A ROBOTIC ARM BASED CHESS BOARD FOR VISUALLY CHALLENGED PEOPLE

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ABSTRACT

The only universal game that the visually challenged can play against sighted persons on an equal footing. In the conventional boards present today the visually challenged need to see through touch. Robotic chess is an electronic, robotic hand based chessboard that makes the game played easier The Visually challenged people are the most unfortunate people who bare darkness throughout their life time. Chess is a mind game that goes beyond sight. Perhaps and quicker. The main feature of this project includes coin movement and cancellation using special keyboard input, coin identification using bar code technique and move identification using speech recognition. A simple programmable robotic arm is utilized in doing the necessary actions commanded by the user. The special keyboard containing A to H and 1 to 8 is used in giving the inputs by the visually challenged for conveying the movement which is sensed by the microcontroller which in turn would process it and makes the robotic arm to do the corresponding action. In an international level no visually challenged has ever won a game against a normal person. Playing on robotic chess the history is expected to turn on.

Keywords-Barcode, Robotic arm, Robotic Chess, Special Keyboard

I INTRODUCTION

The world today demands people to be independent, irrespective of their challenges, mentally or physically. Visually impaired people have to rely on someone for fulfilling even the minor needs [1] suggested by N. Banerjee. The visually impaired have an exposure to all the latest equipment's made this especially for them, but none has attempted a better research over issue.

The source of entertainment for them is restricted, and chess is the only game that has entertained them more than any other. Robotic Chess, an original project work of ours, the globe and independent. In reality, the computer only is a unique innovation making them visual across calculated the movements and a human still assisted him for executing the movement on the chessboard. Board games are rich issues for human robot cooperation research because these games have an intermediate and an easily adjustable degree of structure. Perception of the chessboard and game pieces, observation of the human, game state and thinking about the game, and manipulation of the chess pieces while playing with the human opponent was involved. Development on physical chessboard game playing systems opens the way for more general human-robot interactions systems that considered less structure. For example, this type of work could lead in the end to a manipulator capable of helping engineering as a field assistant that performs manipulation tasks in different field environments [2] suggested by P. I. Corke .

Chess is a mind game, which goes beyond sight. It is the second sport, which was made world championship. The visually impaired already have a special wooden Chessboard made for them with aids that suit them. In term of robot control, it can be specified by defined speed and position of the end effector. The problem has become important in both the medical and the manufacturing fields, where the robot arm must be suitably placed

with respect to targets (tasks) that cannot be moved. An applicable numerical formulation is presented. While other methods are used the inverse kinematics solutions in their formulation for defining a locality for the manipulator base, this kind of solution is difficult to accomplish because of the inherent complexities in determining all inverse kinematic solutions [3] suggested by C. Catuszek.

The exceptional features used here are Robotic Arm motion using given inputs, Special keypad for giving move inputs, Headphone with mike for speech recognition. Barcodes assigned for each coins (32) for coin identification. Move recognition and storage and Automatic Time manager the visually impaired players need to 'see' through 'touch „in the wooden Chessboard [4] suggested by T. Federal and O. Mitchell.

Each of the squares on the wooden board has a hole in the center and the pieces have a downward projection at the base, which fits into the hole in the squares on the Board..All the Black squares are raised about 3-4 mm above the white squares [5] suggested by Hsia-Jen Liu and Kayoing Young.

The wooden Chessboard bears names for each of the squares (A1 to H8) the game starts in a usual manner as the other Chess games. When a player makes his move, the other player recognizes the move by his sense of touch [6] suggested by G. Kaur .

Once he has recognized the move he stores it in his mind and so on. As the game proceeds this process of recognizing through touch and storing each and every move really becomes a tedious job for the visually impaired. If he misses even a single move he has to start his sense of touch all over again [7] suggested by Sham R.Nair.

Not only it drains the energy but also it is pretty time consuming. The Arm would consist of eight elbows and one wrist, where the eight elbows is to locate the position of the corresponding square in the chessboard, and the wrist is for picking or dropping the coin[8] suggested by T. Standee. The whole action of the Arm is taken care by the instructions provided by the microcontroller Robotic Chess takes care of all these time consuming process from coin movement to identification and storing of movements. The above fig 1 shows the exact design of robotic chess.

II METHODOLOGY

A.The special keypad design

The above given architecture shown in the figure 1 is the external design of the special keypad that is used to give inputs for the coin movements. and cancellation by the visually challenged. The keypad consists of Uprooted Keys, Engraved Keys asshown in the fig 2. The two modes of inputs area A and B indicates Coin movement and Coin Cancellation. The inputs are directly given by the visually challenged by pressing the necessary keys in the keypad as trained during the training session[9] suggested by. For an instance, if the user wants to move the Black Horse1 coin from position b1 to c3 then the user would select the A mode of coin movement then select the source and the destination keys as b,1,c and 3[10] suggested by . This action would be fetched by the microcontroller to inform the Robotic arm to do the necessary movement commanded.

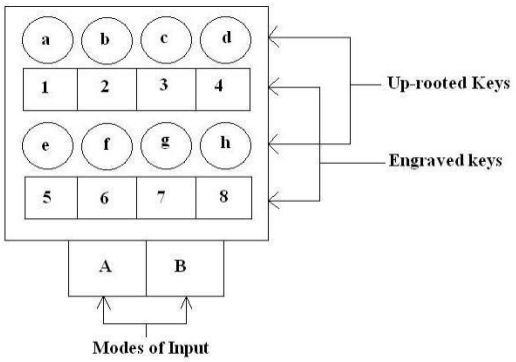

Fig1-special keypads

The below diagram consists of architecture of robotic chess. Where input is given through special keypad and message passes through microcontroller and leads to robotic arm where it helps to move the chess coins. As the game proceeds this process of recognizing through touch and storing each and every move really becomes a tedious job for the visually impaired. And they would be easily recognizing the coins in easier way without any difficulties .

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As the game proceeds this process of recognizing through touch and storing each and every move really becomes a tedious job for the visually impaired. The Arm would consist of eight elbows and one wrist, where the eight elbows is to locate the position of the corresponding square in the chessboard, and the wrist is for picking or dropping the coin. The Arm would consist of eight elbows and one wrist, where the eight elbows is to locate the position of the corresponding square in the chessboard. This are the exceptional features about the special keypad which is shown in the above diagram.

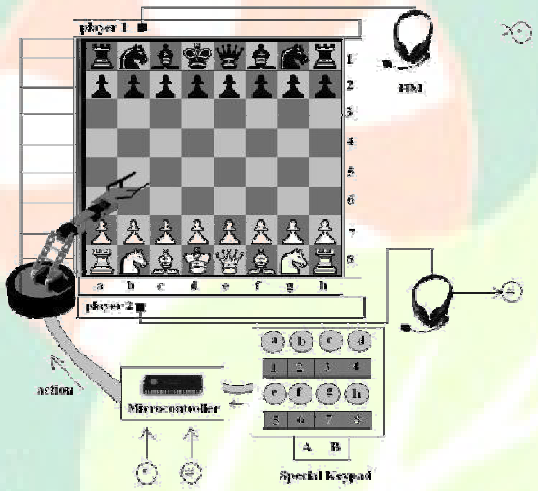


Fig 2- Architecture of robotic chess

B.Robotic Arm Design

The above given architecture as shown in the figure 3.The main arm is a programmable structure for performing the actions. The robotic arm is a type of usually programmable, with similar functions to a human arm; the arm may be the sum total of the mechanism or may be part of a more complex robot. The terminus of the kinematic chain of the manipulator is called the effector and it is analogous to the human hand it consists of a Base with a movable wheel of circumference equaling the distance between the two square□s middle points.

The Arm would consist of eight elbows and onewrist, where the eight elbows is to locate the position of the corresponding square in the chessboard, and the wrist is for picking or dropping the coin. The whole action of the Arm is taken care by the instructions provided by the microcontroller. The arm edge of the robotic arm would carry a sensor for capturing the coins that has been used during the movement instructed by the microcontroller. This sensor is a barcode reader which senses the unique

barcode given to each of the coin used in the game.

The Fig-3 shows the block diagram of robotic chess. Where it consist of two players. The microcontroller used here is 89C52 and special keyboard which are the two major components used for robotic arm based chess board for visually challenged people. The robotic arm consist of wheels and arms which helps to move the chess easily. TheArm would consist of eight elbows and one wrist,where the eight elbows is to locate the position of the corresponding square in the chessboard, and the wrist is for picking or dropping the coin.

C. Barcode Technique

The barcodes are used in identifying each coin in the game. A barcode system is a network of hardwareand software, consisting primarily of mobile computers, printers, handheld scanners, infrastructure, and supporting software. Barcode systems are used to automate data collection where hand recording is neither timely nor cost effective..For an Thus the bit size of barcode is The Barcode

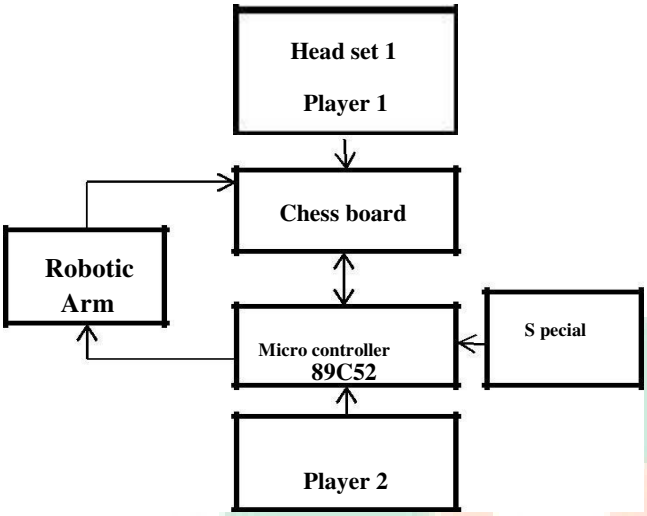
„1 for white coins. Then each coin would be assigned would start with binary „0 for black coins and binary their 5 digits, where the first digit will refer to the color of the coin and instance, the above given diagram shows the White Queen and the Black Queen, Where the First digit only differs between the codes i.e. Binary **„1** White and Binary **„0** for black and the other 4 digits remains the same. ***T***he user can identify the move by saying out orally last move, this is fetched to the microcontroller and the corresponding reaction message is fetched from the storage memory device and its output is fed to the Headphone of the user. This is how the barcode technique is used in the chess coins.

D .Move and Coin Identification

The user also has an extra feature of identifying the last move that is made and also the current positions of the coin. Here the user is trained to use the speech recognition system for the purpose. The user can identify the move by saying out orally last move, this is fetched to the microcontroller and the corresponding reaction message is fetched from the storage memory device and its output is fed to the Head phone of the user. The user has this second feature of identifying the particular coins current position in the Chessboard. Here he has to speak out orally the name of the coin. For an instance, if the user says “BLACK HORSE 1”, it would automatically invoke the voice processor to tell the position of the coin via headphone of the user saying the position **“F3”** by the voice processor, where it is already stored and regularly updated in the device memory. This updates are periodically done when the sensor in the robotic arm senses the coin s barcode.

E **.** Microcontroller

The 89C52 provides the following standard features: 8Kbytes of Flash, 256 bytes of RAM, 32 I/O lines, three 16-bittimer/counters, a six-vector two-level interrupt architecture, a full-duplex serial port, on-chip oscillator, and clock circuitry. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. ted in a single chip, the overall cost of Robotic Chess reduces and until the next hardware reset to be displayed in a manner until the As the peripherals are integrals portable. Movement detection is done by comparing last know piece locations with the new ones, after finding the opponent s movement, a chess game verification algorithm will verify the movement for opponent mistakes or even cheats, if the verification fails, a warning soundtrack will be played. The application returns the "from" and "to" algebraic notation coordinate pairs of the opponent’s movement.



..**Fig 3-**Block Diagram of robotic chess

III METHOD OF PLAYING

As shown in the block diagram fig -1, coin movement and cancellation using special keyboard input, coin identification using bar code technique and move identification using speech recognition. A simple programmable robotic arm is utilized in doing the necessary actions commanded by the user. The special keyboard containing A to H and 1 to 8 is used in giving the inputs by the visually challenged for conveying the movement which is sensed by the microcontroller which in turn would process it and makes the robotic arm to do the corresponding action In the case of application such as pick and place operation as for piece relocation, task is specified as initial and final end-effector location. This sensor is a barcode reader which senses the unique barcode given to each of the coin used in the game. Then the barcode is used to identify the coin

Finally the coins will be moved based on the speech which is stored in the voice processor. After this process the arm will move those coins according to the processor. Again the user would use the special keypad to move the coins in the chessboard and the process continuous.

IV CONCLUSION

This Electronically designed Robotic Arm Based Chessboard is aimed towards the welfare of visually impaired people. Robotic game playing is an excellent toy problem for exploring human-robot collaboration because it has an easily varied degree of structure to play with them in different manner. Hence,. In an International level no visually Challenged has ever won a game against a normal person. A trajectory tracking control scheme, taking into account the robot dynamic model in order to perform effective trajectory tracking capabilities like welding, cutting, and speed controlled tasks. This paper of ours will be dedicated to the vision 2020. The year 2020 is visualized as the year when a physically challenged wouldn't be actually abled.

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