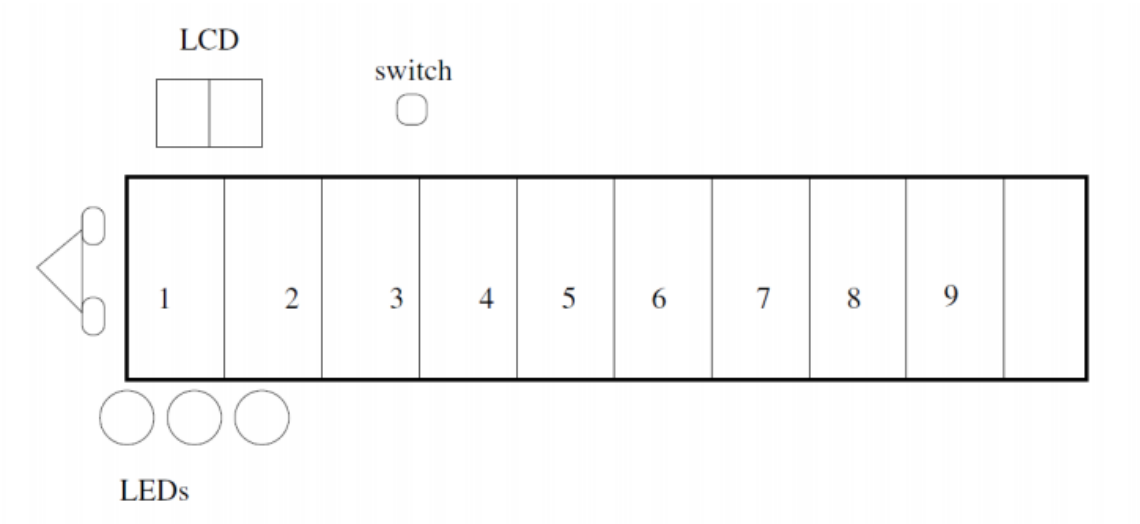
Task:

You are required to implement a simple game using your Atmel Atmega328P microprocessor and an ultrasonic HC-SR04 component, along with other electronic components. The goal of this game is to implement a simple game that can be used to improve hand-eye coordination. The figure below gives a high-level view of how the game works. The game is played on a suitable rectangular board approximately 10cm wide. The surface is divided into k regions (in the figure shown, k = 9, but you will decide your own k). At the one end of the board is an ultrasonic sensor, two 8-segment LEDs, a slide switch and/or push button switch, and some LEDs.



The game has two modes

- **Test mode**: In test mode, the player must put her/his finger (or suitable object) in a region. Using signals from the ultrasonic sensor, you must make the LCDs display the number of the region.
- **Playing mode**: In playing mode, your system will randomly generate a number, which should then be displayed on the LCD screen. Within 4s, the player must put her/his finger or object in the given region.
  – If the player correctly places their finger/object in the correct region, a GREEN LED should light up (the player scores 2 points).
  – If the player misplaces their finger/object in the wrong region, a RED LED should light up (the player scores −1 points).
  – If no finger/object is placed on the board, an ORANGE LED should light up (score of 0). After 6 turns, the game ends. At the end of the game, the overall score of the player must be displayed on the LCD displays for 2 seconds. If the score is negative, then the red LED should be on; if the score is positive the green score should be on.

- The game or test is initiated by pressing the push button once. The mode is changed with the slide switch.