# IOT.mp3

Hi, good afternoon. Today, I want to talk to you about the IoT, the Internet of Things. Before we start, though, remember, if you click on the link below here, you can go to my homepage and you can find the script for this talk. You can also find questions, multiple-choice and essay and you can find answers and sample answers. And you can also listen to the MP3 talk of this. You can download all of those as word documents if you want. They're all there. Click on the link later.

OK, let's start. We're going to talk about the Internet of Things today. I'm sure you've heard about this. Let's start with what is it? Basically, the Internet of Things is any device that is connected to the Internet. For example, my watch, my smartwatch is connected to the Internet. But in your house, you probably have a range of devices which are Internet connected. For example, these days, you can get smart fridges, a smart fridge is connected to the Internet. What does it do? Well, it can tell you what's left inside your fridge and it can send you announcements, messages when you need to buy milk. It can access the Internet and find recipes for things that you have in your fridge. At some point in the future, I expect Amazon will produce their own fridges and your smart fridge will be able to buy milk without even asking you. I'm not sure if that would ever happen, but it might. You can also get smart heating, smart lighting. All of these devices are connected to the Internet. You can get a smart oven. On the way home, you can tell your oven, "Oven, heat up to 200 degrees", or you can have food in it ready to go. "Oven, start." These are all Internet-connected devices, and these are part of the IoT: Internet of things.

Right now, 2020, there are approximately seven billion Internet-connected devices. That means one for almost every person on the planet. Some countries have more, some countries have fewer, but generally about seven billion devices. That's obviously going to change. Right now, the major Internet companies have released home control devices. You've got the Amazon, Alexa, the Google, Google? I don't know what it's called. The Google Google? And Apple are just releasing their Siri, which is a home control center. Basically, these are devices you can talk to and you can access all of the other devices in your house through this one device. So, for example, Alexa ... not, not you Siri ... So, for example, Alexa, you can say, "Hey, Alexa, switch on the lights." "Hey, Alexa, run my bath." "Hey, Alexa, warm up the house a little bit." This is a control unit. And all the Internet players, they want to get into these, of course, because if you control people's houses, if you are the device people use for their house, you can control their data, their information, and they're more likely to buy things from you.

Okay. So, let's have a quick look at the history of the Internet of Things. It's not a very big history because it's quite recent. The Internet, of course, started in about the 1960s. In the beginning, a few universities were connected and that gradually spread around the world until the 1970s when most countries were connected to the Internet. Obviously, at the time it was quite slow, but it started to speed up. 1982, this is a picture of the world's first Internet-connected device. I think this is Stanford University. If I'm wrong, I'm going to write the correct university down here. And this Coca-Cola machine was connected to the Internet and it would tell the owners of the machine the temperature of the drinks and it would tell them how many drinks were left so they would know when to go and restock it. That's the first Internet-connected machine, Internet machine ....

Well, devices, in general, have become faster and smaller and much more capable, thanks primarily to this thing here. This is the MOS transistor. MOS stands for metal oxide, silicon transistor. Not entirely sure what it does. I've done a lot of research into it, trying to understand it, and I really can't. It's a switch. I've understood that much. It's a switch. You can switch it on or off and it's very, very fast. So, it's very, very useful in circuit boards. In fact, every circuit board in the world has one. This is the most produced component in the world. Currently, thirteen sextillion of these MOS transistors have been made. That's thirteen with 22 zeros after it, I think. So, because this is getting smaller and faster and more capable, devices can get smaller and faster, and more capable, and it becomes more ... it becomes easier to connect them to the Internet, to connect them to networks. You've probably heard about Moore's Law. Moore's Law says that computing power will double every two years and the price of computing power will halve every two years. And you've probably seen this arrow. It goes up like this. Moore's Law ... if Moore's Law is true, computing power is going to keep doubling. At some point, we're going to reach the singularity. And that's the point where it's doubling instantly. That's not instantly. I can't click instantly. And when we reach that point, computers have to make computers because humans can't produce things that quickly. Whether or not we can ever actually reach that point is debated, I have no idea. Anyway, that's a different talk for a different day.

OK, let's talk about some of the benefits of the IoT. Benefits are quite obvious. Well, firstly, smart homes. You can connect all the devices in your home. It's very convenient for you. You don't have to go around using different devices. It's very convenient. It's also much more economical and much more environmentally friendly. You can analyze where you're losing heat. You can control things much more easily.

There will be huge benefits for our aging populations, most developed countries have rapidly aging populations. Most countries, like Japan, for example. By 2050, I think about 40 percent, or even more, people will be over the age of 65. So, we're going to need a lot more care for the elderly. The IoT can do that. We can have connected health devices. We can have home help assistance. All these things can be connected to the Internet.

Driverless cars, of course. Driverless cars are going to going to be here soon. I mean, they are already here, but they're going to be rolled out big time, I think within the next ten years. Those cars will obviously be connected to a network and that will be part of the Internet of Things. Each car will know what each other car is going to do. If the car at the back, if the car at the front has an emergency stop, the car at the back will know about it at the same time as the car in the front. So, it's going to make driving an awful lot safer, I think.

We also have health monitoring. We can have online health care. We can be connected to a doctor. We can be connected to a hospital. The hospital can automatically monitor our health. If I have a heart attack now, here, it's going to take a while before people find me. It's going to take a while for an ambulance to get here. If I'm connected to an automatic hospital, if I have a heart attack, they're going to know about it straight away and the ambulance will be on its way. And they will also know where I am because of GPS. That's all the Internet of Things.

IoT factories are going to become a thing of the future. A thing of the present. An IoT factory will be much more economical, much more environmentally friendly because they will be connected to the market. Right now you have to produce more so that you don't have a shortage in supply. If you are connected to the market, you know exactly how many products are being sold and exactly how many products are needed. And you can produce exactly the right number of products, which reduces the amount of waste. Factories that are connected as well would also be much more economical because each part will know what the other part is doing automatically so they can adjust.

Agriculture, agriculture, smart agriculture. Part of the IoT. Again, you're going to be able to produce for the market. You won't have huge surpluses. You won't have huge losses. Also, smart fields, smart farms are going to be able to rotate crops. They'll be able to analyze the weather at a much more high level of detail than we can at the moment. And they can adjust everything to fit that. They can adjust water, they can adjust whatever they need when it's needed, because it's all connected through sensors. Drones. They can use drones to fly around the field and analyze everything as well.

The army, of course, the army is probably going to be into this much more quickly than we are in civilian life, because the army, they don't want to lose soldiers. They want as many automated machines as possible. If there is a World War Three, it's probably going to be machines versus machines. If the army can save people by using automated machines, they will. And these automated machines connect to each other. And that is part of the IoT. Of course, I read somewhere that the army, the American army, already has an autonomous gun car. So, this can drive around and it can shoot things. Right now, it's controlled by a person somewhere back in America, but it does have the capability to select its own targets, which is a little bit scary. But that's a talk for another day, I suppose.

Education, of course. Education is going online partly because of the coronavirus, but it's heading that way anyway. And all parts of the school will be connected at some point as well.

Right. Let's look at a few problems. Obviously, one of the problems will be security. And countries might find that they have to separate themselves. So rather than having a worldwide Internet, you might find you have country-specific Internet like China does at the moment. China is pretty much cut off from the rest of the world with the Internet. So, this video I'm making now, putting on YouTube, nobody in China will see it. I expect. If you're from China, write a comment down below. Probably nobody. So that might be one thing that happens.

The second thing, of course, is hacking. Hackers will try and get into these networks and there are different things they could do. The first thing is data will be stored in the cloud. So the first thing they can do is they can hack into the cloud and they can steal data. That's happened quite recently. They've taken lots of documents and pictures and all these different things. Now, that's going to be a constant game of catch up. The cloud companies will always be trying to stay one step ahead of the hackers and security will have to keep pace with that.

Another thing they can do is they can hack into networks. Driverless cars, again, if somebody can hack into a network and control a car, who knows what they can do. If they could control a whole city of cars, again, who knows what they could do. Power station grids. All these kinds of networks, if they can hack into them, who knows what they can do?

They can initiate denial of service attacks or wide scale hacking by hacking into a lot of smaller devices and then sending out spam or sending out viruses throughout the world. One computer doesn't have enough computing power to attack something, but if they can create a network of slave machines or zombie machines, they can attack things a lot more powerfully. Those things might happen.

Artificial intelligence. Artificial intelligence isn't yet good enough to control all of these things. At some point it might be, but right now it's not advanced enough to control all of these things. And if it ever gets advanced enough, who knows what will happen. And also, we are not advanced enough. This technology is very, very recent technology. It's just happening. And we are not educated. We are not trained in this kind of thing. So, we don't know what we're doing yet. We're kind of making it up as we go along almost. And again, part of that is connected to the security. A lot of these companies that are making Internet-connected devices, they are not technology companies. For example, if Microsoft makes an Iot device, you can be pretty sure it's going to have high level security in it. However, if a toy company that makes dolls for children suddenly decides to make an IoT doll, that's not going to have security. That's not going to be very safe because they're not a technology company. They're just trying to release it. And because these products are coming out as fast as possible, each company wants to produce the next technology, the next technologically advanced toy or device as fast as possible. So, they are sacrificing security for speed here. So, at some point in the near future, all of these unsafe devices are going to come back to bite us. Hopefully, we'll learn as we go along.

OK. The future, what's going to happen in the future? Well, right now there are seven billion devices. By 2025, it's predicted there will be 21 billion devices and that's going to keep increasing. 5G Internet, which is coming out now, will allow people to download at speeds of about a gigabyte a second. Again, 6G will be coming out by 2030, probably. And then who knows? 7G? 8G? I don't know where they're going to go. The faster the Internet is, the faster the connection is, the more advanced the technology can be. So that's coming. What is going to happen in the future, though? Your guess is as good as mine? I have absolutely no idea. The future is so uncertain. I think, in fact, I think the future now is more uncertain than it has been at any time in history. Things change so quickly these days that you cannot predict a year in advance. What technology is going to be here in 2021, 2025? I have no idea. There is absolutely no way of knowing. It's a very exciting time to be alive, but also a little bit scary. Anyway, is the IoT good or bad? You can argue both sides. However, it is coming. And the thing about technology, once we discover something, it's there. We cannot roll it back. So we have to learn to live with this. We have to work out some rules, some guidelines and we have to work out what we're doing.

Anyway, that's the Iot. Thank you for listening. I hope you learned something. Don't forget, click on the link below. You can go to my homepage and you can find the script for this talk. You can find questions, answers, and the MP3 have a go, do some writing, do some listening. Your English will improve. Just keep trying. All right. Thank you. See you next time. Goodbye.

**Questions**

1. What does IOT stand for?

A: It’s Only Tuesday

B: Internet Of Things

C: Inside Our Thoughts

D: Isn’t October Through

2. What is the IoT?

A: A way of programming a computer.

B: Any computer in the world.

C: A way of finding where you are.

D: Any device that is connected to the Internet.

3. Which of these things CAN’T a smart fridge do NOW?

A: Tell what’s inside your fridge.

B: Access the Internet and find recipes.

C: Go online and buy milk.

D: Send you announcements about what you need.

4. How many Internet connected devices are there now?

A: 7,000,000

B: 70,000,000

C: 700,000,000

D: 7,000,000,000

5. What do the big Internet companies want you to use their home device?

A: Because then they can control your data.

B: Because then they can help you with your house.

C: Because then they can make bigger devices.

D: Because then they can see what your house looks like.

6. When did the Internet start?

A: The 1950s.

B: The 1960s.

C: The 1970s.

D: The 1980s.

7. What kind of machine was the first Internet connected device?

A: A vending machine.

B: A computer.

C: A smartphone.

D: A microwave.

8. What did the device do?

A: It told the company how the weather was.

B: It told the company the news.

C: It told the company how many drinks were left.

D: It told the company the price of food.

9. Steven says that 13 sextillion MOS transistors have been made. Which of these numbers is 13 sextillion?

A: 13,000,000,000,000,000

B: 13,000,000,000,000,000,000

C: 1,300,000,000,000,000,000,000

D: 13,000,000,000,000,000,000,000,000

10. What does Moore’s Law say?

A: Computers will not be used in the future.

B: Computers will cost more every time they advance in power.

C: Computers will get bigger and bigger.

D: Computing power will double every two years.

11. What is the singularity?

A: The point where there is only one computer.

B: The point where computing power doubles instantly.

C: The point where we don’t need computers anymore.

D: The point where we can’t buy enough computers.

12. Steven talks about having a heart attack. What does he try to demonstrate with this example?

A: The advantage of being connected to an online hospital.

B: The fact that none of us live forever.

C: One of the effects of unhealthy living.

D: The disadvantage of having very high cholesterol in a modern society.

13. How will IoT factories reduce the amount of waste?

A: By creating a new way for customers to buy a product.

B: By allowing the company to get products to the market faster.

C: By monitoring the market and only producing what is needed.

D: By giving the market a way to monitor a product.

14. Steven says, “the American army already has an autonomous gun car”. Which of these words is closest in meaning to “autonomous”?

A: perpetual

B: uninhabited

C: violent

D: independent

15. Which of these is something that hackers CAN’T do with the IoT?

A: Hack into the cloud and steal data.

B: Hack into shops and buy lots of merchandize.

C: Hack into networks and control things.

D: Hack into many computers and send spam or viruses.

16. What is the main problem when a toy company makes an IoT toy?

A: They don’t think about the security.

B: They make something that is too expensive.

C: They cannot make it.

D: They have no way of buying all of the parts.

17. What is Steven’s final thought about technology?

A: AI is going to save our world.

B: The more technology we have the better things will be.

C: Once something is invented, you cannot stop using it.

D: Technology should be stopped at all costs.

18. Do you think the advantages of the IoT outweigh the disadvantages?

19. Do you think that we will ever reach a “singularity”?

20. Have you become dependent on the IoT? Why or why not?

**Answers**

1. B 2. D 3. C 4. D 5. A 6. B 7. A 8. C 9. C 10. D 11. B 12. A 13. C 14. D 15. B 16. A 17. C

18. Do you think the advantages of the IoT outweigh the disadvantages?

I don’t think so, but that doesn’t mean we can ignore them. Steven explains several advantages for the IoT, but, on the other hand, all of the disadvantages he lists can be boiled down to “security”. If it is possible to make the networks 100% secure, then there would be almost no disadvantages to this system. However, that is an impractical assumption.

The IoT will bring many technological benefits. It will improve our health, it will help to improve the environment, it will reduce waste, it will make us more efficient and economical. It will be a system that future technology is designed around and it will bring changes that we can’t even begin to imagine at the moment. These advantages are enormous.

The only real downside is the possibility that hackers could gain access to the networks. If that happened, they would be able to access data, or, at worst, bring down a whole city or country’s infrastructure. This would be devastating, but it doesn’t have to happen. Internet and technology companies are constantly improving their security. Hackers are always trying to find gateways into systems, but, once companies start using AI to design the security, these will probably disappear. Most of the gateways left are down to human error. I believe that at a near point in the future, networks will become 1005 secure.

I know that there are some disadvantages to the IoT, but I believe that they can all be overcome and the advantages far outweigh the disadvantages.

19. Do you think that we will ever reach a “singularity”?

That is a very difficult question that doesn’t have a simple answer. I am going to say that I do not think we will reach a singularity, but I need to clarify what I mean by that. In the talk, Steven says that a singularity is the point where technology, or rather computing power, increases so rapidly that humans can no longer make it, instead relying on computers to make computers. In effect, the point where the computers take over from humans as the rulers of the world. If you look at the trajectory of computing power over the last century, it is fairly easy to see why people would think that a singularity will come, but I disagree. To explain my reasoning, I would like to look at the limitations of AI and the uniqueness of the human brain.

Computing power is indeed increasing exponentially, but that does not mean that it always will. Also, vastly improved computing power does also not equal intelligence. For a situation like the “singularity” to be possible, it would require AI that was, in essence, self-aware. The AI system would have to be able to make connections across various fields and come up with new and novel ideas. AI systems are able to self-learn and they are incredibly powerful, but they are powerful in one particular field. The Google AI system that beat the reigning world go champion was a monster at go, but that was all it could do. I believe that future AI systems will be highly advanced, but they will be highly advanced in particular fields and they will never be able to cross over into being self-aware.

Secondly, there may be something unique in our brains that we cannot replicate with computers. Computers can have far more neurons than we do, but that doesn’t equate to intelligence. Whales have far more neurons than we do. Our brains have the ability to make connections that are new and not always logical. This ability gives us the power to create and to invent things that have never been considered before. This may not be something that AI systems will ever be able to do.

So, I do not believe that we will reach a singularity. However, I do expect that at one day we will probably all have some kind of AI implants in our brains to supplement our own intelligence.

20. Have you become dependent on the IoT? Why or why not?

Oh, yes. Most definitely. I got my first smartphone in 2011. I bought my first smartwatch in 2016. I bought my first Alexa home device in 2018. I bought my first Alexa controlled smart device in 2019. Before I made each of these purchases, I knew in my heart that they were not necessary. I knew that I could live easily without any of them. But, I was wrong. I was not wrong because of the nature of the device; I was wrong because of what I made the device into. I have shifted all of my life, or the large majority of it, onto these devices. If you took one of them away, I would, in all honesty, be devastated.

Now, in my defense, I would argue that we become dependent on any new form of technology as and when it is invented. Many people say that we should do things the old way, but is that really true? Let’s look at the examples of the washing machine and the microwave oven.

When the first electric washing machines were invented, in 1904, the were extremely popular. It has been argued that the washing machine did more for the liberation of women than any other invention. Before the electric washer, washing was done, by women, at a river or stream and typically took the lager part of a day. Nobody has argued that we should go back to washing clothes in rivers, for obvious reasons. I would argue that the IoT has allowed us to save time in a similar way.

The microwave is a similar time-saving device. We (usually women) no longer have to spend hours getting a meal ready. Large parts of it, or even the whole meal can be microwaved. There are people that say we should cook meals properly because of the health risks, but there are a wide variety of healthy microwave options available and they all save time.

Once we have a new time-saving device, we become dependent on it. That has always happened and it always will happen.