SMART EXERCISE COUNTER USING COMPUTER VISION

[1]Dr.M.Senthil Kumar, [2]M.Sashrutha, [3]R.Ramya, [4]G.SaiSunitha

[1]Associate Professor, [234] UG Scholar
[1234]Dpartment of Computer science and Engineering,
[1234]SRM Valliammai Engineering College,Kattankulathur,Chengalpattu Dist,Tamil Nadu,India.

Abstract - Fitness trackers are getting a popular way to encourage physical exertion and impact health actions. Several characteristics of the mortal body turn into postural gest, recognizable also during sports conditioning. Measuring the diurnal exercises of body composition, resting heart rate and blood pressure, knowledge of physical exertion actions, and perception of heartiness were used to determine the impact of the fitness trackers. The process of furnishing a substantiated coach for every person requires time and plutocrat. A new Virtual Exercise Counter grounded on Artificial Intelligence ways for the exercise discovery and reiterations count is described in this work. Using the OpenCV with the Artificial Intelligence algorithm has been enforced in this Design. In this design, the exercises like ringlets/ biceps and push-ups are counted using Computer Vision. Therefore, the technology of artificial intelligence(AI) can be used to accelerate the process of personalization by calculating the most suitable fitness governance for the specific people's requirements or preferences

Index terms: Exercise counter, curl counter, Pushup counter, AI Gym

I.INTRODUCTION

" Exercise not only affects our bodies, but it also alters our minds, stations, and moods", according to a popular word. Currently, fitness is fashionable. Everyone solicitations to be in good shape, look good, and be healthy. Still, no bone can go to employ a particular coach or visit a spa during this epidemic. Wearable technologies are another possibility, but they aren't accessible to everyone. A model for AI Coach was proposed in thispaper.Several exploration studies pertaining to well- being and exercise in aged grown-ups applied off- the- shelf technologies or developed customized systems to study the short and long- term goods of computer- supported exercise. Despite academic and marketable success in aerobic exercise monitoring, there's a void in automatic free- weight exercise monitoring and evaluation. Fitness trackers are getting a popular way to encourage physical exertion and impact health actions. Several characteristics of the mortal body turn into postural geste, recognizable also during sports conditioning. The main focus of this paper is thus on the exploration necessary to design and emplace a general armature for a computer- grounded exercise system with real- time assessment and guidance in combination with remote coaching approaches. This work extends the original donation of our exercise system by including fresh details on the design, perpetration, and deployment. The physical health and cognitive capacities of the actors were assessed using in- exercise collected data and formalized clinical measures. The qualitative evaluation of the system, still, was reported only from the original laboratory testing. Analogous evidence- of- conception systems grounded on Artificial Intelligence with OpenCV.

II.RELATED WORKS

Ferda Ofili etal. proposed an automated interactive exercise guiding system using the Microsoft Kinect. The guiding system attendants druggies through a series of videotape exercises, tracks and measures their movements to give real- time feedback, and records their performance over time(2). Han Ding etal. developed a FEMO system that provides an integrated free- weight exercise monitoring service that incorporates all the essential functionalities mentioned over. FEMO achieves this by attaching unresistant RFID markers on the dumbbells and using the Doppler shift profile of the reflected backscatter signals for on- point free- weight exertion recognition and assessment(3). Doyle etal.(12) presented a smartphone- grounded exercise system where they emphasized the significance of visual feedback on quantitative measures in exergaming.Dr.Senthil Kumaret.al(5) proposed a emulsion imaging in Pixel position Image processing fashion. RistQ(14) detects and recognizes smoking movements using accelerations from a wrist swatch. In addition, Chang etal.(12) use accelerometer detectors implanted in a glove to fete and track free- weight conditioning in the spa. Dipankar Daset.al(13) suggested an automatic inner exercise recognition for both spa and home operation scripts. Conditioning under consideration are Biceps coil, Casket cover, Row, Push up, Sit up, Squat, and

Triceps coil. Ho- Jun Parket.al(15) proposed a real- time approach for counting drive- ups using 2D videotape imagery. The proposed system uses OpenPose in each frame to prize multiple joints and links of a mortal body.

III. MATERIALS AND METHOD

Trampolinists everyplace are trying to find easy and accessible ways to work out. With advances in technology, there's a major shift towards " virtual exercise. " There are numerous movement walls similar as Lack of time, lack of interest, loss of provocation, and indeed sweat. Guided exercises with technology help individualities overcome these common walls and not only train, but also be more effective. The device includes Tracking stoner exertion, Transferring motivational dispatches, Demonstration of exercise, and Setting and covering health pretensions.

Exercise System Design

3.1 System setup

In the OpenCV library of python, the exercise will be counted. This will be given to the druggies with low- cost conditions. Opencv, Mediapipe, Numpy, and Cvzone are used to count the exercises. Opencv, Mediapipe and Cvzone are used to descry the face and full body of the person. Using this the body corridor similar as elbows, hips, wrists, knees, and ankles are detected. Numpy is used to count the exercises with fineformulae.Since the system was designed for use in a home terrain, the main constraint on ease of use was assessed by the webcam. Using six homes, we originally plant it veritably readily for coaches to set up an each- by- one computer. In some homes, the system was a bit heavy and big, making it delicate to find space in the system. Utmost actors placed their computers coming to their being computer system. One party used a wheeled wain to bring the computer screen closer, keeping a sufficient distance from the webcam to make the screen easier to see Using Jupyter we apply the Python3 libraries. Thus, the main focus of this paper is on the exploration necessary to design and emplace a general armature for a computer- grounded exercise system with real- time assessment and guidance in combination with remote coaching approaches. The thing of this study is to develop an armature for automated exercise guiding for druggies. This will motivate them and track their physical performance while they can exercise at home. The original stage included the following detailed requirements analysis Complete coaching system with focus groups With seniors, caregivers, trainers, etc. This paper focuses on the performing conditions confined to the interactive exercise guiding system as Invisible, low conservation, affordable use Dimension modality, Including age-applicable exercise for the senior, Development of friendly stoner interface. Capability to get raw measures to do it Balance, continuity, strength estimates, Inflexibility, Comity for future integration with guiding platform.

3.2 Pose Estimation

Posture estimation is a computer vision fashion for tracking the movement of a person or object. This is generally done by chancing the locales of crucial points for certain objects. Grounded on these crucial points, we can compare different movements and acts and learn from them. Pose estimation is laboriously used in the field of stoked reality, vitality, games, and robotics. Moment there are several models for performing posture estimation. Some styles of posture estimation are Open disguise, Pose net, Blaze disguise, Deep Disguise, Thick disguise, Deep cut. The choice of one model over another may fully depend on the operation. In addition, factors similar as supereminent time, model size, and ease of perpetration can be different reasons for choosing a particular model. Thus, it's better to know your requirements from the very morning and choose the modelaccordingly.In this paper, the Blaze disguise is used for detecting mortal disguise and rooting crucial points. The model can be fluently enforced through a veritably helpful library, well known as mediapipe.Media pipe is an open- sourcecross-platform frame for erecting multimodal machine learning channels. It can be used to apply slice- edge models like mortal face discovery,multi-hand shadowing, hair segmentation, object discovery and shadowing, and so on. Ringlets are the key to bulking up your biceps, but it's not as simple as ripping through an fantastic number of dumbbell ringlets. You need to get the pacing of your drill right to truly test your biceps, as well as add variations so you 're working the muscles from all angles. Wind 1 counts toward your shoulder. Lower it half, hold 4 counts, also lower it first to count another 4 counts. All of these different ideas make the biceps coil further grueling and intriguing.

3.3 In-Exercise feedback

It was sought to combine aspects from classic training vids when erecting the in- exercise feedback screen. Although some of the actors didn't comprehend how the performance bars linked to their exertion, the in exercise feedback screen was supposed useful by the actors. Some people also forgot that the thick mark inside the performance bar reflected their former outside performance, which they were intended to meet or beat. Although actors could see the affair through disguise estimation between them exercise performance, they've a system whether you pursued them rightly. As explained before, some themes aren't duly followed or themes reps weren't always counted. First a decision was made to give videotape feedback only to minimize the complexity of visual feedback. In future, it's planned to include further targeted feedback on the data affair of disguise estimate. It'll give the stoner a better hint for being suitable to do shadowing affiliated issues yourself.

3.4 Outcome Measures

Internal and external outgrowth measures must be suitable to descry changes in the terrain. Druggies' performance in relation to the standard balance and other aspects of physical fitness, inflexibility, strength, and abidance are each important rates. The dimension of these are pivotal in aiding the health trainer as well as furnishing druggies with commentary that will encourage them to exercise more constantly. The exercise intervention's results must also be interpreted in terms of standardized clinical criteria, which are the most precious to the health trainer. At the launch and end of their exercise programme, the cases in our airman trial were assessed using a variety of scales. Although there was no significant association when we directly compared our internal result measures to external outgrowth measures, we did see certain tendencies that could be delved further using more advanced methodologies and data collected over a longer period of time. Figure:3(a) is the bicep counter showing "up" count. Figure:3(b) is the bicep counter showing "down" count. Figure:3(c) is the pushup counter showing count no:1. Figure:3(d) is the pushup counter showing count no:2.

Figure :3 (b)   Figure :3(c)   Figure :3(d)   Figure :3(a)
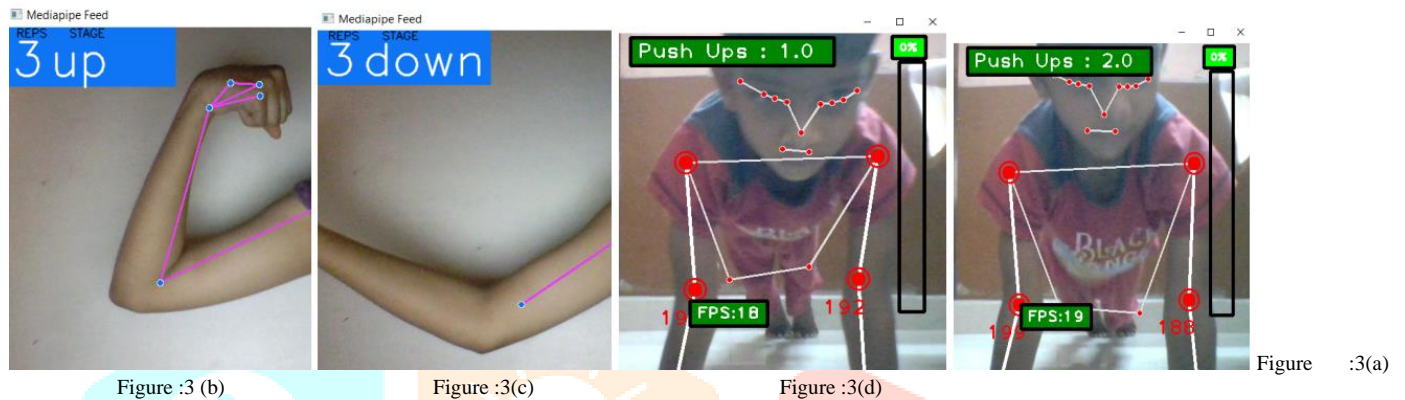
IV. DISCUSSION

The design counted the Exercises in the virtual mode using the opencv with Artificial Intelligence. It's a Predefined Model by Media pipe that's a train to descry the body key points of a person's body, by detecting body corridor similar as elbows, hips, wrists, knees, and ankles. It uses the joints of these body corridor to determine body postures. Postnet Model will help to get crucial points on the real- time data and help to descry a person's Body. With the help of a classifier, different acts of exercises are classified which can be trained on different Dataset of exercises performing in good delicacy. This design will make it easy to count the exercises in Virtual mode rather than Offline mode with the low cost conditions.

V.CONCLUSION

Fitness exercises are veritably salutary to particular health and fitness; still, they can also be ineffective and potentially dangerous if performed inaptly by the stoner. Partial knowledge is parlous and Exercise miscalculations are made due to the same reason when the stoner doesn't perform the proper form or disguise. To overcome such a massive problem we introduce Exercise Counter, that detects the stoner's exercise disguise and provides substantiated, detailed recommendations on how the stoner can amend their form. This is the easy way to count the diurnal exercises with the help of low cost of conditions. Hence, this is a virtual system for counting the exercises, there's no need for a third person to guide or count the diurnal.

REFERENCES

[1] Barbara Rita Barricelli,Elena Casiraghi,Jessica Gliozzo,Alessandro Petrini,Stefano Valtolina: Human Digital Twin for Fitness

Operation, 2020.

[2] Ferda Ofli, Gregorij Kurillo, Stepan Obdrzalek, Ruzena Bajcsy, Holly Jimison,Misha Pavel: Design and Evaluation of an Interactive

Exercise Coaching System for Older Adults: Lessons Learned, 2015.

[3] Han Ding,Wei Xi,Zhiping Jiang,Zheng Yang,Zimu Zhou,Panlong Yang,Jizhong Zhao: A Platform for Free-Weight Exercise

Monitoring with Passive Tags, 2017.

[4] P. Donovan, J. Papay, J. Hibbard, K. Lawson, M. Moore, and R. Wolever, Three Pillars of Health Coaching: Patient Activation,

Motivational Interviewing and Positive Psychology. Healthcare Intelligence Network, 2010.

[5] Dr.M.Senthil Kumar et.al ,Fusion Imaging in Pixel Level Image Processing Technique – A Literature Review, International Journal of

Engineering & Technology, Volume & Issues 7 & 12,ISSN : 2227-524X.g.

[6] J. Doyle, C. Bailey, B. Dromey, and C. Scanaill, "Base - an interactive technology solution to deliver balance and strength exercises

to older adults," 4th Int. Conference on Pervasive Computing Technologies for Healthcare, 2010.

[7] J. Macek and J. Kleindienst, "Exercise support system for elderly: Multi-sensor physiological state detection and usability testing," in

Human-Computer Interaction – INTERACT 2011,2011.

[8] E. Brox, L. Luque, G. Evertsen, and J. Hernandez, "Exergames for elderly: Social exergames to persuade seniors to increase physical

activity," in 5th Int. Conf. on Pervasive Computing Technologies for Healthcare, 2011.

[9] J. Kruger, H. M. Blanck, and C. Gillespie, "Dietary and physical activity behaviors among adults successful at weight loss

maintenance," International Journal of Behavioral Nutrition and Physical Activity, 2006.

[10] A. Zhan, M. Chang, Y. Chen, and A. Terzis, "Accurate caloric expenditure of bicyclists using cell phones," Proceedings of ACM

SenSys, 2012.

[11] "Are Personal Trainers Worth the Price," http://www.telegraph.co.uk/health/dietandfitness.html.

[12] K.-H. Chang, M. Y. Chen, and J. Canny, "Tracking Free-weight Exercises," in Proceedings of ACM UbiComp, 2007.

[13] Dipankar Das, Shiva Murthy Busetty, Vishal Bharti, Prakhyath Kumar Hegde:Strength Training: A Fitness Application for Indoor

Based Exercise Recognition and Comfort Analysis,2018.

[14] A. Parate, M.-C. Chiu, C. Chadowitz, D. Ganesan, and E. Kalogerakis,"RisQ: Recognizing Smoking Gestures with Inertial Sensors on

A Wristband," in Proceedings of ACM MobiSys, 2014.

[15] Ho-Jun Park,Jang-Woon Baek, Jong-Hwan Kim,"Imagery based Parametric Classification of Correct and Incorrect Motion for Push-

up Counter Using OpenPose",IEEE paper,2020.