Make an obstacle avoidance robot using Thymio II, which has to travel from the Start point to the other end area and return to the Start area, as shown in Figure 1. The full environment area is a grid-based map consisting of **3**×**19** cells, where each cell is 20 cm × 20 cm. There will be 5 obstacles (blue circles in the figure) positioned randomly, where there is only one in a column.

Tasks:

1. **Mapping and Localization**: Robot must travel from the Start point to the other end while **localizing** itself within the environment using the **encoders** and **mapping** where the obstacles are using its **proximity sensors**. Hints: use a 3 × 19 array, and fill it with “0”s, representing the empty free area.
   1. When the obstacle is detected, fill the corresponding cell with “1”, representing the cell as an obstacle. Print the updated **map**. (**2 points**)
   2. The robot should update the **pose** upon entering a new cell and print the updated **pose** (cell number in a row, cell number in a column, direction) on the console (**2 points**).
   3. Must stop and turn back when it reaches the Start area. (**1 point**)
2. **Grid-based navigation**:
   1. The robot should return to the Start area and print the current pose (cell indexes) on the map path on the console. For example, printing the cell indexes from the current location to the goal as follows (19,1) (18,1) (18,2) …. (2,2) (2,1). (**2 points**)
   2. Head to the Start area (**1 point**) without hitting obstacles. (**1 point**)
   3. The robot must stop when it reaches the Start area. (**1 point**)