TIC TAC TOE

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Objectives

- Introduction
- Description
- Project Features
- Hardware Part
- Software Part
- Challenges
- Future work
- Demo
Introduction

- Games provide a real source of enjoyment in daily life.

- Games also are helpful in improving the physical and mental health of human. Apart from daily life physical games, people also play computer games.
Description

• TIC TAC TOE, It is a two player game, zero-sum game (gain equals the loss of other).

• N*N square board. In our game, it is 3 x 3 squares.

• Win state: when one of the two player get three same symbols horizontally, vertically or diagonally - on a 3 x 3 grid.
Methodology

- Robot that play against human player;
- Take image of the board;
- Analysis the image using alpha beta algorithm;
- Send command to Arduino to make the robot take the piece from specific position;
- Move it to one of the nine positions depend on which player was play.
Project Features

- The game can start by any one of the two player.

- The main features of our project that we can play any level of tic tac toe with the robotic arm (Simple, Medium, Hard).

- The result after the game finish will see on the LCD.

- The game can detect if the player play or not by itself without click any button to hint it.
Hardware Part

• First we constructed a mechanical arm capable of manipulating pieces to play the game.

• Then in this part we determine the values for each motor on each position for the nine positions and store the values in different functions, then depend on the command received by serial we control the arm.

• Lastly and the most important was the development of code to translate move of the tic-tac-toe program into actions of the physical system.
Components

• A robotic arm with gripper
• Arduino Microcontroller
• 4 servo motors
• Board of 3 x 3 squares
• Red and white pieces
• LCD
• Web cam
• Power supply
Microcontroller

- Arduino UNO
- Microcontroller: ATmega328P
- 14 digital input/output pins (of which 6 can be used as PWM outputs).
- 6 analog inputs.
Servo Motors

- We use the MG996R with high torque (metal servo) because this type of servo endure high torque and if we use the plastic motor may be damaged fast.
Robot Design
Software Part

We build application by using visual basic program to deal with the hardware part. This application consist of three parts these are communicate with each other to play a Tic Tac Toe game between robot and human player using the image processing to analyze the picture from camera and the alpha beta algorithm to determine the suitable position for the robot.
Interface
Implementation

- TicTacToe class: control the board in the project; consist off 3x3 array and function to set the current player; may be player X or player O in the specified position in the array; the position in the array specified by the AI algorithm in AI class for the player O, and when any position in the array is set by any player there is two function to detect the win or the equality.

- Second part is a TTTAI class this class will detect the best move for the robotic arm (Player O)
Implementation

- Third part in the program is the frame window that shown to the user, this frame consist of webcam image with size of 360*360 pixel to open the web cam connected to computer, Picture Box which consist the picture taken by the camera every 200 milliseconds.
Challenges
Demo
Any Questions
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