

CHAPTER 7

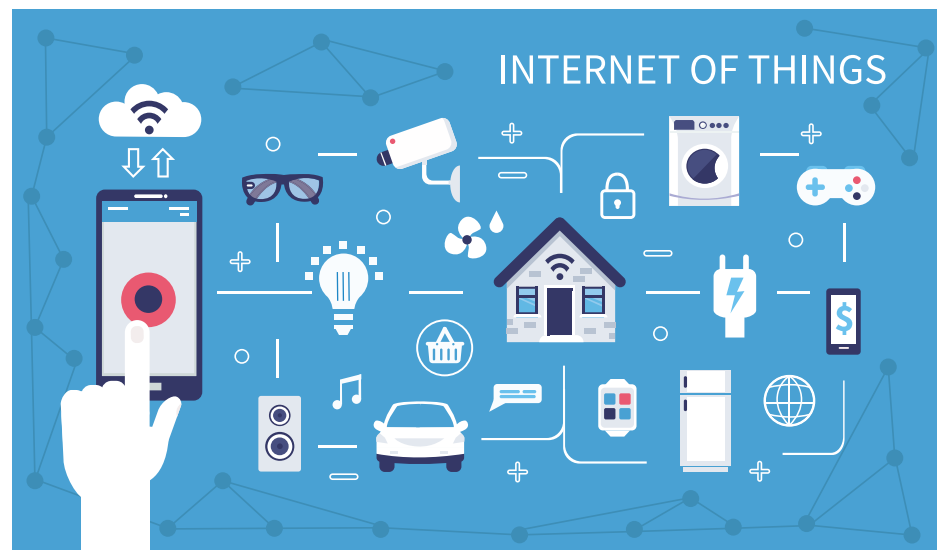
The Internet of Things

Have you noticed that the advertisements you see on the Internet are always related to your interests? How does the Internet know what you like and select advertisements to match? The Internet of Things (IoT) is the term used to describe *machine-to-machine* (or M2M) communication that allows this to happen. The advantages of the IoT are significant and range from personal benefits (like tracking your health information to warn you if your health is at risk) to city-wide benefits (like coordinating traffic lights to reduce traffic congestion). However, with the benefits come risks. For example, your health information could be revealed to your employers or insurance company. **How can you evaluate the advantages and the disadvantages of the IoT to ensure you achieve the positives of the technology without experiencing any of the negatives?**

In this chapter, you will

- learn vocabulary related to the Internet of Things;
- use passive voice accurately to emphasize action;
- summarize and reference to avoid plagiarism;
- edit and improve your own writing;
- recognize the differences between academic and popular texts;
- weigh advantages and disadvantages to develop a unique opinion;
- write two summaries and integrate them into a persuasive essay.

GEARING UP



- A.** In a group of four students, think about how you use the Internet to find information or a service. Make a list of all the websites you visit for these purposes. These are examples of human interaction with the Internet.

Purchase from Amazon,

- B.** In your group, list the ways you use the Internet for human-to-human communication. These are examples of how the Internet facilitates human-to-human communication.

Skype,

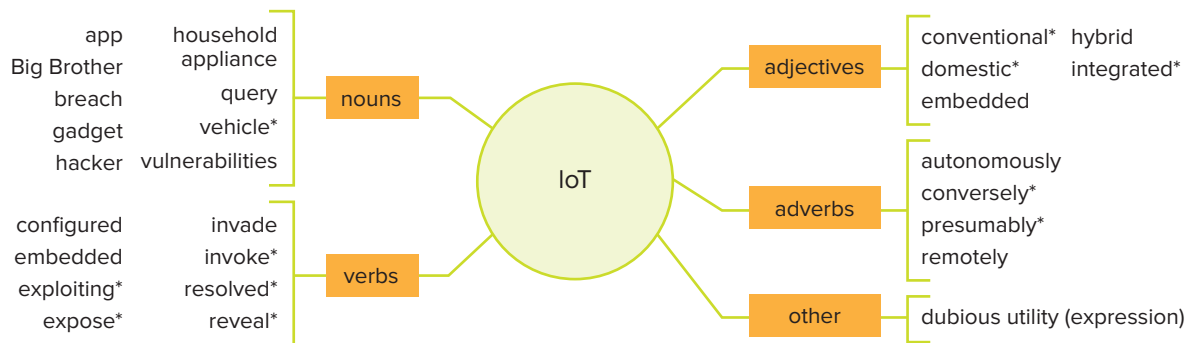
- C.** With your group, list examples of machine-to-machine (M2M) communication that assist human activity.

Traffic data on Google maps,

- D.** Discuss the following questions in your group: Do you believe the interactions and activities you listed in tasks A, B, and C are advantageous? Do M2M interactions have any disadvantages? What are they?

VOCABULARY BUILD OVERVIEW

Below are the key words you will practise in this chapter. Check the words you understand then underline the words you use. Highlight the words you need to learn.



* Appears on the Academic Word List

READING 1

Introduction to the Internet of Things

Machines can communicate with each other through computer chips that are embedded in them and linked to the Internet. Have you ever left home and worried that you left the stove on? If your stove contained a computer chip that could communicate with your phone, you would be able to use your phone to turn off the stove. That's efficient!

VOCABULARY BUILD

A. The following sentences are based on Reading 1. Choose the best word(s) from the box to complete each sentence, and write the definition of the word on the line below.

autonomously configured conventional conversely
embedded household appliance integrated invokes query

- ① For example, a dishwasher could be configured to delay the wash cycle until off-peak hours, when the cost of electricity drops.

Definition: arranged to work with other equipment, in a particular way

- ② The appliance can send a _____ to find the cost of electricity at various times, and adjust its schedule of actions accordingly.

Definition: _____

- ③ Communication between a _____ (for example, a dishwasher) and the energy company does not need a human at either end to send data.

Definition: _____



- 4 Unlike traditional computers, the IoT has applications that are built into a device and connected to other, similar devices. The resulting network forms a(n) _____ system.

Definition: _____

- 5 Through the IoT, each individual household appliance acts _____ to turn on or off by itself, based on data it has collected from the energy company.

Definition: _____

- 6 The device might be configured to contact the energy company before it turns on to determine the price of energy at that time. _____, the energy company could send information to each household appliance whenever the energy rates change so the appliance always has current price information.

Definition: _____

- 7 The IoT is a series of household appliances with embedded computer chips that are constantly in contact with each other. The computer chips are _____ so the appliances can act together and get work done.

Definition: _____

- 8 When a shopper walks up to the display, the system uses a camera to capture an image, and _____ software that can analyze the image.

Definition: _____

- 9 _____ computers allowed people to interact with the Internet; the IoT allows computers to interact with other computers or appliances.

Definition: _____



Before You Read

A. Discuss these questions with your classmates.

- ① What do you already know about M2M communication? In what ways is your life already influenced by M2M communication (or the IoT)? Do you think that you benefit from M2M communication? Why?
- ② In some places in the world, energy companies try to balance the demand for electricity (usually high during the day and low at night) by charging more for energy during high-demand (peak) hours and charging less during low-demand (off-peak) hours. Does this happen in the country you are from or where you live? Are you familiar with other ways of balancing, or reducing, the demand for energy? Do you think these approaches are effective?
- ③ In what ways could M2M communication be used in your home or in places where you shop (in retail)?
- ④ Do you think there might be any disadvantages to M2M communication?

While You Read

B. While you read, think about the writer's purpose. What kind of text is this? How do you know? What audience is the writer addressing? Consider the text organization, vocabulary, and content. When you finish reading, discuss your answers with the class.

The Internet of Things

1. Introduction

For over thirty years, the Internet was focused on providing communications that involve humans. Applications like electronic mail (email), chat, and voice over Internet **protocol** (VoIP telephony) require two human participants who interact. Applications like web surfing, search, and file transfer arrange for a human to access a service.

This chapter explores a new use of the Internet: communications among machines. Researchers and networking professionals are using the terms *machine to machine* (M2M) and the *Internet of Things*¹ (IoT) to describe the concept. This chapter explains the motivation for [developing] machines that communicate with each other.

10 2. Embedded Systems

Unlike earlier applications that use **conventional** computers, IoT applications focus on *embedded systems*. That is, computing and communications [capabilities] are **integrated** into a device, such as a light switch, **household appliance**, a heating or

protocol (n.): accepted or established system of rules

1. Although in many ways it fails to capture the idea, the term *Internet of Things* seems to have gained acceptance.

air conditioning system. According to Farnam Jahanian of the National Science
 15 Foundation, “Today, the number of networked devices equals the number of people
 on Earth. In three years, Internet devices will outnumber people by a factor of three.”

Why would a household appliance need to communicate over the Internet? One
 reason involves home automation—if all electrical devices in a home had connectivity,
 an owner could contact the devices to determine their status and control them.
 20 Without returning home, an owner could answer a question such as, did I leave the
 iron on? More importantly, the owner could turn the iron or the lights off, or could
 start an oven preheating while he or she was on the way home.

2.1 Embedded Systems in the Smart Grid

The examples above involve humans controlling devices. Does machine-to-machine
 25 communication also make sense? Yes. One instance where machine-to-machine
 communication will be important arises from the concept of a *smart grid*. In a smart
 grid, an appliance has an **embedded** controller and network connectivity. The
 appliance can send a **query** to find the cost of electricity at various times, and adjust
 its schedule of actions accordingly. For example, a dishwasher could be **configured**
 30 to delay the wash cycle until off-peak hours when the cost of electricity drops. Similarly,
 an air conditioning system could raise the temperature slightly during peak hours,
 and then cool the house during off-peak hours.

Communication between an appliance and the energy company does not need a
 human at either end—the embedded system in the appliance acts **autonomously** to
 35 contact a server at the energy company and obtain information about schedules and
 pricing. **Conversely**, systems at an energy company could be configured to download
 rates and schedules to systems at each residence whenever a change occurs.

2.2 Embedded Online Security Systems

Home automation systems allow an owner to monitor or control electrical devices.
 40 Intelligent security systems take one step beyond home automation by being proactive.
 That is, the system acts on its own to inform the owner when an unexpected event
 occurs. For example, if a motion sensor is **tripped** by a robber, the system can contact
 the owner’s smartphone, turn on the lights, and supply a video stream from a camera.
 The system can then accept commands to ignore the event, reset the sensor, or take
 45 further action.

The significant advantage of an intelligent security system lies in its ability to have a list
 of contingencies. That is, the system can take action depending on the event that occurs,
 the time of day, and the actions of the owner. For example, the system might be **configured**
 to inform two or more smartphones for a given event. Furthermore, if an owner does not
 50 respond within a specified time, the system could choose to inform the local police.

2.3 Embedded Systems in Retail

The Internet of Things includes much more than household appliances. One interesting
 use of embedded systems involves retail locations. For example, some shopping malls
 have electronic displays with sophisticated embedded systems. When a shopper walks
 55 up to the display, the system uses a camera to capture an image, and **invokes** software
 that can analyze the image. The software identifies human faces, analyzes each, and
 estimates traits, such as the individual’s age and sex. The display then selects ads
 that are targeted for the individual’s demographic profile.

tripped (v.): switched
 on or activated
 (e.g., a mechanism)

cloud server (n.): main network computer that controls other computers and allows for online processing and storage

Electronic displays in malls do much more than merely show ads; they send data in both directions. In terms of gathering information, the systems track each viewer, calculate how long the person continues to look at the display, and report statistics back to a server in the cloud. The **cloud server** takes information from the displays as well as information from other sources, and ... combines the information. Once new decisions are made, the cloud server downloads the information to the displays. For example, a cloud server might sample weather at each site, and decide to advertise umbrellas during a rainstorm or air conditioners during a heat wave.

A similar technology is used in grocery stores. Cameras mounted over shelves and refrigerated cases gather images of shoppers. The images are analyzed to determine the amount of time each shopper stands at a particular spot and the approximate location of the items the shopper considers. The data is then fed back to a cloud server that combines information from many stores and recommends product placement for each individual store.

(871 words)

Comer, D. (2015). *Computer networks and Internets* (6th ed., pp. 567–569). Boston: Pearson.

After You Read

C. Answer the following questions to check your comprehension.

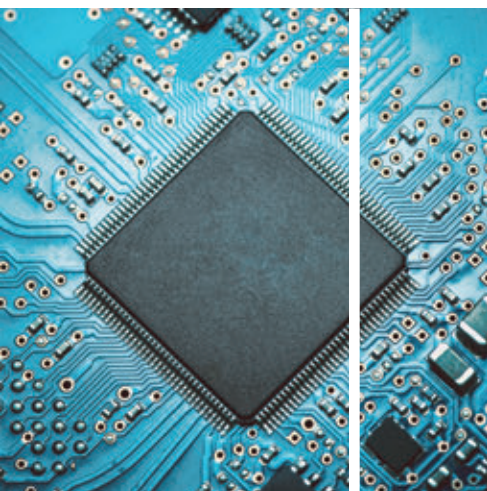
- 1 What is an IoT device (or smart appliance)?

- 2 In column 2 of the table, list the IoT applications mentioned in each section of the reading. In column 3, write the advantages associated with these IoT devices. Some of the information has been provided for you in the table. The complete list will be useful when you write your final assignment.

SECTION OF READING	EXAMPLES OF IOT APPLICATIONS	ADVANTAGES OF IOT APPLICATIONS
2. Embedded Systems	• <i>light switch</i>	• <i>energy savings</i> • <i>peace of mind (you don't have to worry that you left your lights on)</i>
2.1 Embedded Systems in the Smart Grid	• <i>dishwasher</i>	
2.2 Embedded Online Security Systems	• <i>intelligent home security systems</i>	

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SECTION OF READING	EXAMPLES OF IOT APPLICATIONS	ADVANTAGES OF IOT APPLICATIONS
2.3 Embedded Systems in Retail	• <i>electronic displays in stores and malls</i>	



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3 How many of these applications have you experienced?

4 The writer introduced definitions of three terms in this reading in an interesting way. Use the line numbers below to find the three terms and their definitions. Complete the sentence to explain how the writer introduced the definitions of these terms. Then, to help you remember the meaning of the terms, write out their definitions.

The writer introduces the definitions by _____

a) (line 12) embedded systems _____

b) (line 40) proactive

c) (line 47) contingencies _____

5 Does the author mention any disadvantages of the IoT? Do you think there may be disadvantages to the IoT?

Using the Passive Voice

In Reading 1, you may have noticed that the writer sometimes wants to refer to an action that happened without emphasizing who performed the action. When you want to de-emphasize the person who did the action, you use the passive voice verb form. You can use the passive voice in the following situations:

1. When it doesn't matter, or you don't know, who did the action

Example: A computer chip **is embedded** in a household appliance to connect it to the Internet.

Note: You don't know who put the computer chip in the household appliance, and the doer's name is not relevant to your point.

2. When you want to emphasize the action more than the person/people who did the action
 Example: The car's security system **was hacked** before the police were aware of the problem.
 Note: The reader does not know who hacked the car's security system. What is most important is that it happened, not who did it.
3. When you want to emphasize the action more than the person/people who did the action even when the doer is mentioned (usually in a "by phrase" after the verb)
 Examples: The weaknesses in the Internet connection **were discovered** *by researchers from Pen Test Partners*.
 It's surprising that these weaknesses **were not detected** *by Mitsubishi* beforehand.
 Note: Even though the "by phrases" include the people (or company) that acted (discovered or detected), they appear after the verb and therefore seem less important than the action.
4. When you want to be objective, for example in scientific and technical writing
 Example: 2.5D multi-chip modules **are installed** in thousands of devices every day.
5. When you want to be polite and not mention who made a mistake
 Example: The disadvantages of IoT enabled devices **should have been discovered** sooner.

The table shows how to form the passive voice in the present, past, and future tenses.

	PASSIVE VOICE FORMATION			
	SUBJECT receives the action	BE shows the tense	MAIN VERB past participle form	BY PHRASE AND/OR REST OF SENTENCE
PRESENT TENSE	A computer chip	is	embedded	in the device.
PAST TENSE	A computer chip	was	embedded	in the device.
FUTURE TENSE	A computer chip	will be	embedded	in the device.

To make a passive voice sentence negative, add *not* after the first auxiliary verb (see #3 above).

- A.** Underline the passive voice verb form with one line, and the "by phrase" (if there is one) with two lines.
- ① That is, computing and communications facilities are integrated into a device, such as a light switch, household appliance, a heating or air conditioning system. (Reading 1)
 - ② For example, if a motion sensor is tripped by a robber, the system can contact the owner's smartphone, turn on the lights, and supply a video stream from a camera. (Reading 1)
 - ③ The on-board diagnostics (OBD) port is accessed after the door is locked. (Reading 3)
 - ④ A similar technology is used in grocery stores. (Reading 1)

The passive voice is used with modals to show degrees of possibility and obligation.

PASSIVE VOICE WITH MODALS

SUBJECT receives the action	MODAL	BE	PAST PARTICIPLE	BY PHRASE AND/OR REST OF SENTENCE
Traffic lights	can	be	configured	to reduce congestion.
Traffic lights	could	be	configured	to reduce congestion.
Traffic lights	should	be	configured	to reduce congestion.
Traffic lights	might	be	configured	to reduce congestion.

To make a passive voice sentence negative, add *not* after the modal.

B. Underline the passive voice modal plus the main verb form with one line, and the “by phrase” (if there is one) with two lines.

- ① For example, a dishwasher could be configured to delay the wash cycle until off-peak hours when the cost of electricity drops. (Reading 1)
- ② The weaknesses in the car’s IoT security system could not be detected by Mitsubishi because the company’s technology was simply not advanced enough (Reading 3).
- ③ All this data also can be sold by data brokers around the world. (Reading 2)
- ④ Any object that can connect to the Internet can make you an invasion-of-privacy victim, because it can be hacked. (Reading 2)

C. Fill in the blanks with the passive voice of the verbs in parentheses to complete the sentences. Use a modal if it is appropriate. After, underline the “by phrases” with two lines.

- ① A light switch (connect) can be connected to a computer chip so the owner can turn the house lights on and off from a cellphone.
- ② To create a machine-to-Internet connection, a computer chip (embed) _____ in a household appliance.
- ③ An air conditioning system (control) _____ by an IoT connection to turn on when the cost of electricity is low.
- ④ With an IoT connection, you never have to worry about leaving your oven on again. The oven (turn off) _____ even when you are out of the house.
- ⑤ Before the IoT, homes (monitor, not) _____ remotely by owners when the owners were out of the house.
- ⑥ Your privacy (invaded) _____ by hackers hoping to steal your personal information.

The passive voice is used frequently in technical or scientific communication that describes a process. It is useful when you want to emphasize the process rather than the person completing the process. However, in general, avoid using the passive voice too often as it distances the reader from the action.





Avoiding Plagiarism by Summarizing

In Chapter 5, you learned how to avoid plagiarism by providing a reference when quoting. In Chapter 6, you learned to provide a reference when paraphrasing. It is also important to cite a reference when summarizing.

Learning how to summarize is an essential skill for students. You can use this technique to help you

1. write a formal summary for your professors;
2. support a point in your own writing;
3. refute a writer's ideas in your own writing;
4. study efficiently.

Like a paraphrase, a summary translates another person's ideas into your own words. However, a summary is only approximately one-third of the original text length. In a summary, give the main points of the writing and eliminate all the details and examples.

Here is an approach to try:

1. Before beginning, read the original source carefully, and underline only the main points.
2. Begin by referring to the author, title, and source of the article.
3. Paraphrase the underlined sections of the original source.
4. Eliminate details, examples, and repetitious points.
5. Write a reference to acknowledge the ideas contained in your summary.

- A.** With one or two partners, on a separate page, practise summarizing the text in the box. Follow the steps above. Refer to the Models Chapter (page 253) to see an example and to learn more about writing a summary. Include the reference for this text.

Unlike earlier applications that use conventional computers, IoT applications focus on *embedded systems*. That is, computing and communications facilities are integrated into a device, such as a light switch, household appliance, a heating or air conditioning system. According to Farnam Jahanian of the National Science Foundation, "Today, the number of networked devices equals the number of people on Earth. In three years, Internet devices will outnumber people by a factor of three."

Why would a household appliance need to communicate over the Internet? One reason involves home automation—if all electrical devices in a home had connectivity, an owner could contact the devices to determine their status and control them. Without returning home, an owner could answer a question such as, did I leave the iron on? More importantly, the owner could turn the iron or the lights off, or could start an oven preheating while he or she was on the way home.

Comer, D. (2015). *Computer networks and Internets* (6th ed., pp. 567–568) Boston: Pearson.

- B.** When the class has finished, write your summaries on the board. Look for successful summarizing techniques in each. As a class, read each summary and identify its best features.



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WARM-UP ASSIGNMENT

Write a Short Summary

- A.** Summarize the following text from Reading 1. Write your summary on a separate page. Use the academic perspective (third-person present tense). Pay careful attention to subject-verb and pronoun-antecedent agreement (see Chapter 6, page 169). Use the passive voice when you want to de-emphasize the person who did the action. Don't forget to include the reference for the text at the end of your summary.

The Internet of Things includes much more than household appliances. One interesting use of embedded systems involves retail locations. For example, some shopping malls have electronic displays with sophisticated embedded systems. When a shopper walks up to the display, the system uses a camera to capture an image, and invokes software that can analyze the image. The software identifies human faces, analyzes each, and estimates traits, such as the individual's age and sex. The display then selects ads that are targeted for the individual's demographic profile.

Electronic displays in malls do much more than merely show ads; they send data in both directions. In terms of gathering information, the systems track each viewer, calculate how long the person continues to look at the display, and report statistics back to a server in the cloud. The cloud server takes information from the displays as well as information from other sources, and ... combines the information. Once new decisions are made, the cloud server downloads the information to the displays. For example, a cloud server might sample weather at each site, and decide to advertise umbrellas during a rainstorm or air conditioners during a heat wave.

A similar technology is being used in grocery stores. Cameras mounted over shelves and refrigerated cases gather images of shoppers. The images are analyzed to determine the amount of time each shopper stands at a particular spot and the approximate location of the items the shopper considers. The data is then fed back to a cloud server that combines information from many stores and recommends product placement for each individual store.

(265 words)

Comer, D. (2015). *Computer networks and Internets* (6th ed., pp. 568–569). Boston: Pearson.



When you receive feedback from your teacher or your classmates on this Warm-Up Assignment, you will have information that you can use to improve your writing on the Final Assignment.

Academic Survival Skill

Editing Your Own Writing

What do you do with feedback on your writing? It can be discouraging to receive instructor or peer feedback when there are many corrections or several different kinds of corrections. However, you can use the feedback to improve your writing if you think about it in a systematic way.

First, stop for a moment to appreciate the positive feedback that you almost certainly received. If you are using this book, you are already a skilled writer of English. You may still want to improve your English writing, but take some time to think about what you have done well.



Next, identify and write down your three most significant—top three—challenges or areas needing improvement. These could relate to how you

- organize your ideas;
- develop (or elaborate on) your ideas;
- choose words to express your ideas;
- choose grammatical structures to express your ideas.

Next, decide how you can improve in those three areas. If you have made several similar grammatical errors, make sure you know how to eliminate them in future writing. If your goal is to develop your writing more, find out how you can do that (e.g., give more examples, provide more details, or write about an opposing idea).

You can ask your instructor or classmates for help, or you can search grammar books, dictionaries, and websites for examples of how to improve or make corrections.

Take notes on techniques you could use, or write a few example sentences to illustrate the grammar point you would like to master. This will help you easily review what you want to improve.

Do your best to understand why you have these challenges. For example, if you do not elaborate enough on your ideas, you may not be allowing yourself enough time, or you may be trying to write as little as possible to minimize the number of mistakes you make. In these cases, you probably need to allow yourself more time or to try to make your writing as complex as your thinking. Understanding your challenges is an important part of editing and improving your writing.

Here is an example of a student's top three challenges.

MY WRITING CHALLENGES	WAYS TO IMPROVE MY WRITING
1 Elaborate on information in body paragraphs.	<ul style="list-style-type: none"> • Add details by giving examples, being more descriptive, or introducing an opposing idea and showing how it is incorrect.
2 Use more formal words.	<ul style="list-style-type: none"> • More formal/academic verbs I get feedback on my writing. (informal) Students receive feedback on their writing. (more formal/academic) • Write differently than I talk IoT stuff is really a hot topic these days. (informal) IoT-enabled devices are popular and their uses are increasing. (more formal/academic)
3 Check use of the passive voice.	<ul style="list-style-type: none"> • Don't forget that the main verb in the passive is in the past participle form. The computer chip was embeddedd in the thermostat to control the temperature.

- Return to the last writing assignment for which you received feedback. Identify and write down your top three challenges.
- Consider how you might approach these challenges: ask your instructor or classmates, look at useful grammar books, or do research online. Write a few example sentences that illustrate your challenges. Do your best to understand why you have these challenges. Keep your list close by for your next writing assignment.
- For your next assignment or assignment draft, proofread your writing specifically for your top three challenge areas. When you get feedback again, add the next top three challenges to your list. As your writing improves, you will be able to delete some of your top challenges.

READING 2

Too Clever for Comfort

In this reading, you will learn about many different applications of M2M communication. Some of the applications are funny and entertaining, others offer significant advantages, and still others are associated with potential negative outcomes. In addition, the writer expresses a clear opinion. As a student of English who is often asked to express opinions in academic work, you may find it interesting to see how this writer expresses his views.



VOCABULARY BUILD

In the following exercises, explore key words from Reading 2.

A. Match each word or expression to its definition. When you have finished, check your answers with the class.

WORDS	DEFINITION
1 Big Brother	a) doubtful usefulness
2 breach	b) small, cleverly designed tool
3 domestic	c) show something that is usually covered or hidden
4 dubious utility	d) character in George Orwell's novel <i>1984</i> who was never seen, but was represented in posters with the slogan, "Big Brother is watching you"; used to refer to a government that watches everyone and has complete power over people's lives
5 expose	e) action that breaks a law, rule, or agreement
6 gadget	f) used to say that something is probably true
7 hackers	g) make something known that was previously secret
8 invade	h) related to life at home
9 presumably	i) people who secretly use and change information on other people's computers (informal)
10 reveal	j) get involved in something in an unwanted or annoying way

B. Fill in the blanks with the key words (first column) to complete the short story. Don't forget to capitalize or make a word plural if required.

An Imagined Future World

In the future, governments will watch their citizens more closely than ever before. This _____ approach to observing people will become common. Citizens, especially smart _____, will invent _____ that attempt to avoid governmental observation. These gadgets will be installed in _____ locations

where the governments are unlikely to find them. Governments will make laws that prevent the invention of these gadgets. However, hackers will _____ the laws and continue to develop avoidance devices. _____ everyone will want such a device, not only criminals; the potential market for these gadgets will be enormous. Governments will _____ retail stores and _____ large quantities of the devices. The citizens will _____ the government observation plans, and they will insist that such close observation serves a _____ since most citizens are good.

Before You Read

- A. Carefully consider the words and expressions in the table above. Which ones seem to have negative meanings?

- B. Based on how these words are used, can you predict the author's opinion about the IoT? Is this different from the author's opinion in Reading 1? Discuss this with your class. Write your prediction here:

While You Read

- C. Read this text to determine if your prediction of the author's opinion of the IoT is correct. When you have finished, discuss with the class whether your predictions were correct.

Too Clever for Comfort

As the smart devices of the Internet of Things invade your home, hackers and Big Brother are close behind.

1. I've always been a fan of useless **gadgets**. High on my list were pizza scissors, the smartphone case that doubles as a hairbrush, and a battery-powered, swirling spaghetti fork. Lately, thanks to the Internet of Things (IoT)—loosely defined as everyday devices linked to the Internet, thereby making them smart—I've got lots of choice.
2. As far as I can tell, the IoT involves sticking a computer chip into something you can buy at Home Depot or Walmart, from fridges to baby monitors, and linking it to an app. You can buy smart toothbrushes, thermostats, and [even a personal health monitor] ... Starting at \$1200 (all currency in US dollars), **faucet** maker Moen has a smart shower **contraption** that allows you to control the heat of your water from your smartphone. No more waiting naked for ten or twenty [painful] seconds while the water warms up.
3. My favourite is a \$199 automated cup ..., made by a San Francisco company, that is advertised ... as a hydration and nutrition tracker. Pour in a liquid, make sure the cup is charged up, and it will identify your drink. Pour in beer, and the word

faucet (n.): tap; device that controls the flow of water from a pipe

contraption (n.): piece of equipment that looks strange or funny, and is unlikely to work well

malicious (adj.): unkind and cruel

WikiLeaks (n.): multinational online media organization that publishes controversial government documents

CIA (n.): Central Intelligence Agency; the US government agency that collects information about people

ransom (n.): amount of money that is used to free someone who is being held prisoner, or get something back that was stolen

sophisticated encryption software (collocation): computer program that creates a complicated code that prevents illegal use of the software or computer

data brokers (n.): people who collect and sell personal information for profit

- 20 *beer* will light up on the outside. Confirmation is always appreciated, I guess, and imagine the fun you could have trying to confuse your smart cup by filling it with a mix of Coke and red wine.
4. The IoT wasn't invented merely to entertain us, of course; some of it is genuinely useful. Smart cities have the potential to solve public problems like traffic congestion. Internet-connected self-driving cars promise a transportation revolution. The IoT market is potentially massive, assuming that consumers keep buying into the dream of a connected **domestic** heaven ... Gartner, an information technology research firm, estimates that more than twenty billion **gadgets** and appliances will be connected to the Internet by 2020.
5. But the IoT also has a dark side. Any object that can connect to the Internet can make you an invasion-of-privacy victim, because it can be hacked. Reports of hacking are piling up, and you have to wonder whether the IoT will lose popularity in the same way that the early IT companies lost popularity in the early 2000s. A house-renovator friend in Toronto told me that enthusiasm for home automation is already [decreasing], partly because so many of the devices, like Bluetooth-enabled door locks, are of dubious utility. But many homeowners also don't [like the thought of] turning living rooms and kitchens into potential listening devices for hackers and advertisers.
6. Many of the security **breaches** so far seem **malicious**. In March, documents published by **WikiLeaks** ... **reveal** that the **CIA** had launched a program called Weeping Angel, which found ways to turn Samsung Internet-connected TVs into devices that could record conversations even when sets were turned off. The CIA declined to comment ... WikiLeaks also said the CIA was looking into hacking car-control systems, **presumably** making the cars vulnerable to crashes, which "would permit the CIA to engage in nearly undetectable assassinations."
7. Last year, hackers attacked the electronic key-card system of a hotel in Austria, preventing guests from getting back into their rooms. The hotel's manager sent a **ransom** of \$1800 worth of bitcoin—typically the currency of choice of blackmailers—to unlock the doors. Early this year, hackers **exposed** more than two million messages [of] parents and children playing with Internet-enabled teddy bears. What these various [breaches] proved is that many makers of consumer products can't be bothered, or can't afford, to invest in **sophisticated encryption software**.
8. Another annoyance with IoT gadgets is perfectly legal monitoring by collectors of massive amounts of consumer data, among them Amazon, Facebook, Google and Twitter. "Smart devices are all about surveillance—tracking your habits," says Jacob Silverman, author of *Terms of Service: Social Media and the Price of Constant Connection*. "The question is whether they use your data responsibly."
9. As artificial intelligence makes the IoT more sophisticated, the gadgets' ability to monitor your behavioural habits rises. The [use] of intelligent, voice-activated personal assistants like Siri (used by Apple) and Alexa (Amazon) has the potential to expose every aspect of your domestic life to Big Data capitalism. Ask Alexa a health question and you might get bombarded with ads for Fitbit exercise trackers. All this data also can be sold around the world by **data brokers**.

10. The best way to fight all these invasions of privacy is to [stay away from] Internet-enabled gadgets. The IoT and all its cleverness are better suited for big fixes, like making cities safer, cleaner and less congested. Besides, do you really need a Bluetooth-enabled frying pan or smart garbage can?
- 65

(792 words)

Reguly, E. (2017). Too clever for comfort. *Report on Business: The Globe and Mail*, 33(9), 21.

After You Read

D. Answer the following questions to check your comprehension.

- 1 Based on the first paragraph of the reading, how does the author feel about “useless gadgets”?

- 2 After reviewing paragraphs 2 and 3, explain the author’s feelings about the smart Moen faucet and the \$199 automated cup. What is the author’s tone in these paragraphs? How do you know?

- 3 In paragraph 4, what does the author suggest is a good use for the IoT?

- 4 The last sentence of paragraph 4 (line 25) is similar to a sentence in Reading 1 (page 183, line 15). In both readings, the writers include a statistic about the IoT. Why do you think these two very different readings contain similar sentences? You may want to use a statistic for the same purpose in your own writing.

- 5 What words signal to the reader that the author is going to present a different opinion about the IoT in the next paragraphs?

- 6 In paragraphs 5 to 10, the writer refers to many IoT devices (listed in the second column of the next table). For each application, write the potential disadvantage. This information will clarify the negative aspects of the IoT.



PARAGRAPH NUMBERS	IoT APPLICATIONS	POTENTIAL DISADVANTAGES
5	Bluetooth-enabled door lock	<i>Dubious utility (Do you really need it?)</i>
5	other “smart” appliances in living rooms and kitchens	
6	Samsung Internet-connected TV	
6	car-control systems	
7	electronic key-card system in hotel	
7	Internet-enabled teddy bears (toys)	
7	IoT consumer products	
8	Amazon, Facebook, Google, Twitter	<i>Extensive (though legal) personal data collection may not be used responsibly.</i>
9	“smart” voice-activated personal assistants	
10	Bluetooth-enabled fry pan or “smart” garbage can	

- 7 When you look at the table above, which (if any) of these negative aspects of the IoT worry you?

E. To help you summarize the content in the final five paragraphs of the text, write the paragraph number next to its purpose.

PURPOSE OF THE PARAGRAPH	PARAGRAPH NUMBER (5–10)
1 IoT devices can invade your privacy, and many are not that useful.	5
2 In addition, hackers seem to be gathering personal information from IoT devices.	
3 These problems won't just disappear. Increasing use of IoT devices means our personal information will be more available than ever before.	
4 It seems that even legal organizations are using IoT devices in illegal ways.	
5 IoT applications are better used for large (city-wide) projects than for personal devices.	
6 Large companies collect personal data all the time, and they may not use that information wisely.	

F. Which paragraph best expresses the author's opinion about the IoT? Do you agree with the author? Why or why not?





Recognizing the Differences Between Academic and Popular Texts

You probably noticed some differences in the writing between Readings 1 and 2. One is academic, and the other is a popular text. Even though both readings are about the IoT, their genres are very different.



A. In the first row of the table, identify which reading is academic and which is popular. Write the number in the appropriate column.

B. Using the questions in the first column, write notes on the differences between the two readings.

DIFFERENCES IN THE TEXTS	ACADEMIC TEXTBOOK:	POPULAR MAGAZINE:
	READING _____	READING _____
1 Who is the audience for the reading?		
2 What is the writer's purpose for writing?		
3 What perspective does the author choose (first person or third person)?		
4 Does the writing seem more formal, or more like the author is speaking to the reader?		
5 Can the reader see a clear organizational pattern in the text?		
6 In general, how do the lengths of paragraphs compare?		
7 Is the choice of words more formal or informal?		
8 Does the author express opinions directly?		
9 Does the author demonstrate a sense of humour?		
10 How do the references differ?		
11 Do you have other points of comparison? If so, write them here.		

- C. Academic textbooks and popular magazines are kinds of texts, referred to as *genres*. Write some other genres of communication that you are familiar with.

- D. How do authors decide which genre they will write?

Genres are associated with conventions (or reader expectations). For example, if a writer decides to write an academic essay (a kind of text / genre), one of the things the reader will expect to see toward the end of the introduction is a thesis. Once authors decide on their audience and the genre they will use, they have a good idea of the conventions their writing should follow to meet readers' expectations.

- E. Which genre of reading do you prefer? Which is easier to read?

READING 3

Researchers Hack the Mitsubishi Outlander SUV

In this reading, you will learn about a group of researchers who successfully hacked into a car's control systems through an insecure Internet-enabled application. In their hacking experiments, the researchers looked for weaknesses in the IoT application that allowed car owners to unlock, heat, and/or cool their cars, and turn on or off the infotainment systems via an app installed on their cellphones. The researchers discovered that it was possible.



VOCABULARY BUILD

- A. Read each sentence and circle the letter of the word or phrase that best matches the meaning of the word in bold. When you have finished, check your answers with a partner and confirm them with the class.
- 1 The car's systems can be controlled from an **app** installed on a cellphone.
 - a) application form that you complete when you apply to college
 - b) piece of software that provides easy access to information or a service
 - c) appliance with an embedded computer chip
 - 2 Hackers who are **exploiting** the car's weaknesses know how to use the technology.
 - a) using the car's weaknesses to do something unlawful
 - b) taking the car parts to build a better car
 - c) using the car's weaknesses to help the owner



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- 3 **Hybrid** cars are becoming more popular as the price of oil and gas increases.
 - a) cars that have characteristics of bigger cars
 - b) cars that are manufactured by two companies
 - c) cars that use both gas and electricity
- 4 IoT devices can be controlled **remotely** through an app, usually installed on the owner's cellphone.
 - a) by only one person
 - b) completely
 - c) from a distance
- 5 Until the weaknesses of the security system are **resolved**, many car owners will worry about parking their cars in public places.
 - a) fixed in a satisfactory way
 - b) shown to be incorrect
 - c) applied to a new rule
- 6 Mitsubishi Outlander is a popular **vehicle** sold around the world.
 - a) motorized form of transportation
 - b) way to get exercise
 - c) dating service
- 7 Similar **vulnerabilities** were discovered in the Jeep Cherokee last year.
 - a) exceptional cases
 - b) weaknesses
 - c) understandings

Before You Read

- A. There are many car- and security-related expressions in this reading. The author assumes that the audience is familiar with these expressions and often simply uses acronyms to refer to them. Here is a list of the acronyms and their full meanings in this reading. Match the acronym (and term) to the best definition. When you have finished, compare your answers with a partner.

CAR- AND SECURITY-RELATED EXPRESSIONS		DEFINITIONS
1 SUV (sport utility vehicle)	_____	a) car's self-diagnostic reporting function
2 SSID (service set identifier)	_____	b) expensive class of large vehicles with a lot of power, designed for city driving
3 OBD (on-board diagnostics)	_____	c) password used by a mobile device when it connects to the wireless local area network (WLAN)

- B. Who is the author's intended audience?

- C. Based on the title of Reading 3, do you think this author will have a positive or a negative opinion about the IoT?

While You Read

- D. Consider this question: If you were the owner of a Mitsubishi Outlander SUV, how secure would you feel after reading this text? Why?

Researchers Hack the Mitsubishi Outlander SUV, Shut Off Alarm Remotely

Mitsubishi Outlander, a popular **hybrid** SUV sold around the world, can be easily broken into by attackers **exploiting** security weaknesses ... that allow the car to be **remotely** controlled via an **app**.

The weaknesses were discovered by Pen Test Partners, and include:

- 5 • The mobile app connects to the car through a Wi-Fi access point, making the app impossible to use if the owner is not in range of the car's wireless network.
- This wireless network's Wi-Fi pre-shared key is written on a piece of paper included in the owners' manual, but its format is too simple and too short, allowing attackers to [break in] easily and relatively quickly.
- 10 • The car's Wi-Fi access point has a unique SSID, but in a predictable format. This allowed the researchers to geolocate the various Outlanders throughout the United Kingdom.

After discovering the SSID and the pre-shared key, the Pen Test Partners researchers connected to an ... IP address within a network's subnet, and this allowed them to
15 find the Wi-Fi connection and send messages to the car. Through these messages they were able to turn the car's lights, air conditioning and heating on and off, change the charging program and, most importantly, to disable the car's anti-theft alarm. "Once unlocked, there is potential for many more attacks. The on-board diagnostics (OBD) port is accessible once the door is unlocked. While we haven't looked in detail
20 at this, you may recall that the hack of some BMW **vehicles** suggested that the OBD port could be used to code new keys for the car," they noted. "We also haven't looked at connections between the Wi-Fi module and the Controller Area Network (CAN). There is certainly access to the infotainment system from the Wi-Fi module. Whether this extends to the CAN is something we need more time to investigate."

- 25 The researchers have tried to get in touch with Mitsubishi and share these discoveries responsibly but didn't have much luck initially. Only after the investigators made these concerns public did the company contact them. Mitsubishi is currently working on new firmware for the Wi-Fi module that should fix these problems. Until [it's ready, company engineers] advised owners to deactivate the Wi-Fi using the "Cancel Vehicle
30 Identification Number (VIN) Registration" option on the app, or by using the remote app cancellation procedure. "While obviously disturbing, this hacking only affects the

compromised (adj.):
unable to work properly

car's app, therefore with limited effect to the vehicle (alarm, charging, heating). It should be noted that without the remote control device, the car cannot be started and driven away," the company pointed out, and added that they are willing to work
35 with the researchers in order to understand and solve the problem.

For a long-term fix, Mitsubishi needs to re-engineer the ... Wi-Fi app-client connection method completely, the researchers advised. "The problem is that any time you connect physical devices, objects or machines to the Internet, you are taking the risk that these could one day be **compromised** due to **vulnerabilities**," Justin Harvey,
40 chief security officer at Fidelis Cybersecurity, told Help Net Security. "There is no doubt that owners of Mitsubishi Outlander hybrid cars will be reluctant [to drive their cars] after this latest hack—at least until it is **resolved**. Indeed, it's not the first time we've seen hackers gain access to a car system; it's reminiscent of the security vulnerabilities found by researchers in the Jeep Cherokee last year."

45 "While it's surprising that these vulnerabilities were not detected by Mitsubishi beforehand, both consumers and enterprises must evaluate the risks of Internet of Things (IoT) devices before using them. The physical nature of these "things" represents a kinetic danger to the real world and, in reality, they could cause an accident or a serious injury. While no damage
50 was done on this occasion, there is no doubt that similar vulnerabilities will be detected in the years to come," he concluded.

"The Mitsubishi Outlander vulnerability
55 is another example of why a [protected] identity ... approach to connected device management is essential in reducing risk and enhancing user experience," noted Simon Moffatt, Director of Advanced
60 Customer Engineering at ForgeRock. "As more and more objects join the Internet of Things, high-end items such as connected cars will become increasingly attractive targets for hackers. While manufacturers focus on end-user experience
65 and device connectivity, there needs to be a more joined-up approach to security, including a strong focus on device, service and user identity management."

"It is important that devices, such as a car or a mobile phone application, have individual identity profiles, with validated, authenticated, and authorized services, that can restrict the operations or data made available," he added. Doing so allows
70 Internet-connected devices to confirm that the digital identity of the user and device is in fact fully [protected], and the right people are accessing the right services at the right time—making **malicious** activities more difficult."

(807 words)



Zorz, Z. (2016, June 6). *Researchers hack the Mitsubishi Outlander SUV, shut off alarm remotely*. Retrieved from <https://www.helpnetsecurity.com/2016/06/06/researchers-hack-mitsubishi-outlander/>

After You Read

E. In your final assignment, you will be asked to summarize the content in Reading 3. To prepare, answer these questions which highlight the main points of the reading. Answering the questions in your own words will provide you the beginning of a good summary.

- ① Who wrote this article, what is the title, and when was it published?

Author: _____

Title: _____

Date of publication: _____

- ② What genre is this reading? Is it more like Reading 1 or 2 of this chapter?

- ③ What is the author writing about? What is this an example of?

- ④ What is Pen Test Partners and what do the researchers do (you will have to search online to find this information)?

- ⑤ What disadvantages did the Pen Test Partners researchers discover in the Mitsubishi Outlander's IoT setup?

- ⑥ How did Mitsubishi respond to the researchers' discoveries?

- ⑦ In general, what should consumers be aware of before they purchase an IoT-enabled product?

F. Look carefully at lines 1, 4, 18, 21, 42, 45, 49, and 50 (eight lines total). What do they have in common?

G. Look carefully at lines 10, 14 and 69 (three lines total). What useful expression do these lines have in common? This expression means that something (the subject of the sentence) creates the conditions for something else to happen.

- 1 Write the sentences according to the grammar pattern. Note that you don't have to complete the sentence.

	SUBJECT	VERB	DIRECT OBJECT	INFINITIVE OF MAIN VERB + REST OF SENTENCE
LINE 10	<i>This</i>			<i>to geolocate the ...</i>
LINE 14				
LINE 69				

- 2 Complete the following sentences with the verb *allow* following the grammar pattern above.

a) The weaknesses in the IoT application _____

b) The vulnerabilities in the Outlander's security system _____

c) The collection of personal data _____



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the Mitsubishi Outlander SUV



Weighing Advantages and Disadvantages to Develop Your Unique Opinion

You may already be aware that when you write following Western academic conventions, your readers often expect you to express your opinion. Most writers who face this challenge wonder how they will develop a unique perspective that their readers will value. How can their opinions differ from those of many other people who write about the same issues? The following task may help you develop a unique opinion.



- A.** You have now read texts in which writers are very positive or less supportive of IoT-connected devices. With a small group of students, discuss how you feel about these devices. Would you purchase IoT devices? Do you see their benefits, or are you concerned about their weaknesses? Or can you understand both sides of the IoT issue?
- B.** Often when people want to think carefully about an issue, they list the advantages and disadvantages in a chart. Complete the table to help you summarize all the advantages and disadvantages of IoT devices. Refer to your answers from the readings.
- Summarize the advantages of IoT devices that you listed in Reading 1, task C, question 2, page 184.
 - Summarize the advantages and disadvantages of IoT devices that you listed in Reading 2, task D, question 6, page 195.
 - Summarize the disadvantages of IoT car control systems that you listed in Reading 3, task E, question 5, page 201.

ADVANTAGES	DISADVANTAGES

The information in this kind of chart may not help you decide whether you think positively or negatively about an issue because the advantages and disadvantages may not be equally important to you. Sometimes a single advantage may be significant enough to outweigh several disadvantages, or vice versa.

- C. Using a chart that lists advantages and disadvantages as significant, somewhat significant, and less significant might be helpful. Working on your own, rewrite the advantages and disadvantages from the first chart in the second chart, categorizing each as significant, somewhat significant, or less significant.

	ADVANTAGES	DISADVANTAGES
Significant		
Somewhat Significant		
Less Significant		

The distribution of the points in this chart should demonstrate your unique opinion about the issue of IoT-enabled devices because you have ranked the points according to how you value them. Your table will show a “unique profile” because the way you value each point will be different from how other people value them. You will have an opportunity to express your unique opinion in your final written assignment.



FINAL ASSIGNMENT

Integrate a Summary into a Persuasive Essay

You will write a persuasive essay in which you integrate the summary from the Warm-Up Assignment and a summary of Reading 3. Follow these steps to complete this assignment.

- Summarize Reading 3 on a separate page. Use the techniques you learned in this chapter. Refer to the Models Chapter (page 253) for more information on how to write a summary and to see a model summary.
 - You should now have two summaries: one from the Warm-Up Assignment and another of Reading 3.
- Define your audience (your instructor, classmates, parents, school newspaper, friends, or another group). You might write differently depending on your audience.
- Establish your unique opinion about whether the advantages outweigh the disadvantages (or the opposite) of the IoT. You will present this opinion to your audience.
- As you write your persuasive essay, use what you have learned in this chapter.
 - Use vocabulary about IoT-enabled devices.
 - Use the passive voice to de-emphasize the doer of the action (refer to Focus on Accuracy, page 185).
 - Integrate your two summaries into your writing. Include both in-text citations and final references.
 - Refer to the Models Chapter (page 247) for more information on how to write a persuasive essay and to see an example.

- E. Edit your writing, then proofread it for your top three challenges (refer to Academic Survival Skill, page 189).



Critical Connections

Use this approach to develop a unique opinion by applying the framework from Focus on Critical Thinking to another issue. The framework involves using two tables. In the first table, list the advantages and disadvantages of the issue. In the second, categorize the advantages and disadvantages as significant, somewhat significant, or less significant. Your categorization will likely be unique because it is based on your values.

- A. Consider one of the issues from the previous chapters in this book or suggest another issue. For example, outline the advantages and disadvantages of one of the following issues:
- The internationalization of education
 - The promotion of products using advertising
 - Trying fad diets
 - Using a digital currency
- B. Once you have decided on the issue you will discuss, write it at the top of the table. Work with a small group of students to brainstorm advantages and disadvantages, and list them on a separate page using the table below as a model.

Issue: _____

ADVANTAGES	DISADVANTAGES

- C. When you have finished, work on your own to weigh the advantages and disadvantages and categorize them. Use the format below.

	ADVANTAGES	DISADVANTAGES
Significant		
Somewhat Significant		
Less Significant		

- D. Compare your table with that of a classmate. You will most likely have listed the information in a unique way; this demonstrates that your opinion is different from your classmate’s. Use this approach when you want to develop a unique opinion for a writing assignment.