



9.7 Project: the relay

Talking to each other · Robot club · about 25 min

What this lesson is about

Drive to the handover, then and only then say go.

- The plan
- Arriving
- Handing over

Questions

6 marks in all

1. Put the relay handover in order.

[1 mark]

Number the lines 1 to 5 to put them in the right order.

- ___ wait(0.5) to settle
- ___ send("go")
- ___ Stay put and listen for finished
- ___ stop()
- ___ Drive into the handover zone

Answer:

```
Drive into the handover zone
stop()
wait(0.5) to settle
send("go")
Stay put and listen for finished
```

Arrive, stop, settle, and only then hand over the baton.

2. The starter code sends go before driving. What happens?

[1 mark]

- ☐ A The Runner leaves before you arrive: a false start
- ☐ B Nothing, the Runner waits for you anyway
- ☐ C The message is queued until you reach the zone
- ☐ D The Runner never leaves

Answer: A. The rule that makes it a relay is that go is sent while you are inside the zone.

3. The handover zone starts 32 cm ahead and is 16 cm deep. How many cm ahead is its middle?

[1 mark]

Answer: 40. $32 + 16 / 2 = 40$, which is where the example stops.

4. What does this program print?

[1 mark]

```
def in_zone(y):  
    return 32 <= y <= 48  
  
for y in [30, 40, 49]:  
    print(y, in_zone(y))
```

Answer:

```
30 False  
40 True  
49 False
```

The zone runs from 32 to 48. 30 has not arrived yet and 49 has gone past.

5. Why is there a `wait(0.5)` between `stop()` and `send("go")` ?

[1 mark]

- ☐ **A** It lets the robot settle, so it is not still rolling when it hands over
- ☐ **B** The radio needs half a second to switch on
- ☐ **C** The Runner cannot hear sooner
- ☐ **D** `stop()` only works after a wait

Answer: A. A robot still rolling could drift out of the zone as it sends.

6. You sent `go` and have heard nothing for two seconds. What is a sensible thing to do?

[1 mark]

- ☐ **A** Send `go` again, in case the first was missed
- ☐ **B** Drive after the Runner
- ☐ **C** Wait forever without sending
- ☐ **D** Leave the zone to look for the Runner

Answer: A. Radios miss things. Repeating the message, from inside the zone, is safe.

The task: the relay

Drive into the handover zone, stop, send `go`, and stay there until the Runner says `finished`.

```
# the two lines every program starts with: the commands, then the robot
from bugbot import *
connect()
# radio this to every other robot
send('go')
# drive forward at 60 for 40 cm, then stop
forward(60, distance=40)
```

The hint students can ask for: Drive into the handover zone, stop there, and only then send `go`. The Runner sets off when it hears it and says `finished` at the far end. Stay in the zone.

A solution

```
from bugbot import *
connect()
while position()[1] < 40:
    forward(60)
    wait(0.1)
stop()
wait(0.5)
send("go")
for tick in range(80):
    for sender, text in messages():
        print(sender, "says:", text)
        if "finished" in text:
            break
    wait(0.1)
```

Any program that meets the task's checks is marked correct in the simulator; this is one way, not the only way.