Methods of Computer Science Education: Design

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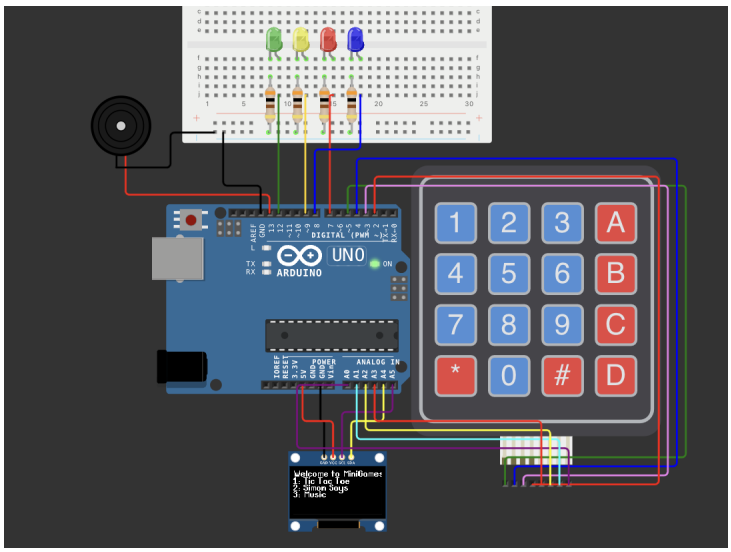

Project name	Mini Games using Arduino
Storyline	It is simple and quick to develop diverse games for the Arduino. This project includes the classic TicTacToe game (with a simple computer player), the known SimonSaysGame and a music player. • TicTacToe a simple two-player game where players take turns marking a 3x3 grid with their respective symbols (usually X and O). The objective is to be the first to get three of your symbols in a row, either horizontally, vertically, or diagonally. If all nine squares are filled without either player achieving this, the game is considered a draw. • SimonSaysGame is a memory game that uses 4 lights. The game generates a random sequence of lights, and the player must repeat the sequence in the correct order. Each round, the sequence gets longer, increasing the difficulty. The player wins by successfully repeating the sequence for a set number of rounds or loses if they make a mistake. • Music, just include your favorite songs (a song library is included in the project (clone from GitHub))
Target	It is for the **fourth year** and LSSA - Liceo Scientifico Scienze Applicate
Level	The base outline will be given to the students, so they only have to program the games. • TicTacToe (intermediate) • TicTacToe AI (hard) • SimonSaysGame (intermediate) • Music (easy)

Learning goals	The student should get used to program on the Arduino and Cpp. Over that they will have to learn how to use different hardware components (e.g. display, keypad, lights and so on). Depending on each student's interest they can choose to do a game with more or less hardware. Students have to acquire information themselves, depending on their project choice. Therefore, independent learning is encouraged very much.
Hardware	Each student have to understand how to use: • keypad • oled display Over that it depends on the preference of each student, what their project is about. Some prefer more hardware and some less, so they are not forced to a specific hardware.
Software	The students will have to learn how to write clean and safe code. They will
Operating description	How the project works
Handiwork	Nothing has to be created by hand by the students. But if they come up with a game idea which includes handiwork, they can do so.
Materials list	Depending on the student's choice they need different materials. Students should research on their own what they need, the following list is a suggestion. • wokwi-arduino-uno **(Only mandatory component)** • wokwi-buzzer • board-ssd1306 • wokwi-membrane-keypad • wokwi-breadboard-half • wokwi-resistor • wokwi-led (220Ω) – blue – green – red – blue • diverse cabels
Lesson planning	Classroom lesson: ... hours Construction: ... hour Software production: ... hour Assembly and final check: ... hours
Project details	pdf, pictures, video, code and more. Eventually also a link to material