

Introduction

Foosball is a table like soccer game that can be played with as many as four players and as little as two. What if you had the urge to play but no one else is around to play? Is it realistically feasible to play by yourself? Well not until “Team Fifa” decided to build a prototype to solve this never ending problem. This paper will discuss the implementation of an automatic foosball machine using webcam tracking connected to microcontrollers which controls the motors to move the rods and hit the ball. Rice University created a similar project that would allow one player versus the computer foosball in fall 2003, which used a foosball table laced with electrical motors and positioning sensors. [1] Also Bernhard Nebel of the University of Freiburg, Germany has already started marketing the “Star Kick” which is a computerized foosball machine without the advanced movements such as back passing and stopping the ball. The biggest problem that the Star Kick had is that the computer is not yet smart enough to evolve to the level of the person playing the game. [2] The computer would play on the same difficulty level regardless if it was playing a toddler or a foosball world champion. After contrasting this project anyone who is at least four foot tall should be able to play foosball without any human assistance. Another interesting model was the “KiRo” which used pulley motors, along with servo motors to drive the rods. [3] What makes the KiRo so unique is that it only used sensors for positioning encoders as oppose to multiple sensors. [4]After looking at the video one would conclude that there are many adjustments that need to be made such as playing foosball at more rapid speeds for pros. [5]This project could potentially open a market for other such automated games such as air hockey and table tennis.

Foosball Schematic

“Project foosball” will perform by using computer vision (webcam) processing 90 frames per second. This webcam will relay messages of location coordinates to microcontrollers. Sensors will be placed inside of the table to assist the webcams tracking accuracy. The microcontrollers will trigger commands to the servo and stepper motors instructing them to move in a particular direction depending on clock pulses. Driver circuits are placed between the microcontrollers and motors to provide resistance against dc current.

As the coils in the motor are turned the rods turn on the foosball table and thus hits the foosball. A computer will be the database of the entire system which records information and provides self maintenance in the case of malfunction.

Nuts and Bolts

Driver circuits will be used to control the microcontrollers. As the images are retrieved from the webcam with coordinates of the balls location, a clock pulse will be generated to the driver circuit. The direction of the pulse shifting determines the direction of the motor. When the clock pulses are high, microcontroller pins will be turned from off to on. As the pulse returns to low, the pins will be disabled and turned off. These pins open and close the transistors going to the motors of the servo and stepper motors. These transistors conduct current through the motor coils.[6] As the coils turn the motors speed changes accordingly. The motors will be mounted on the end of the playing sticks or on a table depending on the weight. What makes these motors so unique is how they communicate with each other. The motors are wirelessly synch to each other. They talk to each other and adjust as they see fit and reset accordingly. By them being so innovated, this will eliminate fully manual control motors and cut down on computer coding.

[1] Wikipedia (2007, 12 June). “Foosbot”

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[2] Dasilva, Vic (2005, 8 December). “Star Kick, The One Man Foosball Table”

[WWW document] HTTP: <http://www.uberreview.com/2005/12/star-kick-one-man-foosball-table.htm>

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[3] Duncan Graham-Rowe. (2004, September)

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<http://www.newscientist.com/article.ns?id=dn6346>

[4] Thilo Weigel, Bernhard Nebel “KiRo-An autonomous table soccer player”
Institut für Informatik, University Freiburg, Freiburg Germany,[2005 January]

[5] KiRo “The Table Soccer Robot”

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<http://www.informatik.uni-freiburg.de/~KiRo/english/index.html>

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[6] Model Railroad & Misc . Electronics “Stepper Motor Driver Circuit (74194)”

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