

Lesson 8

mBot2 At Your Service!

A Talking Robot Waiter

STEAM · 45 minutes · Intermediate

Today your robot learns to understand your voice.

You will speak to it — and it will speak right back to you.

By the end

Your robot will take a food order out loud — just like a real robot waiter!

What You Will Be Able To Do Today

1

Make mBot2 do jobs using speech recognition and a Wi-Fi connection

2

Combine speech recognition with variables to hold a conversation

3

Send messages to faraway computers using cloud messaging

4

Use true-or-false statements together with sensor data

Speech Recognition Turns Talking Into Text

- Speech recognition finds the words and sentences in a human voice
- It converts what you say back into written text
- All the computer really sees is frequency changing over time
- That differs hugely from person to person — a high or low voice, fast talking, an accent
- Even your mood changes how the same sentence sounds
- Decades of computer science and language research made this possible

Try it

Have two friends say the same word. Notice how different they sound!

Where You Meet Speech Recognition Every Day

TVs, smartphones and smart home devices

Ask for the room temperature or the lights,
just by speaking

Put an appointment straight into a calendar

A huge help for people with disabilities

Safer driving — approve a new route by
voice, not by touching a screen

Some systems learn your voice; others know
only a few set words

This Job Is Too Big For The Robot Alone

- mBot2 records your voice, just like it recorded sound in an earlier lesson
- But recognizing speech is far too much computing for the robot to handle
- So it sends the recording over the internet to a huge network of powerful computers
- Those computers turn it into text and send the text straight back
- That network of computers is what people call “the cloud”
- This is why you must connect to the internet first

The cloud

The cloud is just other people's computers doing the hard work for you.

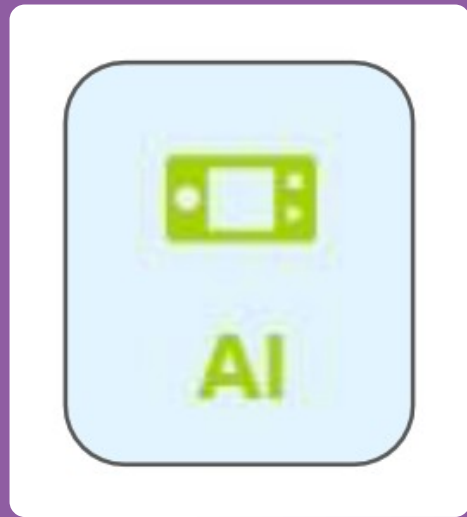
Privacy Matters — Know What Is Happening

- The recorded audio travels to servers to be processed
- It is not stored permanently
- Using the service needs a “key”, made automatically with a free account
- You never type the key in anywhere yourself
- Only an email and a password are needed — no names or pictures
- Wi-Fi names and passwords are saved as plain text, so a temporary hotspot is safer

Ask questions

Good digital citizens always ask: where is my data going?

Find The AI Blocks — But Switch Mode First



The 'AI' category

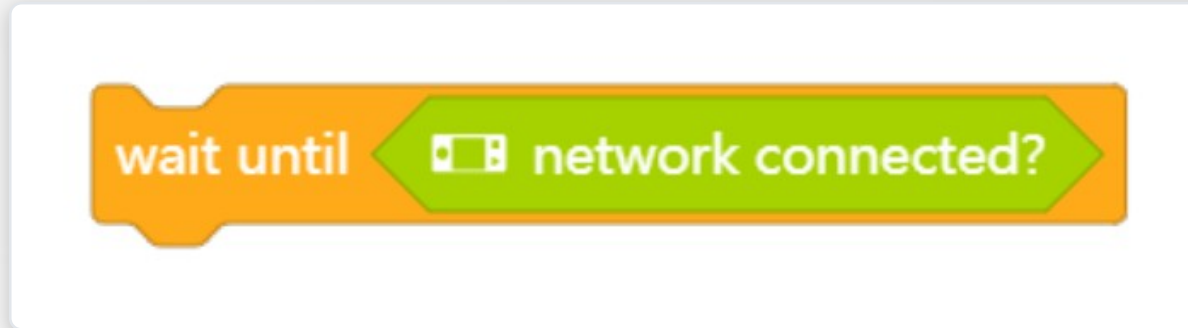
- Connect the CyberPi in the 'Devices' tab
- Switch to Upload mode
- Open the AI category in the code blocks
- Now you can see the speech recognition functions
- Blocks look greyed out? You forgot to switch to Upload mode

Connect To Wi-Fi



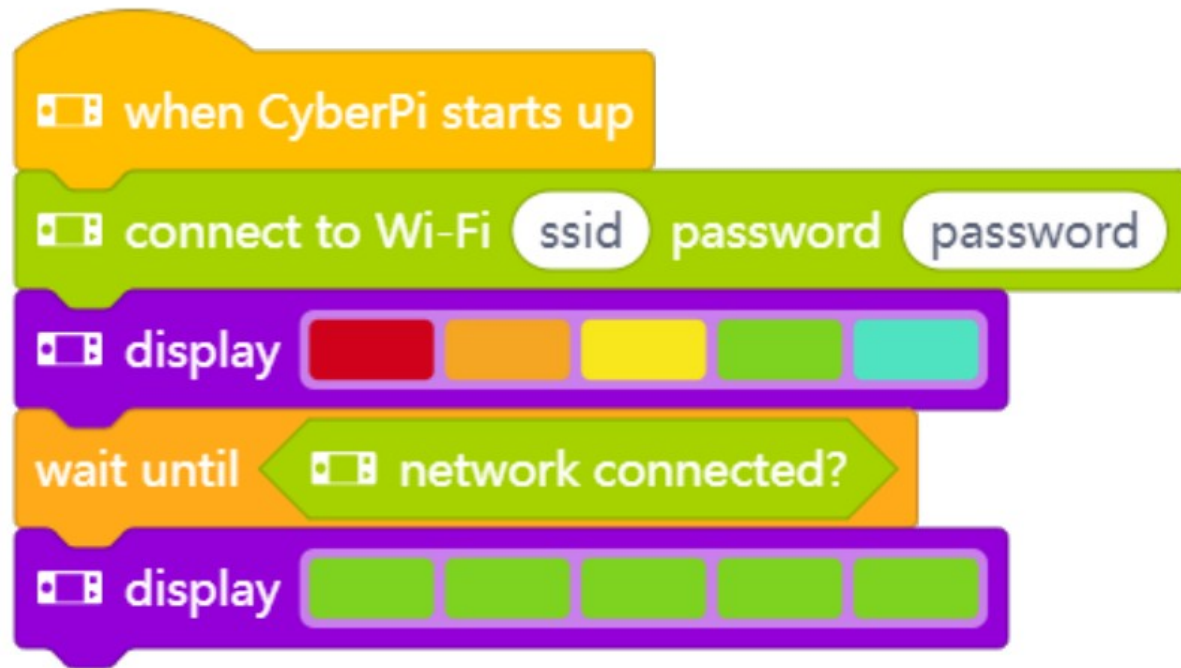
- This block starts trying to connect to the wireless network you name
- The SSID is the network name — both it and the password are case sensitive
- Some schools only allow known devices, checking a unique number called a MAC address
- If that number is unknown, the network refuses even a correct password
- Easiest fix: a temporary phone hotspot, if your school rules allow it

Wait Until The Connection Is Really Made



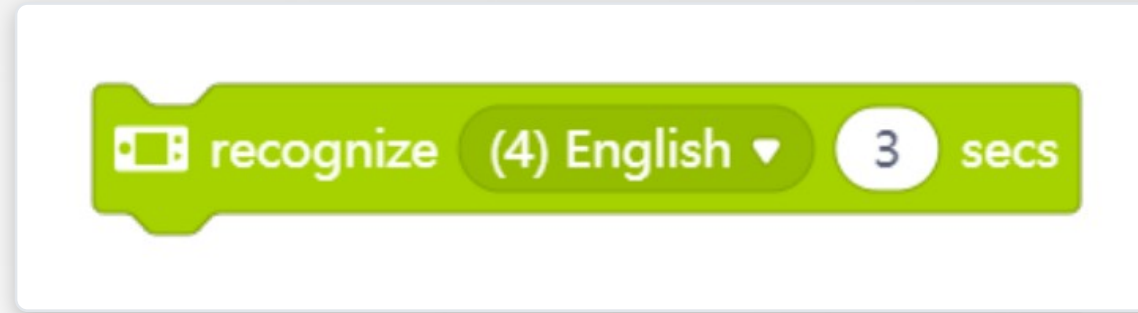
- The connect block does not wait — the next blocks run straight away
- That is called non-blocking
- This Boolean block checks whether the connection worked and reports true
- Pair it with a “wait until” block to pause everything until you are online
- Later you could add a friendly message or a time-out

Your First Program — Get Online



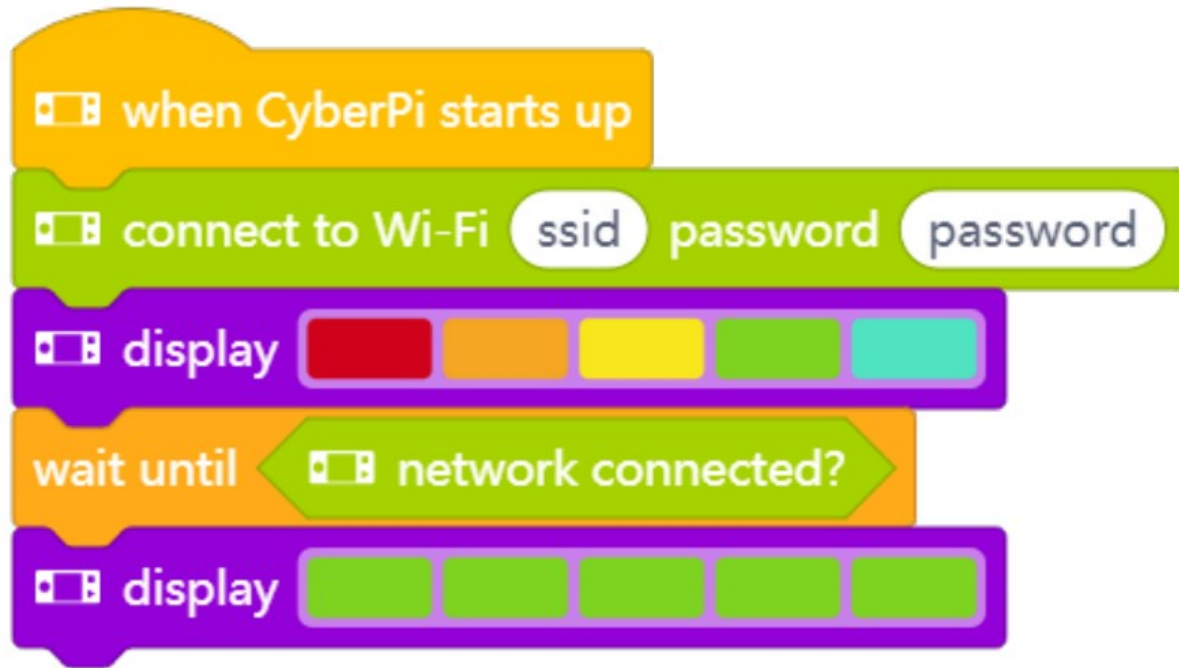
- One thread makes the internet connection when the robot starts up
- Other threads handle the recognition
- The display shows the status; the LEDs turn green once connected
- Type your network name and password exactly — they are case sensitive
- Connect by USB cable, switch on Upload mode, and test it
- Now your robot is on the Internet of Things

Blocks For Speaking And Listening



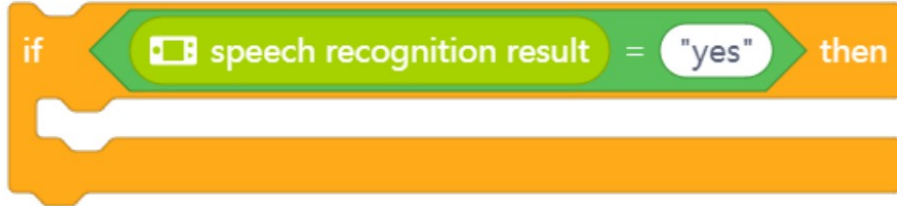
- One block makes the robot read text out loud — the opposite of recognition
- Another starts recording for a set time and sends it off for recognition
- Speech recognition works in 12 different languages
- A reporter block hands you back the recognized text
- Save it in a variable, show it on screen, or test what it contains
- There is even a block that translates text into another language

Say Something And See It Understood



- Press button B and mBot2 listens for 3 seconds
- The result appears on the CyberPi display
- The robot then speaks the recognition out loud
- Compare what you said with what it understood
- Build it and test it — this is the heart of the lesson

"Yes" Is Trickier Than It Looks



... would not work... the recognition result would be different ("definitely yes"). In order to allow a broader set of answers check if the answer-string contains the word "yes":



- You could tell the robot to recognize exactly "yes"
- But what if someone says "definitely yes" or "yes of course"?
- An exact match fails — "yes" does not equal "definitely yes"
- Instead, check whether the answer contains the word "yes"
- Now every polite way of agreeing works
- Be careful how specific you make your matches

Cloud Messaging Reaches Across The World

send user cloud broadcast message

when receiving user cloud broadcast message

send user cloud broadcast message with value 1

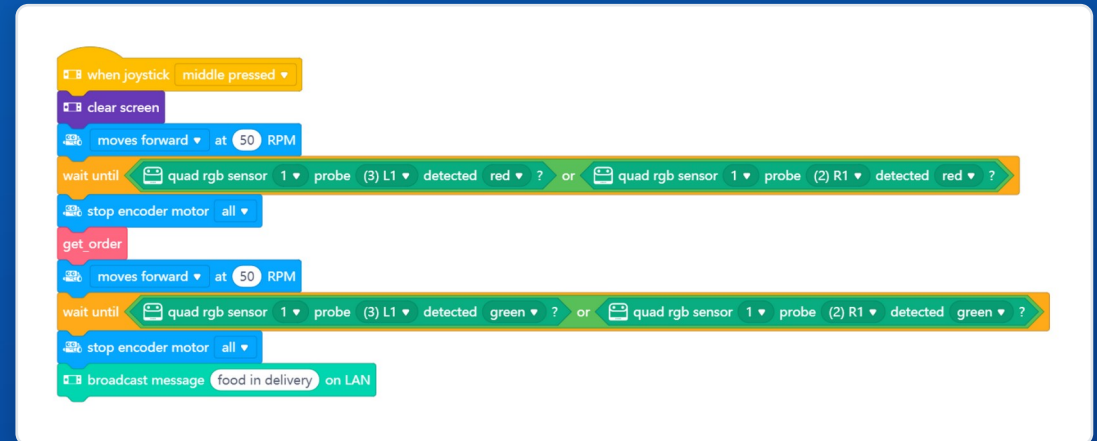
user cloud broadcast message value received

- LAN messages from the last lesson only work when devices are close together
- Cloud messaging blocks live in the IoT category
- They work exactly like the LAN blocks, but over the internet
- Both devices must use the same account, so only your devices connect
- Cloud broadcasts work worldwide but can take a few seconds to arrive
- LAN broadcasts are fast but only work locally

Your Mission

Program A Robot Waiter

- Turn mBot2 into a waiter that takes an order by voice
- Use a variable to remember which stage the conversation has reached
- Send the order to the kitchen using a message
- Plan first: what should it do, what do you need, which blocks — then test and improve
- A second CyberPi can show the status, if it is on the same Wi-Fi network



25 minutes

Showtime and Wrap-Up

- Did your robot waiter take an order successfully?
- Film a short, fun movie of your service robot
- Reflect: what are you most proud of? What would you improve?
- Which parts were easy, and which were tricky?
- What do you want more explanation about, and who could help you?

Today you learned

- What speech recognition is
- How to get your robot online
- How to hold a dialog
- How to send cloud messages