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Design Of Chessboard Using Arm 7

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ABSTRACT

Chess is one of the old and challenging board games. Even though digital games have become more attractive now a day's Chess is still admired in the onscreen model of the game. A board game with clear movements of all the pieces is considered attractive for the users. Hence, a new chess board is designed by the Advanced RISC Machines (ARM) processor.256 x 256 touch screen display, ARM processor, buzzer and switches are components used in chess board designing. Keil software is used to achieve the automation of the chess board.

keywords: - Chess board, Keil software, ARM processor, digital games.

I. INTRODUCTION

Playing a game is an activity for individuals. Many games are designed for most participants to enjoy. Companies are investing to create games with technology for the new era. In growth of the digitalized world today and technology has advanced tremendously, because of making computer chess games and online chess hubs are very familiar. [1]. they do not give the sense of playing a real chess game with a chess board and pieces. There are many mobile and desktop applications accessible that permit users to play chess with a computer through a user interface (UI) still they do not think the game interactive segment. [2].

Chess is one of the familiar strategy games and needs excellent practice and training. Chess training centers around the world can utilize these robots to provide remote coaching classes to children from professionals all over the globe. [3]. Variety of chess implemented by the past motivates automatic chess to be an impressive in terms of amusement. Newly, robotics and automatic trend are being promoted everywhere. Chess is a two-player strategic board game played with sixty-four squares in the order on 8x8 grids. Every participant starts from the sixteen pieces: one king, one queen, two rookies, two knights, two bishops as well as eight pawns. The queen is very powerful and the pawn is the lowest powerful so every piece proceeds differently [4]. Its aim is to create an unavoidable threat in checking and catching by placing the opponent under the king.

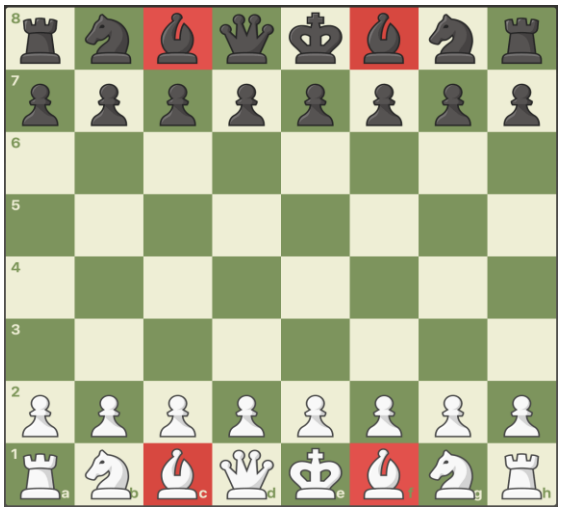

Fig. 1: CHESS BOARD

Chess has several principles and setups. Few of them are based on the game category. Competition of chess has duration, but may not be in local chess [5]. Due to differences in gaming, the principles of chess are explained. Anyhow, the kinds of chess and their moving phases are major rules that attract us. There are six kinds of pieces, inclusive of King, Queen, Knight, Bishop, Rook as well as Pawn every kind has its individual moves. In a single rotation there are four kinds of operations to choose from: Moving, Killing, Castling and Enjoying [6].

II. LITERATURE SURVEY

A. Dimitrija et. al. [7] suggested the robot arm to play chess. Their robots notice the location of chess pieces by utilizing camera that arranged on top. It is a gesture of pieces by using a clamp and arm process. The robot arm shows the mechanical segments to participants. The reactions of the participant could be most fascinating if the gesture of a chess piece is created with an invisible mechanism.

G. D. Illeperuma et. al. [8] Keeping the photo reflectors below chess board to locate chess pieces is an automatic chessboard system. With the control button, players can inform the system of their final turns. The system detects changes between earlier and present locations to determine game status. Anyway, all locations of chess pieces can be identified and remembered If maintained by software.

Banerjee et al. [9] execute their algorithm in dark red and lemon yellow color chessboard. They scaled the picture obtained by the camera with 640x480 resolutions. They choose Region Of Interest (ROI) manually as well as find the cell with the corner identifier. To determine the gesture of a chess piece, they compare the chess board matrix among some passing time.

Matuszek et al. [10] implemented an independent chess playing robotic device called Gambit. It was developed to play mechanically versus public opposition. It has a prime sense depth camera arranged on the robot arm and a palm is kept into the clutch to provide deepness and Red Green Blue color information. Depth as well as RED, BLUE,GREEN color information is utilized to examine as well as to identify the chess piece.

Piskorec et al. [11] Provides a chess vision system to examine and identify the original chess game. The device is designed by utilizing C ++ with Open Source Computer Vision libraries and two cameras are in parallel: top-vision and side-vision. The reason of the top-vision is to identify collaboration of pieces; Used to identify chessman types during side view.

Gurjit Kaur et al. [12] presents an artificial intelligence chess robot utilizing electromagnet. The goal for the activity is for chess admirer is to amusement reason, mainly for the single participants. An AT89C51 microcontroller was utilized in the activity to collect the input from parallel port as well as to handle Motors to gesture a piece of chess. The algorithm was designed utilizing MATLAB codes and C programming. MATLAB codes are utilized to approach the Red Green Blue Picture snapshot from the camera according to identify purchaser gesture and to acquire the point of the chess piece.

Sokic et al. [13] images scaled by the camera at 240x240 resolutions. They choose the ROI Utilizes GUI and spilt the cells by numerical integration, and then use the Sobel operator to determine the movement of the chess piece. They also design a triggering system for the end of the roll period among the participants.

Goncalves et. al. [14] Calibrate the camera to notice its posture related to the chessboard, spilt the cell with arithmetical computations, and later displays the color division. The change of a chess piece is identified by observing the presence of a chess piece on the cell.

III. CHESS BOARD WITH ARM PROCESSOR

The architectural overview of Chess board with ARM processor is represented in below Fig. 2.

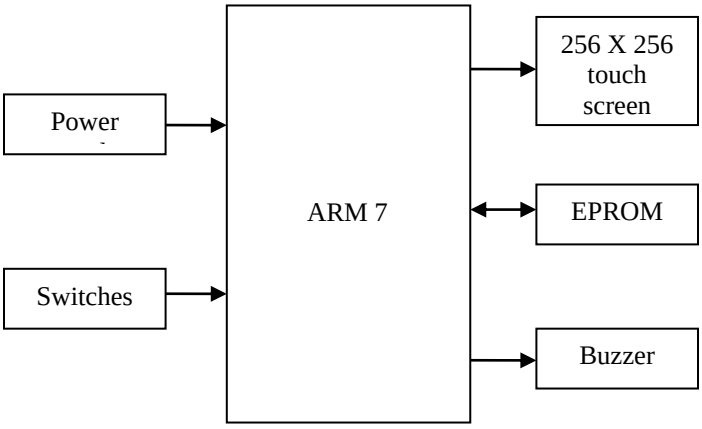

FIG. 2: ARCHITECTURAL OVERVIEW

The described model includes many elements such as ARM 7 microprocessor, power supply, buzzer, switches, EPROM and 256X 256 touch screen display. A complete explanation of these elements is expressed below.

ARM 7 microprocessor:

ARM7 is a common reason 32-bit microprocessor that provides high performance and least power utilization. ARM design is depending on the reduced instruction set computer (RISC) rules as well as the order set and the corresponding decode mechanism are easy than the micro-programmed complex instruction set computers. These simple outputs in high reference output and imposing real-time discontinue reaction for a little and profitability core processor.

ARM has seven basic function modes, the user mode, which is a non-specific mode that applies to all tasks.; FIQ (Fast interrupt request) mode, recorded when high importance (fast) disturbance is increased; IRQ (Interrupt) mode, when low-importance (normal) disturbance is increased; Supervisor mode, it comes in reset and when the software implements the interrupt notification; Abort mode utilized to control storage approach breaking Undef mode, utilized to control unspecified directions; And system mode, a special mode that uses similar registers as user mode.

Power supply:
There are several kind of power supply. All high voltage Alternating Current are designed to convert electricity into an appropriate less voltage supply for electronic devices as well as for more equipment. This is divided into a series of blocks and executes a specific operation.

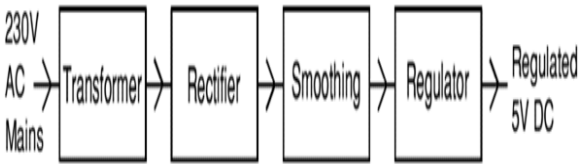

Fig. 3: BLOCK DIAGRAM OF REGULATED POWER SUPPLY

The blocks are described in more detail below:

- Transformer - steps down high voltage Alternating Current converts to low voltage Alternating Current.
- Rectifier - changes Alternating Current to Direct current, but the Direct current (DC) result is differing.
- Smoothing - smooth's the Direct current from differing from high to a low ripple.
- Regulator - ignore ripple by fixing Direct current outcome to a specified voltage.

Switches:
A switch is an automatic machine used to detach and attach an electric circuit. Switches changes megawatts of power on high voltage distribution lines from submineral to industrial unit. The switch is mentioned as the "gate" when summarized in arithmetic form. In the philosophy of logic, functional arguments are referred to as logic gates. The utilization of electronic that act as a device of logical gates is the key for a desktop, a system of electronic on/off buttons that act as computer logical gates. A railroad button is not an electrical, but a mechanical device that reroute a train from one track to other.

Buzzer:
The buzzer or beeper is a signaling device commonly utilized in electronics, generally in home appliances like automobiles, microwave ovens, or at game shows. It contains several switches or sensors, usually linked to the control unit.

When any button is pushed or the pre-set time is up, a constant or intermittent beep or beep in the connected button or control panel will light and sound the alarm.

Touch screen:
A touch screen is a connection of the input ('touch panel') as well as the outcome ('display') system. According to the above information the panel is usually coated processing system's electronic visual display. The display is always a Liquid-crystal display, AMOLED or OLED (organic light-emitting diodes) display during the device is normally a notebook, tablet or smart phone. The client can provide input or manage the information processing system using a particular stylus or multi-touch movement by touching the display with one or more fingers.

EPROM:
An (EPROM) Erasable Programmable Read-Only Memory is a kind of Programmable Read-Only Memory (PROM) chip that maintains its information when its power is turn off. Desktop RAM that can recover collected information later a power has been switched off as well as recall is known non-volatile. It is an array of floating-gate transistors separately designed by a computerizied machine which provides high voltages that commonly utilized in digital circuits. The designed, Erasable Programmable Read Only Memory can be deleted by showing it to efficient ultraviolet (UV) light source (like from a mercury-vapor lamp). EPROM are simple noticeable by the transparent fused quartz window on the top of the package, This allows the silicon chip to be detected, as well as allowing exposure to UV light when removed.

Operation:
The automatic chess board can be connected to the internet and this enables any user to play the game of chess on a physical board over the internet. Keil software is used to implementation of the chess board. Once code is Witten, then load this code into Keil software. For every movement delay will be calculated and after completion of delay buzzer will be blown. Therefore, automatic chess board is implemented.

IV. IMPLEMENTATION

Installing the Keil software on a Windows Personal Computer

- Insert the CD-ROM in desktops CD drive
- On every desktops, the CD will "auto run", and then observe the menu. If the menu does not pop up, then double click on the Setup icon, in the root directory: Keil menu will appear.
- On the Keil menu, please choose "Install Evaluation Software". (It didn't need a license number to install).
- Follow the directions as they pop up.

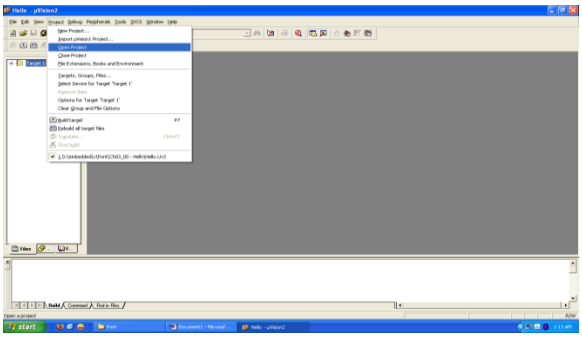

Fig. 4: KEIL SOFTWARE WINDOW

Configuring the Simulator:

- Open the Keil µVision2
- Go to Project – Open Project and browse for Hello in Ch03_00 in Point and open it.
- Go to Project – Choose Device for Target 'Target1'
- Select 8052 (all variants) and click OK

Present it required to verify the oscillator frequency:

- Go to project – Options for Target 'Target1'
- Make assured that the oscillator frequency is 12MHz

Building the Target:

- create the target as explained in the figure below

Running the Simulation:

- Having effectively made the target, at present it is prepared to begin the debug period as well as process the simulator.
- Initial begin a troubleshoot period
- To check that the port project is appeared, it required to begin the 'periodic window update' flag
- Go to troubleshoot - Go
- During the simulation is going on, Check the Performance Examiner to verify the impede timings
- Go to troubleshoot – Performance Analyzer and click on it.
- Double click on DELAY_LOOP_Wait in Function Symbols: and click Define key

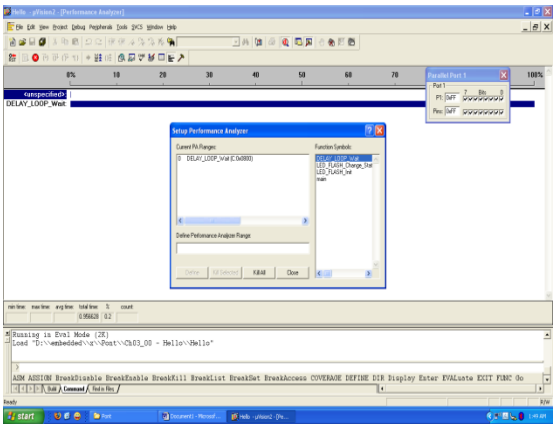

Fig. 5: PERFORMANCE ANALYZER WINDOW

V. CONCLUSION

In this paper, Chess board with ARM processor is designed and implemented. Keil software is used for implementation of the chess board. Different components are used in this chess board model as ARM 7 microprocessor, power supply, Buzzer, Switches, EPROM and 256X 256 touch screen display. By using Keil software delay of every implementation is calculated and after completion of time buzzer will be blown.

REFERENCES

[1] Gui Wu, "The Total Number Calculation of States of Chinese Chess Based on the Dynamic Programming of Computer Games", 2021 33rd Chinese Control and Decision Conference (CCDC), Year: 2021

[2] Lintang Matahari Hasani, Dana Indra Sensuse, Kautsarina, Ryan Randy Suryono, "User-Centered Design of e-Learning User Interfaces: A Survey of the Practices", 2020 3rd International Conference on Computer and Informatics Engineering (IC2IE), Year: 2020

[3] Tiantian Guo;Hongkun Qiu, Bairui Tong, Yajie Wang, "Optimization and Comparison of Multiple Game Algorithms in Amazon Chess", 2019 Chinese Control And Decision Conference (CCDC), Year: 2019

[4] Daniela-Maria Cristea, Imre Zsigmond, Ioan Sima, Bogdan-Gabriel Trofin, Róbert Kovács, "Neural Network adaptability from 2D to 3D Chess", 2019 IEEE 13th International Symposium on Applied Computational Intelligence and Informatics (SACI), Year: 2019

[5] Prabin Kumar Rath, Neelam Mahapatro, Prasanmit Nath, Ratnakar Dash, "Autonomous Chess Playing Robot", 2019 28th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), Year: 2019

[6] Afonso de Sá Delgado Neto, Rafael Mendes Campello, "Chess Position Identification using Pieces Classification Based on Synthetic Images Generation and Deep Neural Network Fine-Tuning", 2019 21st Symposium on Virtual and Augmented Reality (SVR), Year: 2019

[7] A. Dimitrija, K. Natasa, and K. Saso, "Automated Chess Playing with a Robot Manipulator", international journal of engineering issues, vol. 2015, pp. 45–51, December 2015.

[8] G. D. Illeperuma, "Using Image Processing Techniques to Automate Chess Game Recording", Proc. of the Technical Sessions, Sri Lankan Journal of Physics 27:76-83, Jan. 2011.

[9] Banerjee, Nandan, et al. A Simple Autonomous Robotic Manipulator for Playing Chess Against Any Opponent in Real Time. Proceedings of the International Conference on Computational Vision and Robotics, 2011

[10] C. Matuszek, B. Mayton, R. Aimi, M. P. Deisenroth, & L. F. Bo, "Gambit: An Autonomous Chess-Playing Robotic

System," Proceedings of the IEEE International Conference on Robotics and Automation, pp. 4291-4297, 2011.
[11] M. Piskorec, N. Antulov-Fantulin, J. Curic, O. Dragoljevic, V. Ivanac, & L. Karlovic, "Computer Vision System for the Chess Game Reconstruction. MIPRO," Proceedings of the 34th International Convention, pp. 870-876, 2011.
[12] G. Kaur, A. K. Yadav, & V. Anand, "Design and Implementation of Artificially Intelligent Microcontroller based Chess Opponent," Proceedings of the World Congress on Engineering, 2010.
[13] Sokic, Emir, and Melita Ahic-Djokic. "Simple computer vision system for chess playing robot manipulator as a project-based learning", example. Signal Processing and Information Technology, 2008, ISSPIT 2008
[14] Gonalves, Jos, Jos Lima, and Paulo Leitao. Chess robot system: A multidisciplinary experience in automation. 9th Spanish Portuguese Congress on Electrical Engineering. 2005.