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EEE102-2
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EEE-102 PROJECT PROPOSAL
Fall Term

Position Detect System

I. *Abstract*

The aim of this project is to create a motion tracking system which will detect the position of a pawn on a 2x2 table and move another pawn on a second 2x2 table to exactly the same place. This project is inspired by smart chess tables which can move pawns without touching them according to their assigned places.

II. *Detailed Design Plan & Basys3 Functionality*

The project will consist of two steps. Firstly, in order to achieve position detection, 4 US 1881 hall effect sensors will be placed under each square of 2x2 table and under the pawn there will be a magnet.(Fig 1) When moving the pawn to a different position (e.g from 1-1 square to 1-2) the magnetic sensor on 1-2 will sense it and the signal will be transferred using an analog to digital converter to the FPGA board that is Basys3. On the Basys3, the placement of the pawn will be displayed on leds. In the second step the signal coming from the Basys3 will be conducted to the servo motors under the second table (another separate table).(Fig 2) Using two servo motors (one controls the motion on the x axis and another one controls the y axis) a second pawn will be moved to the desired place that is the placement on the first pawn. The motion of the pawn will be provided again with magnet placed under it and a metal piece placed on the rod which is controlled by servos.(Fig 3)
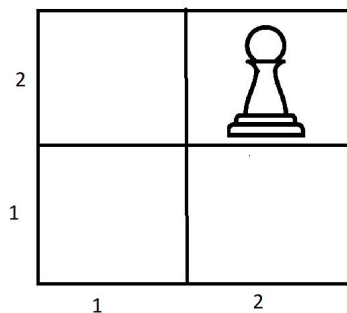

Fig.1
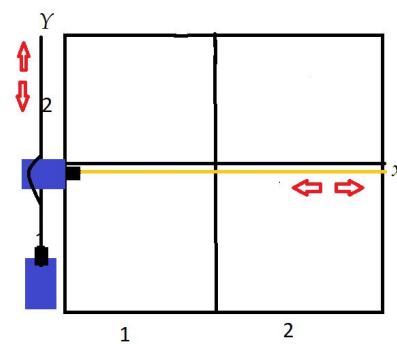Table1-with Hall effect sensors beneath and a pawn placed with a magnet under it

Fig.2
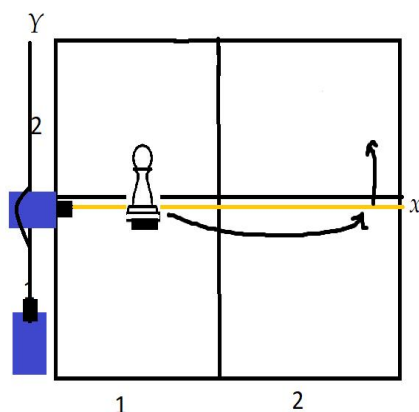Table2- with 2 servos controling the motion in y and x axis under the table

Fig.3
Table2- with pawn moving to the same position as table 1 using servos while attaching them magnetically.

III. *Progress Demo*

For the progress demo, the placement of the pawn in the first table will be detected and converted to digital signal. It wil displayed with the leds on Basys3.

IV. *Final Demo*

In final demo servos of the second table will be controlled with Basys3 and will move according to the position of the first pawn. Magnetically attached second pawn will be placed on the same position of the first pawn.

V. *Components*

- Basys3 FPGA board
- 2 SG90 9G servo motors
- 4 US 1881 hall effect sensors
-Analog to Digital Converter (could be Arduino or can be made manually)
- Jumper cables