Eye Free Yoga - An Exergame Using Kinect

M.D.Nirmal, Bhandari Kalyani Chandrakant, Kadam Jayashree Pramod, Bujone Vaidehi Vilas, Shelke Swapnali Kishor

ABSTRACT: In our day to day life, yoga plays an important role to improve physical and mental health. Normal people can manage their schedule and attend yoga classes but the problem for blind people arises. We need to provide special trainer to train blind or low vision people. Due to busy schedule of today's generation, no one can dedicate sufficient time to provide training. So here we have developed an application which can train and teach this exergame to the blind and low vision people by using kinect, developed by Microsoft, which acts as a yoga instructor, teaches yoga poses and has customized auditory-only feedback based on skeletal tracking. We found participants enjoyed the exergame and the extra auditory feedback helped in understanding each pose. The report discusses the postulates of yoga as science of mind. The yogic practices not only server as prevention and cure of mental disorder but also result in mental piece and higher psychic and spiritual attainments. In the yogic psycho-physiology of the pranic system, the body, mind and spirit work in an integrated manner. Expansion of consciousness takes place through the awakening of the of the chakras. The report reports findings based on scientific data to demonstrate the psycho-therapeutic use of yoga, and underlines some simple yogic techniques for mental health.

KEYWORDS: Accessibility;video games;exergames; visual impairments; Kinect; eyes-free; audio feedback; yoga.

1. INTRODUCTION

Many research studies have proved that mostly people who are blind and low vision are generally not healthy. They are like to have poor, fair, or obese health. Their fitness level is not maintained. This is seen in the youth with visual impairments. This reduces their physical activity and further parents expectations. Exercise classes are available but instructors there do not spend their time on blind or low vision people. Exergames are nothing but video games for exercises.[1] It provides fitness and gateway for advanced exercises but blind and low vision people could not exercise due to their disability. In response to this, eyes free yoga is developed using microsoft Kinect for windows. This technique provides instructions for yoga poses and its a verbal and auditory system. The game can hear, speak, see and act as a yoga instructor.[1] The yoga poses are developed using skeletal tracking. Thus with the help of yoga instructions and depth camera i.e Kinect sensor we can teach yoga for blind and low vision people.

2. LITERATURE SURVEY

Eye free yoga had turned Kinect into teacher for blind on 19th Oct, 2013. Hideo Kojima, worked on how they will provide secured camera to recognize trouble.

- *Prof.M.D.Nirmal, Professor, Pravara Rural Engineering College, Loni, vedic1234@gmail.com*
- *Bhandari Kalyani Chandrakant, Student, Pravara Rural Engineering College, Loni, bhandari.kalayani@gmail.com*
- *Kadam Jayashree Pramod, Student, Pravara Rural Engineering College, Loni, jayashree.kadam15@gmail.com*
- *Bujone Vaidehi Vilas, Student, Pravara Rural Engineering College, Loni, vaidehi.bujone@gmail.com*
- *Shelke Swapnali Kishor, Student, Pravara Rural Engineering College, Loni, swapnali.shelke10@gmail.com*

Nick Burton Pegged Kinect sports lag between action and on screen response at 150 ms. Frederic Blais, working in Ubisoft worked for minimizing the size of Kinect sensor.A novel method for fingertips detection and centres of palms detection distinctly for both hands using MS KINECT in 3D from the input image.[5] KINECT facilitates us by providing the depth information of foreground objects.[5]On 1 February 2012, Microsoft released the Kinect Software Development Kit (SDK) for Windows (www.microsoft.com/ en-us/ Kinect forwindows), which will undoubtedly amplify the Kinect Effect.[3]The Washington blind school for children also contributed a lot.

3. IMPERICAL WORK

1. CD sets:

Multiple sets of CDs were available at homes to practice yoga.[1]so that any busy human can practice it without any time compulsion.

2. So Sound Yoga Board:

Above fig gives us an idea about so sound yoga board.it is usually used by rich people who can afford expensive needs. This board is very expensive ,so it is its main drawback even though it is of good use.[1] It communicates through our body sensation when the person is out of alignment and indicates which part of the body are under stress but this is very expensive[1]

3. Visually Impaired Yoga Mat:

A less expensive solution, visually impaired yoga mat ,provides tactile cues for foot and hand placement .Some yoga instructor have spent a long period of time working with the visually impaired to gain a better understanding such as being aware of the words used to instruct the class empathy.

4. Yoga Instructors:

Another group of instructors held poses and let the students feel them to gain a better understanding. Over all most of the opportunities for people who are blind or low vision to engage in yoga have needed contact with a yoga instructor with the knowledge and experience to accommodate.

5. An exergames:

One recent trend to increase exercise activity is the use of exergames, which are video games used for exercise. Exergames can provide fitness activities and act as a gateway to more advance exercises. However many people cannot play these games due to having disability.0

4. PROPOSED SYSTEM

1. Yoga System Instructor:

Here there is no need of extra instructor as system itself is acting as a instructor. So, there will be no issues regarding instructor and their valuable time to spend on a blind.

2. Microsoft Kinect platform:

The Kinect is a line of motion sensing input devices used by xbox 360, xbox 1video gaming, consoled and used by windows PC. The Microsoft Kinect is a new product launched by Microsoft in November 2010. Its capability to produce depth and RGB streams at a price much lower than traditional range 2 sensors have made it a sensation in the field of Computer Vision. At the heart of the Kinect lies a time of light camera that measures the distance of any given point from the sensor using the time taken by near-IR light to reflected from the object. In addition to it, an IR grid is projected across the scene to obtain deformation information of the grid to model surface curvature. We use the Open Kinect driver framework for the Kinect that produces 640 x 480 RGB and depth images at 30 fps.

KINECT for XBOX 360.

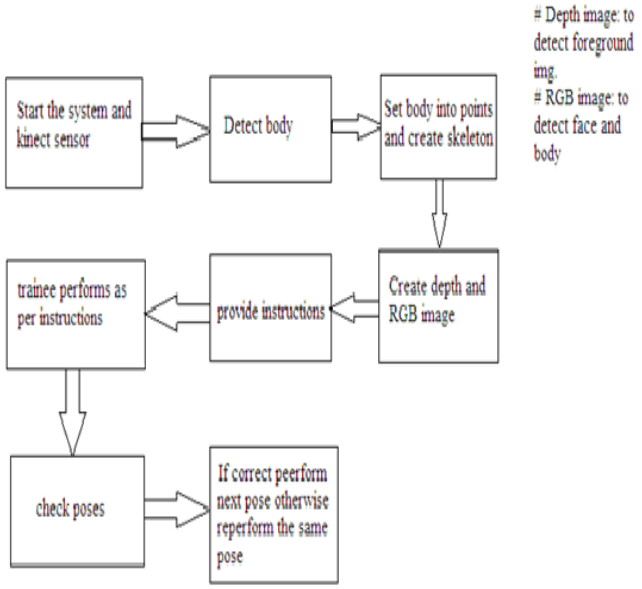
3. Automatic checking

E.g. Virabhadrasana (Warrior II) pose

The rules utilized Kinect Skeletal Tracking, which contains 20 body joints, to provide custom verbal corrections. The 20 joints recognized by the Kinect SDK provide information about their X, Y, and Z position. Be-cause we were able to calculate the distance between any two skeletal points, we could calculate the different body angles using the Law of Cosines. For example, the game can calculate that the “armpit” angle is currently 45° and the proper angle should be at least 80° The game responds with the appropriate verbal correction. To reduce errors with occlusion and rotation of the body we determined how the participant should face the Kinect based on the pose. We also used built-in “Joint Filtering” provided by the Kinect. As a result, we did not encounter any issues with occlusion during the development or the studies. The rules were determined after reading yoga resources and asking yoga instructors for common errors. The lead researcher inter-viewed one yoga instructor at a yoga studio about important and unimportant aspects of each pose. The researcher would act out the poses and possible errors to gain clarification. Each pose had an average of 10.5 rules and a mode of 11 rules. The least con-strained pose, Tree, had 7 rules due to the main focus on balance. People performing this posture could use their arms however they wanted. The most constrained pose, Reverse Warrior, had 12 rules, because each limb was contributing something unique. Each violated rule provides the appropriate verbal correction to fix the issue.

3 WORKING:

1. Block Diagram



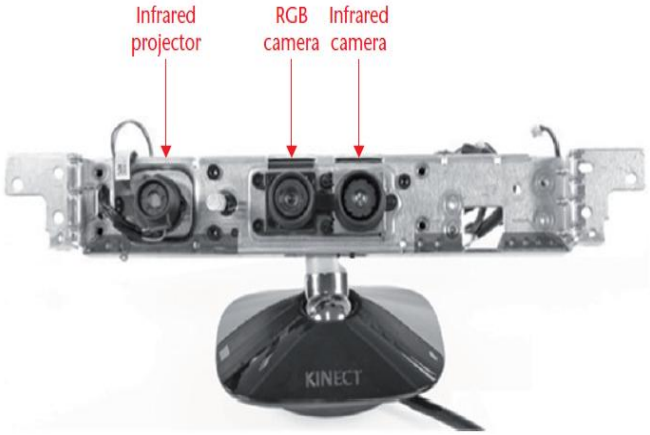
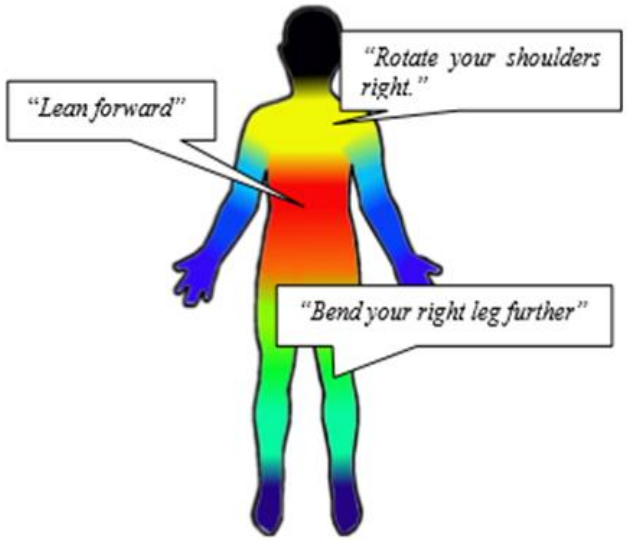
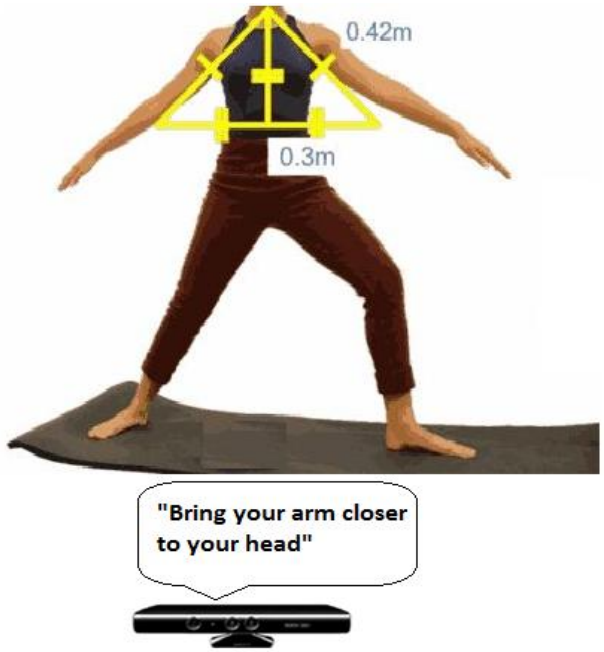


Figure shows the arrangement of the infrared (IR) projector, the color camera, and the IR camera. The depth sensor consists of the IR projector combined with the IR camera, which is a monochrome complementary metal oxide semiconductor (CMOS) sensor. The depth-sensing technology is licensed from the Israeli company Prime Sense. Although the exact technology is not disclosed, it is based on the structured light principle. The IR projector is an IR laser that passes through a diffraction grating and turns into a set of IR dots.



Priority of adjustments shown on the human body. The highest priority is the core, which is red (hot), and lowest priority are the feet, which are purple (cold). The head orientation is not measured.



In Virabhadrasana,his arms are at 45^0& need to be raised to ≥ 80^0.The kinect response with a verbal correction.

We used information from yoga instructors to program a set of rules for each pose. The rules utilized Kinect Skeletal Tracking, which contains 20 body joints, to provide custom verbal corrections. The 20 joints recognized by the Kinect SDK provide information about their X, Y, and Z position. Be-cause we were able to calculate the distance between any two skeletal points, we could calculate the different body angles using the Law of Cosines. For example, the game can calculate that the “armpit” angle is currently 45° and the proper angle should be at least 80°. The game responds with the appropriate verbal correction. To reduce errors with occlusion and rotation of the body , we

determined how the participant should face the Kinect based on the pose. We also used built-in "Joint Filtering" provided by the Kinect. As a result, we did not encounter any issues with occlusion during the development or the studies. The rules were determined after reading yoga resources and asking yoga instructors for common errors. The lead researcher inter-viewed one yoga instructor at a yoga studio about important and unimportant aspects of each pose. The researcher would act out the poses and possible errors to gain clarification. Each pose had an average of 10.5 rules and a mode of 11 rules. The least con-strained pose, Tree, had 7 rules due to the main focus on balance. People performing this posture could use their arms however they wanted. The most constrained pose, Reverse Warrior, had 12 rules, because each limb was contributing something unique. Each violated rule provides the appropriate verbal correction to fix the issue. The rules have from 1 to 4 choices of verbal corrections to make based on the Kinect Skeletal Tracking data. The suggested verbal correction was prioritized by location of the issue. We designed the verbal feedback to first adjust the center of the body followed by the legs and arms to lessen the amount of verbal corrections. The priority of corrections given is shown in Figure.

4 CONCLUSION

We have developed an accessible yoga exergame, Eyes-Free Yoga, where the players interact with a "yoga instructor" and receive audio-based instructions for six standing yoga poses. This new accessible exergame can enable people who are blind or low vision to access yoga while at home, which could improve both their physical and mental health. We have shown through an evaluation with 16 people who are blind or low vision that the game was enjoyable and provided useful customized feedback. This project may positively impact more than just people who are blind or low vision. For example, if a sighted person is performing a yoga position where their head cannot face the screen, he or she may receive the feedback they need with auditory cues. Exergames with more comprehensive feedback may provide an enhanced experience and be accessible to more players. We hope to provide general insights for exergames that use skeletal tracking.

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