



R&D Cell, CTCT & IT

NEWS LETTER



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“You will face many defeats in life, but never let yourself be defeated”

HUMAN MICROCHIPPING

ASI/T Surya Prakash B

You'll never again have to worry about losing your wallet.

In emergencies, medical personnel will have easy access to your health data.



You will be able to automatically control many of your devices.

Chips may however make us prime targets for people with bad intentions. We need to think about who really benefits from human microchipping

It has been predicted that this is the year in which we will witness the beginning of human microchipping. This technology makes it possible, among other things, to instantly verify whether a person is who he says he is. An RFID (short-range radio frequency identification) implant can hold all the information we usually carry in our wallets. It can transmit our identity information as we walk through a security checkpoint, enable us to use public transport and make long lines at the supermarket checkout a thing of the past. The future of microchipping is exciting, with many interesting potential applications. Chips like the ones we now use in our pets could become commonplace in the next decade. Of course, there are a few downsides to the technology, ranging from the practical and realistic to the possibly more far-fetched and dystopian. But while some experts have their doubts about whether these chips are appropriate for use in humans, the fact that they could offer many advantages is indisputable.

The RFID chip

The RFID chip is basically a tiny two-way radio, roughly the size of a grain of rice, capable of containing various types of information. It is inserted under the skin and when scanned, the chip can provide information such as a person's ID number linking to a database with more detailed information about the wearer.

Advantages

The RFID chip can be a useful tool, especially when it comes to emergency situations where instant access to the right medical information can mean the difference between life and death. Here's some other advantages:

1. You'll never again have to worry about losing your wallet

We use RFID chips for many of our daily activities. They are in the cards we use to pay for things at the store, take public transport, gain access to buildings and borrow books from the library. The problem with these plastic cards is that we can lose them or they can get stolen. An implanted RFID chip is impossible to lose or steal.

2. Even easier identification

Our passports, IDs and driver's licenses already contain microchips and it would require minimal changes in infrastructures at train- and bus stations and airports to transition from scanning passports to scanning arms. You will be identified without having to do a thing - except walk past a reader.

3. Club memberships and access control

Members use their chips to keep track of what they order and even to pay for their food and drinks. Waiters can scan the chips and a computer automatically debits their bank accounts. Implanted RFID chips are also practical in the workplace, in hotels, at gyms and anywhere else identification is needed to be granted access.

4. Your medical history will always be easily accessible

An implanted RFID chip can be used to quickly gain access to your medical history: what antibiotics you've had in the past, what you're allergic to, what medication you take and any other medical information that's relevant in medical emergencies, especially when a patient is unconscious. These implants are particularly useful for people suffering from diabetes, cardiovascular disease or Alzheimer's disease. The chip itself doesn't contain the patient's entire medical history, but rather a unique code or number that can be used to access the information from a database.

5. Keeping tabs on patients, children and criminals

It's not uncommon for babies to get mixed up at hospitals, for the elderly or hospital patients to wander out of care facilities or for criminals to escape from prison. It is also not uncommon for children to get lost in a crowd, run away from home or be kidnapped. In these instances, being able to track people means peace of mind for millions of caregivers, family members and parents. In the event of a kidnapping, the first 4 hours are the most critical, as murder usually happens within that time frame. An RFID chip could significantly lower the risk of something terrible happening.

6. You'll be able to automatically control many of your devices

Imagine being able to start your car automatically, opening your front door as you approach it, your favourite TV channel switching on as you sit down on your couch, or your thermostat making sure the temperature is just right when you come home from work. All this is possible with an RFID implant, bringing a digital identity into the real world.

7. Nobody but you will be able to use your weapon

Situations in which a weapon is stolen and ending up in the wrong hands or kids accidentally finding a weapon will no longer lead to dangerous situations. Also, the GPS functionality in these weapons will provide information on where, when and by whom the gun was fired, making the 'lost weapons' phenomenon at crime scenes a thing of the past.

Disadvantages

Of course there are various disadvantages to implanting RFID chips as well. There are health concerns as well as privacy concerns. Will we still have control over our bodily privacy? Will we be able to remove the implants ourselves? How will we know if our chips are being hacked?

1. RFID chips may pose a threat to our health

There are many different digital identification systems, and we use many different cards. We have a credit card, an ID card, a medical aid membership card, a public transport card and so on. We would probably also need to implant more than just one RFID chip. A potential problem with these chips is that they don't always stay in their place. They sometimes migrate to a different location, making it hard to find them, which would be particularly problematic in medical emergencies. Some other risks include electrical hazards, adverse tissue reactions, infections and incompatibility with medical equipment such as MRIs machines. During an MRI scan, patients cannot take anything metal, including microchips. Then there's the potential risks associated with certain pharmaceuticals and the issue of electrosurgical and electromagnetic interference with devices and defibrillators.

Research studies have indicated that microchips caused cancer in between one and ten percent of lab animals implanted with the chips. Even though these cases are too rare to be distinguished from the cancer risk associated with any other implanted (medical) device, the fact remains that there are various potential RFID chip related health issues that are currently not adequately studied.

2. Microchips may take away our freedom of choice

With RFID implants, we will always have to be on our very best behaviour. No more riding the bus for free, driving a little faster than we should, making up an excuse for why we got to work late. In order to serve the public better, the service provider(s) need to have more access to more information, which can also severely limit our freedom. For instance, will we still be able to choose to pay with cash money or our credit card or will we be forced to pay with our RFID implant? What if receiving microchips becomes mandatory for, say, being able to apply for a job, get insurance, being admitted to school? How will we be able to remove the implant?

3. Chips may make us prime targets for people with bad intentions

As is the case with most new technological developments, RFID chips are also sensitive to exploitation. Because they contain so much important information, they can become a prime target for people with bad intentions, such as hackers. Imagine the information on your chip not only being readable, but also writable. That would mean your data could be corrupted, wiped or copied. This means that criminals could use your data and copy it onto or replace it with their own data, altering your - and their - physical identity.

4. We need to think about who really benefits from human microchipping

Yes, RFID implants could make our lives more efficient, but we should actually ask ourselves who really benefits from human microchipping. It would make it very easy for Big Brother to continuously track where we are, what we do, how we do it and whom we're doing it with. This could be very valuable information for large corporations and governments. RFIDs could enable governments, security companies or the police to

electronically 'frisk' citizens via chip readers placed in public places or along roadsides and pedestrian areas, etc. RFIDs can basically be scanned from a few feet away, by anyone who has a reader. This is a legitimate concern that requires stringent privacy controls and security measures.

Conclusion

RFID chips are already widely implemented. Their applications range from animal tracking, product tracking, inventory, access and passport control and many others. While the thought of having a chip injected into your body is a little strange, it really is no stranger than other implanted devices we use today, such as pacemakers. At this point, microchipping is purely voluntary and mainly used for high-risk patients such as diabetics and people suffering from Alzheimer's and cardiovascular disease. If human microchipping is not done mandatorily, and not used for tracking or 'frisking', people generally seem quite open to the potential applications. Mass implantation of these chips will however need to undergo many debates about health and privacy issues.

6G TECHNOLOGY

ASI/T Pawan Kumar

6G technology refers to the sixth-generation technology. It is proposed to integrate 5G technology for a global coverage. For resource monitoring and weather information multimedia video and high-speed Internet connectivity and the Earth imaging satellite networks are used. To integrate these three kinds of satellite like telecommunication, navigation, multimedia networks which provide global positions, internet connectivity with high speed and for mobile user's weather information services are major three objectives for 6G technology.

Advantages 6G Technology



Advantages 6G Technology

- Ultra fast to access Internet.
- Data rates up to 10-11 Gbps.
- Home automation and other related applications.
- Smart Homes, Cities and Villages.
- Space technology and Defence applications will be
- modified with 6G networks. Home based ATM systems.
- Satellite to Satellite Communication for the development
- Sea to Space Communication

Quantum computer

HC/RO Vishwanath Swamy

A quantum computer is any device for computation that makes direct use of distinctively quantum mechanical phenomena, such as superposition and entanglement, to perform operations on data.



How Do Quantum Computers Work?

Quantum computers perform calculations based on the probability of an object's state before it is measured - instead of just 1s or 0s - which means they have the potential to process exponentially more data compared to classical computers.

Classical computers carry out logical operations using the definite position of a physical state. These are usually binary, meaning its operations are based on one of two positions. A single state - such as on or off, up or down, 1 or 0 - is called a bit.

In quantum computing, operations instead use the quantum state of an object to produce what's known as a qubit. These states are the undefined properties of an object before they've been detected, such as the spin of an electron or the polarisation of a photon.

Rather than having a clear position, unmeasured quantum states occur in a mixed 'superposition', not unlike a coin spinning through the air before it lands in your hand.

These superpositions can be entangled with those of other objects, meaning their final outcomes will be mathematically related even if we don't know yet what they are.

The complex mathematics behind these unsettled states of entangled 'spinning coins' can be plugged into special algorithms to make short work of problems that would take a classical computer a long time to work out if they could ever calculate them at all.

Such algorithms would be useful in solving complex mathematical problems, producing hard-to-break security codes, or predicting multiple particle interactions in chemical reactions.

Types of quantum computers

Building a functional quantum computer requires holding an object in a superposition state long enough to carry out various processes on them.

Unfortunately, once a superposition meets with materials that are part of a measured system, it loses its in-between state in what's known as decoherence and becomes a boring old classical bit.

Devices need to be able to shield quantum states from decoherence, while still making them easy to read.

Different processes are tackling this challenge from different angles, whether it's to use more robust quantum processes or to find better ways to check for errors.

Quantum computing supremacy

For the time being, classical technology can manage any task thrown at a quantum computer. Quantum supremacy describes the ability of a quantum computer to outperform their classical counterparts.

Some companies, such as IBM and Google, claim they might be close, as they continue to cram more qubits together and build more accurate devices.

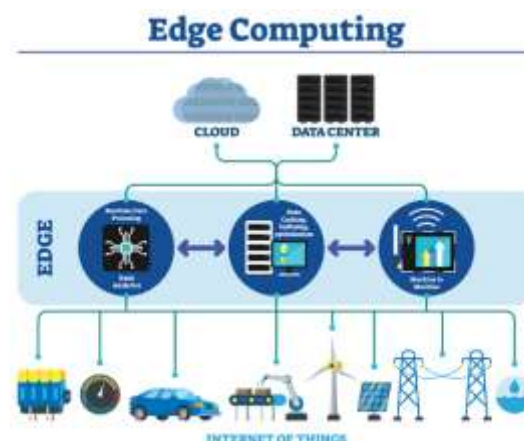
Not everybody is convinced that quantum computers are worth the effort. Some mathematicians believe there are obstacles that are practically impossible to overcome, putting quantum computing forever out of reach.

Edge Computing

HC/RO B Venkateshan

As more and more amounts of data are generated every day, we need new technologies that allow us to deal with such loads of information to be analyzed and acted upon.

As a result, Edge Computing is one of the emerging technologies that will grow the most during the years to come. It is a distributed, decentralized architecture that enables mobile computing and Internet of Things (IoT) technologies. In edge computing, data is processed by the device itself or by a local computer or server, near the source of the data.



Although IoT is the key driver of edge computing, this technology becomes an essential component of data-driven applications such as Artificial Intelligence or Machine Learning, which rely on the cloud for the heavy lifting.

This is a technology in its early days. But with the current adoption pace of technologies and devices such as drones, autonomous cars, or robots; we are currently witnessing newcomers and important players in the field.

Top Organizations Leading Edge Computing Innovations

The current edge computing market landscape consists of players from the public cloud (Microsoft, IBM, Google, Amazon AWS), networking companies (Cisco, AT&T), Independent Software Vendors – ISVs (Oracle) and industrial automation companies (Schneider Electric, Siemens). Each of these segments tackles edge computing differently.

Countries Leading the Advancements in Edge Computing

Clearly, the USA is the country with the biggest number of entities working in Edge Computing. It stands out that virtually there is the same number of corporations and universities innovating in this technology (around 350 each).

However, there is a hub of activity in Asia, with countries such as India, China, and Japan positioning themselves as leaders of edge computing technology.

Top Edge Computing Trends

Edge (and fog) computing main trends comprise computer networks, algorithms, and images.

Some startups and companies responsible for latest key advancements are Vapor IO (USA), Nebbiolo Technologies (USA), and Saguna Networks (Israel).

Saguna Networks powers Smart Mobile Networks by bringing an open cloud computing platform deep into the 4G Radio Access Network. They have patented a method to support Edge Computing on a communication network. Opening the mobile network so operators can provide a fast user experience while improving network economics and reducing congestion.

As for Nebbiolo Technologies, they are an early stage startup bringing cloud-like flexibility and real-time controllability to IoT platforms.

Finally, Vapor IO is building the next generation hybrid and edge cloud. They have introduced a truly programmable, open source based out of band management solution and a hyper collapsed data center solution.

Edge Computing Over Time

The trend looks clear: edge computing is a technology that is growing in interest by the year. As the amount data we produce grows more and more, so does the need for a technology that securely and effectively allows such data transmissions.

What's new in recent Windows 10 updates

R&D Team

New features in recent Windows updates will help you manage your time, increase security, and get more creative with Windows 10. With this update, it'll be easier to get things done on your PC and across your other devices, including syncing to Android phones (7.0 or later)."



Create events quickly

Add an event or reminder to your calendar right from the taskbar. On the taskbar, select the date and time, then enter your details in the text box that says Add an event or reminder.

Get to notification settings from the taskbar

choose where notifications show up and how to sort them, select Notifications > Manage notifications on the taskbar.

Paste from your cloud clipboard

Use the cloud-based clipboard to copy and paste images and text from one PC to another. Select Start > Settings > System > Clipboard, and then use the toggles to turn on both Clipboard history and Sync across devices. You can also press the Windows logo key +V as a shortcut to easily access your clipboard.

Give your apps a sleek new look

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Give your apps a sleek new look

Make your apps stand out by switching to Light or Dark mode. Select Start > Settings > Personalization > Colors. Under Choose your color, select either Light or Dark mode.

Add emoji from your keyboard

Express yourself however and wherever you want. Press the Windows logo key +period (.) to open an emoji panel. Use kaomojis to create faces with text, and symbols—like punctuation and currency—to make a statement.

Automatically back up your precious folders

Keep your Documents, Pictures, and Desktop folders automatically backed up with OneDrive so they're protected even if you lose your PC. On the right side of the taskbar, select OneDrive > More > Settings . On the AutoSave tab, select Update folders and specify which folders you'd like to automatically sync.

Bring the Microsoft experience to your Android phone

Open the Google Play Store app on your Android phone, type Microsoft Launcher in the search box, and then install it. Once Microsoft Launcher is installed, you can get beautiful Bing wallpapers that refresh daily, sync your Office docs and calendar, and more.

Make your pointer easier to see

If you're having trouble spotting your pointer on your screen, make it bigger or change the colour. Select Start > Settings > Ease of Access > Cursor & pointer.

Make things on your screen larger

To make just the text on your screen bigger, select Start > Settings > Ease of Access > Display , then adjust the slider under Make text bigger. To make everything bigger, choose an option from the drop-down menu under Make everything bigger.

Use Snip & Sketch to capture, mark up, and share images

Screen sketch is now called Snip & Sketch. Open Snip & Sketch to take a snip of what's on your screen or to mark up and share a previous image. In the search box on the taskbar, type Snip & Sketch, then select Snip & Sketch from the list of results to open the app.

To quickly take a snip, press the Windows logo key+Shift+S. You'll see your screen darken and your cursor displayed as a cross. Choose a point at the edge of the area you want to copy and left-click the cursor. Move your cursor to highlight the area you want to capture. The area you capture will appear on your screen.

The image you snipped is saved to your clipboard, ready for pasting into an email or document. If you want to edit the image, select the notification that appears after you've made your snip. Snip & Sketch offers options to save, copy, or share and includes a pen, highlighter, and an eraser, all with variable line widths.

Pause updates until a convenient time

To temporarily delay updates for your device, select Start > Settings > Update & Security > Windows Update , and then select Pause updates. Once you reach the pause limit, you'll need to get the latest updates before you can pause again.

Let Microsoft keep your PC healthy

Keep your device running smoothly with recommended troubleshooting suggestions that find and fix issues on your device. To view recommended trouble shooters, select Start > Settings > Update & Security > Troubleshoot .

Technical Quiz

R&D Team

1. _____ allows us to control electronic components
 - a) RETful API
 - b) RESTful API
 - c) HTTP
 - d) MQTT

2. MQTT stands for _____
 - a) MQ Telemetry Things
 - b) MQ Transport Telemetry
 - c) MQ Transport Things
 - d) MQ Telemetry Transport

3. MQTT is better than HTTP for sending and receiving data.
 - a) True
 - b) False

4. MQTT is _____ protocol.
 - a) Machine to Machine
 - b) Internet of Things
 - c) Machine to Machine and Internet of Things
 - d) Machine Things

5. Which protocol is lightweight?
 - a) MQTT
 - b) HTTP
 - c) CoAP
 - d) SPI

6. PubNub publishes and subscribes _____ in order to send and receive messages.
 - a) Network
 - b) Account

- c) Portal
- d) Keys

7. By clicking which key the PubNub will display public, subscribe, and secret keys.

- a) Pane
- b) Demo Keyset
- c) Portal
- d) Network

8. The messageChannel class declares the _____ class attribute that defines the key string.

- a) command_key
- b) command-key
- c) commandkey
- d) Key_command

11. _____ specifies the function that will be called when there is a new message received from the channel.

- a) Reconnect
- b) Error
- c) Connect
- d) Callback

10. _____ and _____ saves the publish and subscribe keys that we have generated with the PubNub Admin portal.

- a) public_key and subscribe_key
- b) Public-key and subscribe-key
- c) publickey and subscribekey
- d) Key_public and key_subscribe

Technical Terms

R&D Team

Signal: Information needs to be converted into the digital form before transmitting electronically. A signal is that information that has been converted into the digital format. It includes Analog and Digital signals.

Communication Channel: This is the medium by which a signal can be transmitted from the sender to the receiver. It can be a simple copper wire or a satellite system.

Transducer: This is the device which is able to convert one form of the energy into another form of energy. In ECE, transducer is a device which converts one form of physical variable such as temperature, pressure and force etc into the corresponding electrical signal as well as provides it as an output.

Receiver: Through this device, the signals can be transmitted and sent by the senders and can be decoded into a form so that it could be understood by the humans such as Television.

Attenuation: It refers to the decrease in the strength of the analog or digital signal in ECE due to its transmission over the communication medium or channel. It generally occurs when signals are transmitted over long distances.

Amplitude: It refers to the strength of the signal.

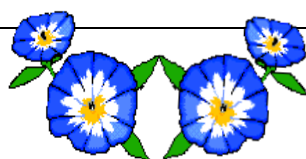
Amplification: When the difference between the sender and receiver of the signal is too large, the amplification of the signals drops significantly.

Bandwidth: It is very helpful in explaining the range of the frequency over which a signal has been transmitted.

Modulation: It refers to the task of adding information to an electronic or optical waveform. This information may be added by altering the frequency phase of the wave form.

Acknowledgement

We are highly thankful for reading out this compilation and hope it will be useful for you in our day to day professional and personal life. We would like to hear your interest areas, suggestions from you to make this newsletter more informative and interesting. Your views will definitely help us to create this newsletter as an effective medium to reach you with latest development in the fields of communication and technology.



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Answers to the Quiz

1	2	3	4	5	6	7	8	9	10
A	D	A	C	A	D	B	A	D	A