

S1: Secure a Door

Student Worksheet · Choose Your Build

🎯 YOUR MISSION

Build the first part of a micro:bit security system: something that can lock a door, or set off an alarm. This is the big idea behind every security system: something notices an event happens, and something else reacts to it.

What you'll need

NEEDED EITHER WAY

micro:bit

☐ Option A

servo motor, micro:bit



☐ Option B

nothing extra, just the micro:bit

Pick whichever option matches the kit you've got, and tick the box above.

How security systems actually work

Whether it's guarding a shop, a house, or a bank vault, every security system really just does two jobs:

1. **Sensing**: noticing that something happened — a door opening, a window breaking, someone walking past.
2. **Responding**: reacting to it — locking a door, sounding an alarm, sending an alert to a phone.

In this challenge, pressing a button stands in for the sensing part. The servo is your responding part.

SYSTEM	SENSING PART	RESPONDING PART
Smart doorbell camera	Someone at the door	Phone notification
Car alarm	A smashed window	The siren
Fire alarm	Smoke	The sprinkler system

💬 TALK ABOUT IT, AS A GROUP

Why might a real security system want both a lock AND an alarm, instead of just one?

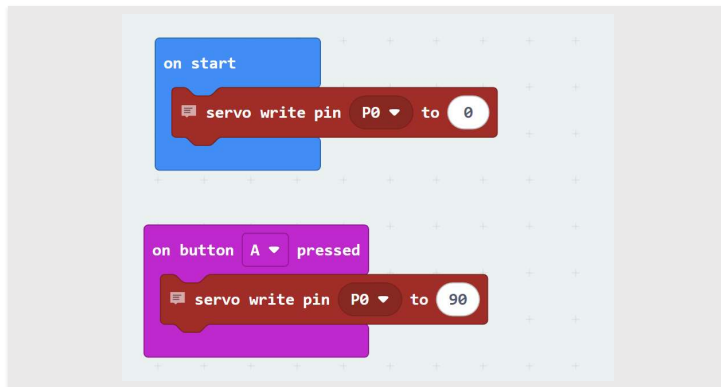
Quick check

Before you start building, work with a partner. For each system below, write down the sensing part and the responding part.

SYSTEM	SENSING PART	RESPONDING PART
School fire alarm		
Automatic supermarket door		
Burglar alarm		

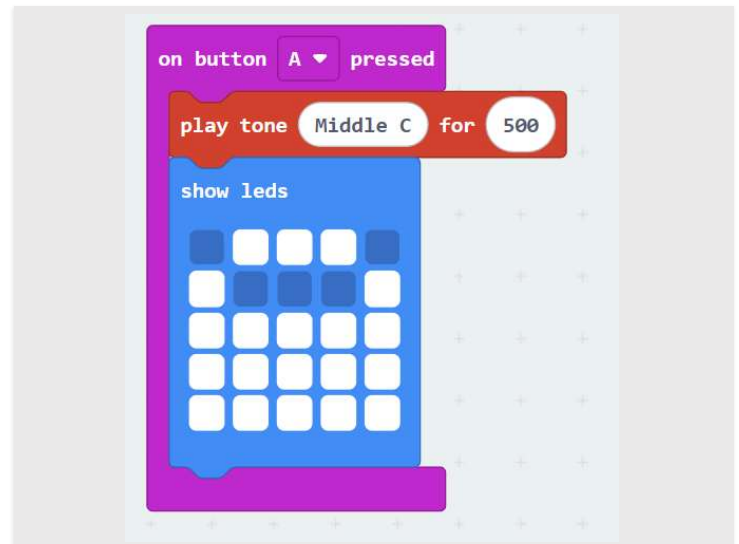
Starter code

OPTION A · BUTTON A ONLY



Equipment needed: micro:bit + servo & breakout board.

OPTION B · BUTTON A ONLY



Equipment needed: just the micro:bit, nothing else.

<> PSEUDOCODE

This is plain-English pseudocode, not real code to copy into MakeCode. Your blocks will need to do the following; you'll build it yourself with the actual blocks.

OPTION A PSEUDOCODE

```
on start:
  servo write pin P0 to angle 0

on button A pressed:
  servo write pin P0 to angle 90

on button B pressed:
  servo write pin P0 to angle ____ // FILL IN THE BLANK
```

OPTION B PSEUDOCODE

```
on button A pressed:
  play tone Middle C for 500 ms
  show leds (lock icon) // draw one with show
  leds

on button B pressed:
  play tone ____ for 500 ms // FILL IN THE BLANK
  show leds (____) // FILL IN THE BLANK
```

🔪 YOUR TASK — OPTION A

Add "on button B pressed" using "servo write pin P0 to ____", so Button B closes the door again.

Value I used: _____

🔪 YOUR TASK — OPTION B

Add "on button B pressed" with a different tone and icon, so you can tell the two states apart.

Tone I used: _____

Choose your build

Pick whichever option matches the kit you've got.

Option A: Servo-controlled door

Pressing Button A drives a servo motor to open a door, and Button B closes it again.

Option B: Simple speaker alarm

Pressing Button A plays a tone through the built-in speaker. No extra hardware needed.

Build it: checklist

- ☐ Both buttons work: one to act, one to reverse it. (Door opens AND closes.)
- ☐ Does the servo always end up in exactly the same closed position?

THINK ABOUT IT

Right now, anyone can press the button and unlock the door. Is that a problem? What would you need to add so only the right person could do that?

Stretch it further

Finished early? Don't start from scratch: modify the code you've already built.

- ☐ Modify your "on button A pressed" group so a sound plays at the exact moment the door opens: a lock and an alert together.
- ☐ Use the LED display to show a simple icon or word for "locked" and a different one for "unlocked".
- ☐ Auto-lock: make the door close itself a few seconds after it opens, instead of waiting for Button B. Add a "pause" block between the open and close lines.

```
on button A pressed:
  servo write pin P0 to angle 90
  pause (ms) 3000
  servo write pin P0 to angle 0
```

- ☐ Sweep instead of snap: move the servo through a few small angles with short pauses between them, so the door opens gradually instead of jumping straight to 90°.

→ NEXT STEPS

This challenge leads straight into Challenge D2 (arming and disarming the system) and D3 (adding a PIN code).