 Speaker 1

So that, I mean, the argument is a bit more complicated, but where you started that argument was very, very interesting, which is to say that in the United States, the balance of power between pedestrians and cars does mean that if you're a pedestrian, you are putting yourself at more risk, which is a really interesting, it's quite a difficult position, but it means that one of the things that we should look at

00:21:53 Speaker 1

in the event of a crash like this, is not just what happens in the seconds before the crash, but also what are the conditions around it.

00:22:04 Speaker 1

Right?

00:22:05 Speaker 1

Why is the car going at 45 miles an hour?

00:22:08 Speaker 1

Why are there so many lanes on this road going through a city?

00:22:12 Speaker 1

Why are there no places for pedestrians to cross the road?

00:22:18 Speaker 1

And one of the issues that the crash investigation looked

00:22:22 Speaker 1

at was also the road itself, right?

00:22:28 Speaker 1

The town of Phoenix, Arizona is known to be very hostile if you're a pedestrian.

00:22:36 Speaker 1

It's very car friendly, one of the most car friendly places in the world.

00:22:41 Speaker 1

It's a very difficult place to be a pedestrian.

00:22:43 Speaker 1

This sign, for example, saying no walking across the road is turned the wrong way.

00:22:50 Speaker 1

So there's

00:22:53 Speaker 1

Elaine Hertzberg was walking along here, didn't see that sign and set off, right?

00:22:59 Speaker 1

And Phoenix, Arizona has one of the worst pedestrian death rates in the United States.

00:23:05 Speaker 1

So one of the things that we should think about is about the balance of power that is built into the environment as well, right?

00:23:13 Speaker 1

So in science and technology studies, we talk a lot about infrastructure.

00:23:17 Speaker 1

We talk a lot about why places look the way that they do.

00:23:22 Speaker 1

We take infrastructure for granted, but those of you that have come from cities outside London will know that London looks different from where you're from, right?

00:23:32 Speaker 1

All cities do look different.

00:23:34 Speaker 1

And you can, one of the ways that you can look at infrastructure is by looking at, well, who has the power in this particular arrangement?

00:23:45 Speaker 1

Is it cyclists?

00:23:46 Speaker 1

Is it drivers?

00:23:48 Speaker 1

Is it pedestrians?

00:23:49 Speaker 1

Is it buses?

00:23:50 Speaker 1

Right?

00:23:52 Speaker 1

There is a battle constantly going on on city streets.

00:24:00 Speaker 1

I think we've got almost every possible-- have we missed anybody?

00:24:06 Speaker 1

Anybody that we might think about when we're asking who killed Elaine Hertzberg?

00:24:14 Speaker 1

Yeah.

00:24:14 Speaker 3

I think it's obvious by now to say urban planners as well.

00:24:19 Speaker 1

Urban planners, right?

00:24:24 Speaker 1

Because somebody decided that the world should look like this and not like something else.

00:24:32 Speaker 1

So sometimes in crash investigation, we distinguish between those sorts of conditions and what we might call proximate causes.

00:24:40 Speaker 1

The proximate causes are what happened in the seconds beforehand, but there might be all sorts of other things that are causes that we might also want to

00:24:49 Speaker 1

take into account, but also we might want to learn from, right?

00:24:53 Speaker 1

The crucial thing is that we might want to understand how things are the way that they are and try and avoid these things happening in the future.

00:25:02 Speaker 1

And that's what crash investigators are trying to do.

00:25:07 Speaker 1

Right, the lawyers might come in and say, we need somebody to blame, somebody needs to be sued, and money needs to change hands, right?

00:25:15 Speaker 1

And that did happen in this case.

00:25:17 Speaker 1

So Uber took some responsibility.

00:25:19 Speaker 1

They paid the family of Elaine Hertzberg a figure, but we don't know what that figure was because that was all done in private.

00:25:28 Speaker 1

The crash investigators want us, rather than hushing it and keep pushing it under the rug, right, they want us to learn from this so that we don't make these mistakes again.

00:25:39 Speaker 1

And that's the crucial thing.

00:25:43 Speaker 1

But it means that there isn't one right answer to the question of who killed Elaine Hertzberg, right?

00:25:54 Speaker 1

These things are complicated.

00:25:55 Speaker 1

There are new technologies involved.

00:25:57 Speaker 1

New technologies are always incomplete, right?

00:26:03 Speaker 1

They're always flawed.

00:26:04 Speaker 1

Mistakes do happen.

00:26:06 Speaker 1

But there are also people.

00:26:08 Speaker 1

There are people involved at all parts of the system, and the interactions between the technologies and the people can contribute to the sorts of risks that we see.

00:26:18 Speaker 1

So the sorts of questions that I'm interested in, in terms of how we might learn from this sort of crash, are not just who gets the blame, but who should get the blame.

00:26:31 Speaker 1

What would it mean to be more responsible in this case if you are, say, Uber, or if you're the policymakers trying to make decisions about this?

00:26:42 Speaker 1

And we might have a set of other questions that are basically sociological questions about how we think about technology.

00:26:51 Speaker 1

Now, fast forward a few years, where are we?

00:26:57 Speaker 1

are now in a situation where

00:26:59 Speaker 1

for some people in some parts of the world, self-driving vehicles have become a sort of everyday occurrence.

00:27:09 Speaker 1

Has anybody been to San Francisco in the last couple of years?

00:27:14 Speaker 1

Yes?

00:27:16 Speaker 1

Have you seen some of these things?

00:27:18 Speaker 6

I drew this car in LA.

00:27:22 Speaker 1

You had a go in one, did you?

00:27:24 Speaker 1

Yeah, brilliant.

00:27:26 Speaker 1

So these things,

00:27:27 Speaker 1

Right?

00:27:28 Speaker 1

If you'd told me 10 years ago that we would be in a situation where you had cars, and when you were in your car, it didn't have anybody behind, so nobody was behind the wheel.

00:27:39 Speaker 1

So that's amazing.

00:27:39 Speaker 1

If you'd told me that you would have, in difficult cities like San Francisco and Los Angeles, cars moving around the city with nobody behind the wheel, right, that would have seemed pretty magical.

00:27:53 Speaker 1

But this is now, for some people in some places, a reality.

00:27:58 Speaker 1

A month ago, the British government announced that it wanted Waymo to come to London.

00:28:07 Speaker 1

So we might see in the coming year these things appearing on the streets of London.

00:28:13 Speaker 1

One of the things that I do is that I'm a member of the government's expert committee on self-driving cars.

00:28:20 Speaker 1

And it's our job to work out what the rules should be so that when these cars do come to London,

00:28:29 Speaker 1

the way that they are put onto the streets is more responsible, and we try and reduce the risks, increase the benefits.

00:28:40 Speaker 1

There is a small company called Wave that is already testing its vehicles in London.

00:28:47 Speaker 1

Waymo are a much, much bigger company, and they now have hundreds, thousands of vehicles.

00:28:58 Speaker 1

The fact that they have lots of vehicles has also meant that they now have a huge amount of data which they use to claim that their self-driving vehicles are much, much, much safer than human-driven vehicles, right?

00:29:14 Speaker 1

So this is from a recent paper that came out last year that says the green bars are what are

00:29:26 Speaker 1

how many events human beings get involved in when they're driving.

00:29:30 Speaker 1

The blue bars are how many events Waymo cars get involved in when they are driving.

00:29:36 Speaker 1

And you can see different sort of categories of incidents.

00:29:41 Speaker 1

And Waymo would claim that their cars are, on average, much safer, right?

00:29:47 Speaker 1

Which would seem to be a good thing, but we might still ask,

00:29:55 Speaker 1

how safe is safe enough, right?

00:29:58 Speaker 1

How much risk is society willing to take when it comes to the risks of self-driving cars relative to the risks of human-driven cars?

00:30:12 Speaker 1

Right, it's a really interesting balancing act that for policy makers, right, they have to decide

00:30:23 Speaker 1

those levels of acceptable risk, recognizing that human-driven cars are a massively beneficial technology, right, but they are also massively risky.

00:30:35 Speaker 1

London is one of the safest cities in the world in terms of cars, right?

00:30:41 Speaker 1

But around the world, how many people die every year as a result of that technology, as a result of cars?

00:30:49 Speaker 1

Who wants to have a guess?

00:30:52 Speaker 1

The total death rate from cars every year in the world.

00:30:59 Speaker 1

What do we think?

00:31:03 Speaker 1

10,000?

00:31:05 Speaker 1

100,000.

00:31:06 Speaker 1

100,000.

00:31:09 Speaker 1

10 million.

00:31:11 Speaker 1

10 million is big, but it's not ridiculously big.

00:31:14 Speaker 1

The actual answer is 1.2 million, right?

00:31:18 Speaker 1

1.2 million people every year.

00:31:22 Speaker 1

die as a result of the technology that is the motorcar.

00:31:28 Speaker 1

Yes, there are a lot of motorcars, and yes, those have a lot of benefits, but that is a big public health problem, right?

00:31:35 Speaker 1

So, the self-driving car companies say,

00:31:39 Speaker 1

our vehicles have got really good, and they don't get drunk, they don't get distracted, they're always looking at the road, and now that they work, because we've learned our lessons, we can make things much safer.

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Which doesn't mean that they're perfect, right?

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One of the things that we've seen in American cities as these things move out is that

00:32:05 Speaker 1

Self-driving vehicles engage in all sorts of activity that might not be catastrophically dangerous, but might be annoying, right?

00:32:15 Speaker 1

So they might make mistakes, they might come to a stop in the middle of a junction, they might drive the wrong way down a street and then have to reverse.

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They might block up traffic and generally make a nuisance of themselves.

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And it means that for some people,

00:32:33 Speaker 1

Some people really don't like self-driving cars.

00:32:37 Speaker 1

This is, right?

00:32:39 Speaker 1

We have no idea why this guy is attacking a self-driving car with a hammer.

00:32:45 Speaker 1

Right?

00:32:45 Speaker 1

But technologies do incite forms of opposition.

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And you can think about why people might be opposed to this technology.

00:32:57 Speaker 1

Right?

00:32:58 Speaker 1

I mean, maybe this guy just wanted to smash something up, and the self-driving car was the first thing, and had it been a car, or a, you know, a trailer, or somebody's window.

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It might have been exactly the same situation.

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But there might be reasons why people are opposed.

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There might also be incidents that are

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that get public attention, even though they're not nearly so dramatic as the case that I started with.

00:33:28 Speaker 1

So this is the case of a Waymo a month ago that ran over a very famous cat.

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This is a cat in San Francisco whose name apparently is Kit Kat and belonged to a shop.

00:33:44 Speaker 1

And Kit Kat got killed by, ran out in front of one of these things

00:33:49 Speaker 1

which didn't have time to see it or stop, killed it, and a lot of people in the local community have gathered to say how disastrous this is, right?

00:34:00 Speaker 1

The reality of technologies in society is that their introduction and their scaling up is complicated, right?

00:34:09 Speaker 1

It's messy.

00:34:10 Speaker 1

People who make new technologies don't necessarily anticipate that people are going to get really, really concerned about the death of a cat.

00:34:19 Speaker 1

But this is the reality.

00:34:22 Speaker 1

Now, if we want to understand self-driving cars, the other thing that we can think about is we can try and understand their history, right?

00:34:33 Speaker 1

We can try and understand where they came from.

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This might help us to understand where they might go next.

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It might help us to understand why the people that are developing the technology want to develop the

00:34:48 Speaker 1

the technology.

00:34:50 Speaker 1

And so we can think back to the history of self-driven cars, right?

00:34:56 Speaker 1

So this, if you ask a self-driving car company, where did things begin, they might point to this.

00:35:03 Speaker 1

This is a competition that was organized by the American government in 2007, and it was basically a sort of race.

00:35:11 Speaker 1

They said, we're going to put some robot cars in a fake town in America, right?

00:35:17 Speaker 1

A town without any pedestrians, without anything in the way.

00:35:20 Speaker 1

And the car that wins the race by being able to drive around the town, we'll get a prize.

00:35:28 Speaker 1

And what you can see is a few of these cars crashing into each other, right?

00:35:34 Speaker 1

Mostly at low speed.

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But in this case, a few of the cars did complete the track.

00:35:41 Speaker 1

And lots of the people that were in the winning teams went on to create the company that became Waymo.

00:35:52 Speaker 1

Right, so this was the early days of innovation in this area.

00:35:57 Speaker 1

And what it's showing you is that the robots didn't work very well, but then they got good really, really quickly.

00:36:04 Speaker 1

And then Google, a few years later, started driving their self-driving cars in California, but didn't tell anybody.

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Right, so they were doing this in secret until

00:36:17 Speaker 1

A New York Times journalist found out about it in 2010 and it went public.

00:36:24 Speaker 1

But this was still only 15 years ago.

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So we're talking about pretty rapid, pretty rapid innovation.

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However, when tech companies tell us a story, their own history, right?

00:36:46 Speaker 1

we shouldn't necessarily believe them.

00:36:48 Speaker 1

We should think about whether there are other histories that we might tell.

00:36:53 Speaker 1

So the story that's going on in this example, sorry, is a story of artificial intelligence in action.

00:37:02 Speaker 1

This is, you know, this is basically dropping

00:37:08 Speaker 1

a computer into a car, taking out a human driver, putting in a computer, and isn't this amazing?

00:37:13 Speaker 1

This is a display of computer driving that seems to be really, really impressive.

00:37:21 Speaker 1

One other thing that we can do is go back much further and look at how cars in the past imagined self-driving technology.

00:37:29 Speaker 1

So this is an advert from 1956.

00:37:37 Speaker 1

This is the company General Motors, still around, imagining what the world would look like in 1976.

00:37:49 Speaker 1

And what you can see is this technology has its own lane, which is quite interesting, right?

00:37:56 Speaker 1

So this is a technology that is built around its own infrastructure.

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Another thing that you can see

00:38:06 Speaker 1

is that even though the technology is really advanced, right, the social roles are exactly as they were in 1956.

00:38:16 Speaker 1

You've got a man and his son at the front.

00:38:19 Speaker 1

You've got two women in the back of the car.

00:38:22 Speaker 1

So the man, even though he's not driving, is still in the driving seat because that was what was expected of men in the 1950s.

00:38:28 Speaker 1

For some reason, this car also has an ice cream maker, right?

00:38:33 Speaker 1

But this was how the future of self-driving was imagined by car companies in the 1950s.

00:38:41 Speaker 1

And the ideas go back even earlier.

00:38:43 Speaker 1

So this is General Motors imagining a similar sort of thing in the 1930s.

00:38:48 Speaker 1

But what they're doing is imagining the whole world being rebuilt so that robots could drive in it, right?

00:38:57 Speaker 1

Because this was a different time, this was a time of

00:39:02 Speaker 1

technological optimism, but also it was a time when America was rebuilding its roads.

00:39:09 Speaker 1

It had a national highway program that was building roads across the whole country.

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So it seemed possible to think about building infrastructure for self-driving vehicles.

00:39:21 Speaker 1

Now we're in a very different time where America has basically stopped spending money on rebuilding roads.

00:39:28 Speaker 1

And so if you're an AI company, you sort of think, well, we've got to deal with the roads as they are, right?

00:39:32 Speaker 1

We can't expect the roads to be rebuilt around us.

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But if we're interested in what transport might look like in the future, history can be a very, very useful guide.

00:39:48 Speaker 1

So this is San Francisco.

00:39:52 Speaker 1

In 1906, I think,

00:39:57 Speaker 1

1906, roundabout there.

00:39:58 Speaker 1

It was before a big earthquake anyway, destroyed quite a lot of the buildings in the middle of San Francisco.

00:40:05 Speaker 1

What can you see in this...

00:40:27 Speaker 7

The camera is actually attached to what we would in this country call a tram, going along the main street.

00:40:37 Speaker 7

It also looks like chaos, right?

00:40:41 Speaker 7

It's messy, it's dangerous, it's slow.

00:40:43 Speaker 7

And one of the questions that we can ask is what happened after this?

00:40:50 Speaker 7

This is a situation of sort of shared space where you have different forms of transport using the road together.

00:40:58 Speaker 7

One of the things that happened after this film was made is that the motor car, people who made motor cars very successfully campaigned for their technology to take precedence over other forms of transport, right?

00:41:14 Speaker 7

So afterwards, American cities were basically redesigned around the motor car.

00:41:19 Speaker 7

which meant getting rid of trams.

00:41:22 Speaker 7

It meant telling pedestrians to keep the sidewalks.

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It meant the creation of jaywalking as a misdemeanor.

00:41:30 Speaker 7

Jaywalking did not exist at all this time.

00:41:34 Speaker 7

And there were public campaigns to get people off the roads, to embarrass people by telling them that they were jaywalkers, to get people off the roads and onto the sidewalks.

00:41:55 Speaker 7

Horses that were previously allowed on roads were told to keep clear.

00:42:04 Speaker 7

And that had benefits for people who were in cars, right?

00:42:07 Speaker 7

For people who were driving, people who wanted to get from A to B and get there pretty quickly, this had enormous benefits.

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It also led to the creation of some unintended consequences, right?

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As technologies always do.

00:42:22 Speaker 7

Cities after this time became extremely car dependent, right?

00:42:27 Speaker 7

This is Los Angeles a few years ago, pretty much this time of year because it was Thanksgiving, one of the biggest traveling weekends of the year in the United States.

00:42:38 Speaker 7

And what you can see is a city built around the motor car, right, in which

00:42:44 Speaker 7

Yes, lots of people are going from A to B in the motor car.

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If you don't own a car in that environment, it becomes very hard to get by, right?

00:42:55 Speaker 7

This is a car dependent place.

00:42:59 Speaker 7

It also created the unintended consequence of traffic, a collective action problem in which lots of people, all wanting to do the same thing, creates a problem of traffic which slows down everybody.

00:43:13 Speaker 7

Right?

00:43:13 Speaker 7

It becomes a classic unintended consequence of a very, very successful, very successful technology.

00:43:22 Speaker 7

So let's just start wrapping up.

00:43:25 Speaker 7

When we're thinking about what self-driving cars might mean for the future of transport, for the future of cities, and the future of our society, we might ask questions about risk.

00:43:40 Speaker 7

Right.

00:43:41 Speaker 7

How can we ensure that the technology is safe and can we trust companies on their own to deliver that safety?

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Or does there need to be government involvement?

00:43:54 Speaker 7

But we also might ask questions about what happens if and when this technology is amazingly successful, right?

00:44:01 Speaker 7

If the technology does what it's intended to do, what sort of issues might that create for society?

00:44:08 Speaker 7

Is a world of self-driving vehicles a world that we want to live in?

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Does it solve some of our problems?

00:44:16 Speaker 7

Perhaps.

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But then does it cause other problems?

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Well, perhaps also, you might end up rebuilding the world around self-driving vehicles and then realising the problems with that only in hindsight.

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So I'll finish up there.

00:44:32 Speaker 7

Thank you all very much for you for listening and for participating briefly.

00:44:37 Speaker 7

I really enjoyed it.

00:44:38 Speaker 7

Thanks.