
Revision Challenges

Railway Crossing

Recreating a railway crossing using multiple Micro:Bits, servos and Neopixels.

For these exercises, imagine you have one Micro:Bit controlling the crossing whilst another is acting as a beacon on-board the train. The crossing will know a train is coming when the beacon's signal strength gets stronger.

BRONZE Challenge:

- Use an image, animation and/or text to create a start-up screen that identifies your program.
- Have the Micro:Bit send the number zero via radio from inside the forever loop.
- Create a beacon strength variable and have it set to the signal strength being received.

BRONZE Challenge:

- We now need two functions, one for the program for when a train is coming, the other for when there isn't. Give each function a suitable name and have a different image in each.
- Call your function for when a train is coming when the signal strength is greater than or equal to -75. Otherwise, call the no train coming function.

SILVER Challenge:

- **We now need to create our crossing lights. For this we need a Neopixel connected to pin 1 which is made up of 15 LEDs.**
- Set up two ranges, with suitable names - one for the top 5 LEDs and another for the bottom 5 LEDs.
- Remove the image in your function for when a train is coming and replace it with a program that will turn the lights on and off (alternating between the top and the bottom) three times. Include a pause of 500ms after each light turns on.

SILVER Challenge:

- **Replace the image in you function for when a train is not approaching with a program to make sure the lights are all turned off.**
- Have your program play a middle C note when the top light is on and a middle E note when the bottom light is on. This is our alarm to warn drivers and pedestrians a train is coming.

GOLD Challenge:

- For our railway crossing barrier we shall use a servo to control its movement. This needs to be connected to pin 2 and be in the open position (0°) at the start of the program.
- When a train is approaching, we want the lights and alarm to sound three times and then for the barrier to close (move to 90°).
- Once the barrier is closed, we need the alarm to stop while the lights continue to flash.

GOLD Challenge:

- **Once the train has passed and the beacon signal fades to less than 75 again, we want the barrier to open (retuning to 0°).**
- **At the moment, the servo is moving too fast. This could cause injury to a pedestrian or damage a passing vehicle. So, we need the barrier to lower 5° every 200ms. When it is opening, it is safer to go faster - in this case 20° every 300ms.**

Thank You
