COMP9032 Project User Manual

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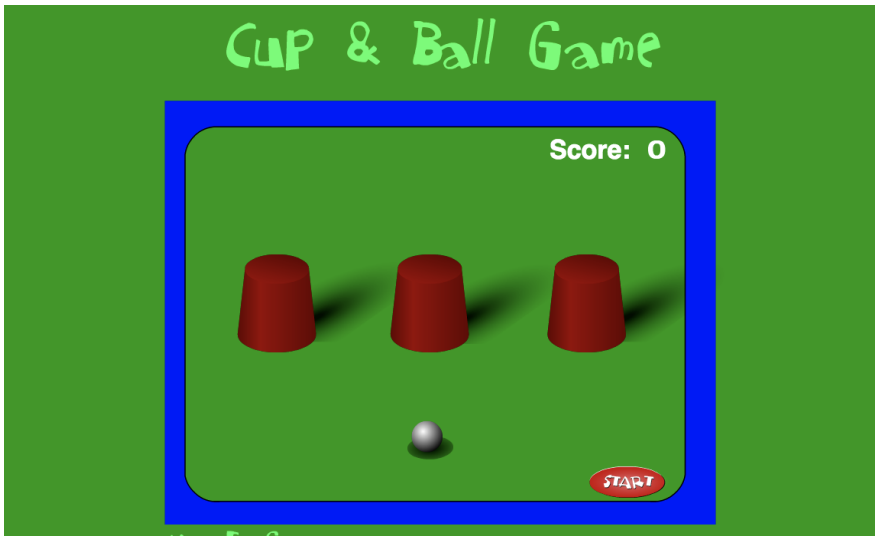
0.1 Introduction

This project simulates an online game called Cup and Ball by using AVR Lab board. In this game, a ball is shuffled under three cups and the user can guess the position of the ball. For each guess, you gain one point if it is correct or lose one point if it is wrong.

In this system, we use the keypad, LCD, motor, LEDs and push buttons to simulate the game. The keypad is used for the user to input the number of cup which he guesses the ball is under. The user can press the number 1, 2 or 3 on the keypad, which indicates the ball is under LED0, LED1 or LED2, respectively. The LCD displays indicators in the game, such as the start of the game, and the scores the user gets. The operation of the motor is used to show the beginning of the game. The LEDs are in different use. LED0-2 are used to indicate three cups that may have balls hidden. LED3-6 are result indicator which indicates whether the user's guess is correct. LED7 is used to indicate the state of the motor. When the motor is running, LED7 is on, otherwise it is off. When the push button on the Lab board is pressed, the game starts.

The user can simulate the game multiple times. If the user loses all the scores, the simulation will be reset automatically and the game will restart.



0.2 Board Connection

The connection of the pins on the Lab board is demonstrated as below.

AVR Pins (top and bottom row)		Input/Output Device Pins (middle row)	
Port Group	Pin	Port Group	Pin
PORT A	PA4	LCD CTRL	BE
PORT A	PA5	LCD CTRL	RW
PORT A	PA6	LCD CTRL	E
PORT A	PA7	LCD CTRL	RS
PORT C	PC0	LED BAR	LED2
PORT C	PC0	MOTOR	Mot
PORT C	PC1	LED BAR	LED3
PORT C	PC2	LED BAR	LED4
PORT C	PC3	LED BAR	LED5
PORT C	PC4	LED BAR	LED6
PORT C	PC5	LED BAR	LED7
PORT C	PC6	LED BAR	LED8
PORT C	PC7	LED BAR	LED9
PORT D	RDX4	INPUTS	PB0
PORT D	RDX3	INPUTS	PB1
PORT F	PF0	LCD DATA	D0
PORT F	PF1	LCD DATA	D1
PORT F	PF2	LCD DATA	D2
PORT F	PF3	LCD DATA	D3
PORT F	PF4	LCD DATA	D4
PORT F	PF5	LCD DATA	D5
PORT F	PF6	LCD DATA	D6
PORT F	PF7	LCD DATA	D7
PORT F	PF8	LCD DATA	D8
PORT L	PL0	KEYPAD	C3
PORT L	PL1	KEYPAD	C2
PORT L	PL2	KEYPAD	C1
PORT L	PL3	KEYPAD	C0
PORT L	PL4	KEYPAD	R3
PORT L	PL5	KEYPAD	R2
PORT L	PL6	KEYPAD	R1
PORT L	PL7	KEYPAD	R0
PORT E	PE3	JP92	RIGHT

0.3 Game Procedure

The whole procedure of this simulation system is demonstrated as below.

1. Game Initialization
After the simulation system is turned on (i.e. the lab board is powered on), the system is initialized and the ball is with an arbitrarily cup. In this time, an indicator "Ready..." is displayed on the LCD. The cup LED with the ball is on and the other LEDs are off.

2. Game Start
When the oush button PB0 is pressed, the game starts and the ball is shuffled under the three cups. In this time, an indicator "Start..." is displayed on the LCD, the motor spins and LED7 is on. The three cup LEDs (LED0-2) are all on, but in dimmed light. The result indicator LEDs (LED3-6) are off.

3. Make a Guess
After the game starts, the user can start to make a guess by pressing the push button PB0 again. In this time, the motor stops and LED7 is off. The three cup LEDs remain dimmed. "Ball?" is displayed on LCD to indicate the user to choose the cup that he guesses the ball is under.
If the user guess that the ball is hidden in cup 1 (indicated by LED0), he can press "1" on the keypad. If the user guess that the bull is hidden in cup 2 (indicated by LED1), he can press "1" on the keypad. If the user guess that the bull is hidden in cup 3 (indicated by LED2), he can press "1" on the keypad. After making guesses, the user will have scores which is displayed on LCD as "Score: X".
If the guess is correct, the on the LCD is incremented by 1, and all the result indicator LEDs will flash four times.
If the guess is incorrect, the score on LCD is decremented, and half of the result indicator LEDs (LED3 on, LED4 off, LED5 on, LED6 off) will flash four times. If the score of the user is less than zero, the game restart automatically. "Lose." will be displayed on the LCD, and the system will go to the initial state. Moreover, if the first guess of a new game is incorrect, the score of the user is -1 and the game will restart. Thus, a user can get scores only if he win the first guess.