



VIRTUAL FITNESS TRAINER

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ABSTRACT

The fourth industrial revolution and the ongoing creation of new technology have made sedentary existence possible. As a result, non communicable diseases like diabetes, cancer, and cardiovascular and respiratory disorders are now reaching epidemic levels. Clients are screened by a traditional gym teacher who then recommends training regimens that can help them reduce their risk of non communicable lifestyle diseases. Unfortunately, fitness instructors are frequently expensive and not always accessible, available, or inexpensive. This study looked into whether a method for creating a more affordable workout regimen might be developed using today's computing power. Virtual Fitness Trainer. Up to four metres away from the camera, the system displayed flawless real-time object detection and tracking, and it also generated results for a distance of up to eight metres.

Keywords- Trainer, AI, Machine Learning, Deep Learning, Fitness

INTRODUCTION:

Many fitness professionals are adept at screening their clients for exercise programs. Traditional gym instructors evaluate various fitness and physical activity components, prescribe exercise to improve these components and help clients overcome acute or chronic conditions [1]. These instructors also teach new workouts and improve and maintain form, to help achieve fitness goals without injury. The key roles and duties of these instructors are thus to motivate, guide, and give constructive feedback to clients. Since the industrial revolution, the development of new technologies has enabled people More recently, the availability of smart devices has

continued to increase. This further impacts an already lazy lifestyle in a Digital World. Some of the effects caused by technologies relate to a general level of physical activity of people, such as steam, gas, electric engines, trains, cars, and trucks are obvious, whereas others are more subtle and complex such as televisions, to reduce the amount of physical labor needed to accomplish many tasks in their daily lives. computers, electronic entertainment, Internet, wireless communication devices and other Telco services [2]. For many decades, chronic diseases have been linked to physical inactivity. Booth and Tseng (2012) of the United States Department of Health and Human Resources reported that exercise is in fact a treatment to prevent most chronic diseases [3]. Studies by Brown *et al.* between 1993 and 2004 showed that the lack of regular exercise was identified as an actual cause of chronic diseases [4]. There has been an increase in both physical inactivity and chronic diseases as aforementioned, reported by the World Health Organization. They found a positive correlation indicating that developing a system that will see individuals increasing physical activity can help fight noncommunicable diseases. While technology has been shown to contribute or cause these noncommunicable diseases, the very same technology can also be the solution to the problem. The purpose of this investigation is thus to develop a system that uses modern technologies to help fight chronic diseases. This system is henceforth referred to as Virtual Gym Instructor. It aims to help individuals increase physical activity through effective exercising, which includes monitoring form, speed, and reps, and warn the user when performing incorrect actions. Monitoring will be continuous and real-time feedback will be given during workouts. Virtual Gym Instructor will use computer vision to improve the physical activity in a similar way as a traditional human gym instructor would. To increase the attraction of the Virtual Gym Instructor, global determinants of physical activity in people are factored in and a complementary social support platform, henceforth known as Keep Up, was developed. The primary objectives are to introduce new users to various pre-created exercises that is affordable, available or accessible on multiple platforms. Exercises will provide real-time feedback, while monitoring the user's form, and provide a subsequent performance report after every exercise in graphical form. Secondary objectives include a complementary system that could account for various factors that influences physical activity in individuals via Keep Up. This platform can provide interpersonal social support and motivation for competitive challenges. The rest of the paper is organized as follows: Section II presents related alternative gym instructor systems. Section III describes the design process of the system. The experimental analyses and results are discussed in Section IV. Section V concludes the paper and outlines future work.

METHODOLOGY:

Pose estimation is a machine learning challenge that estimates a person's pose from an image or video by way of estimating the spatial positions of certain physique parts (key points). Pose estimation is a computer vision method for monitoring the actions of an individual or object. This is typically achieved by discovering the area of the key factors for the given objects. Based on these key factors we can evaluate distinctive actions and postures and generate ideas.

PROPOSED SYSTEM

The Virtual Gym Instructor and Keep Up social support platform can be accessed from any personal computer with a web camera for an affordable solution. Figure 1 is a block diagram of the user and trainer capabilities of Virtual Gym Instructor. Referring to Figure 13, the “Integrator” is optional for users that have a connection to the Internet for Keep Up functionality.

1. Virtual Gym Instructor

The details of each exercise may include information about the trainer, the settings of controllers, and data describing the motion that specific body parts should follow. Figure 2 shows some of the main information stored by the Virtual Gym Instructor.

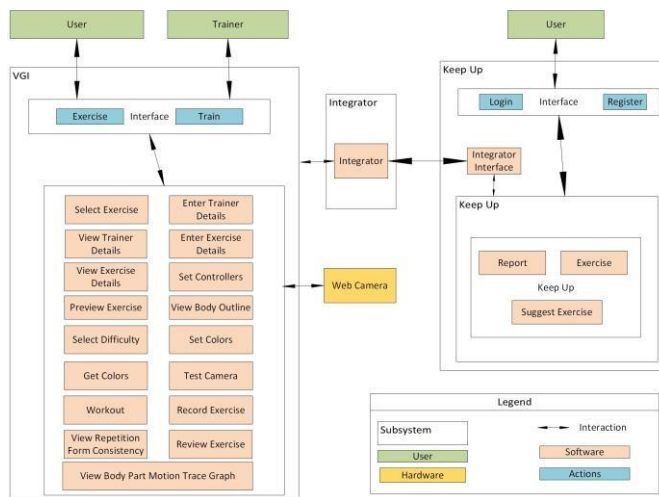


Fig: Block Diagram

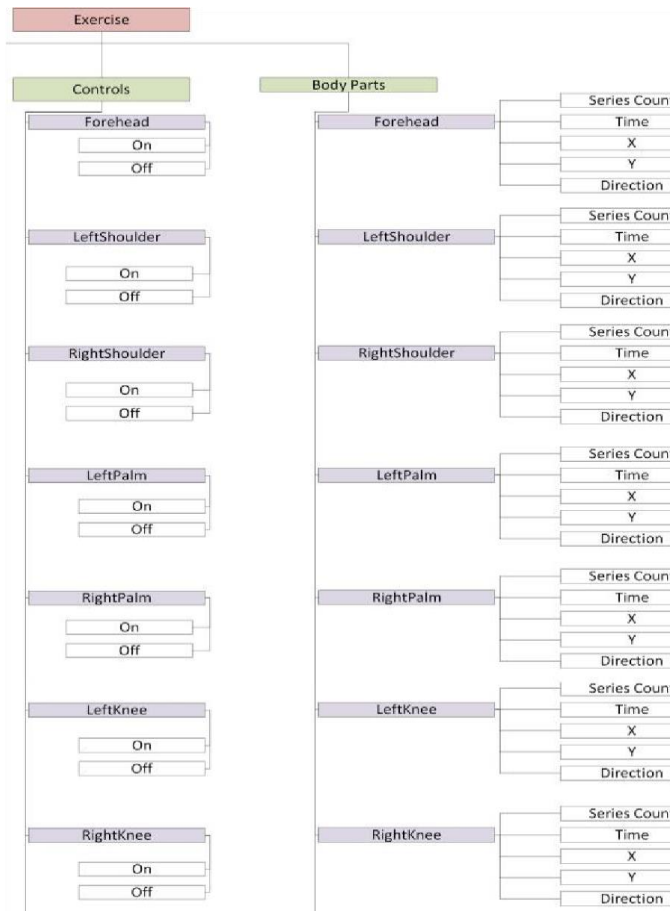


Fig: Virtual Gym Instructor Decomposition Tree

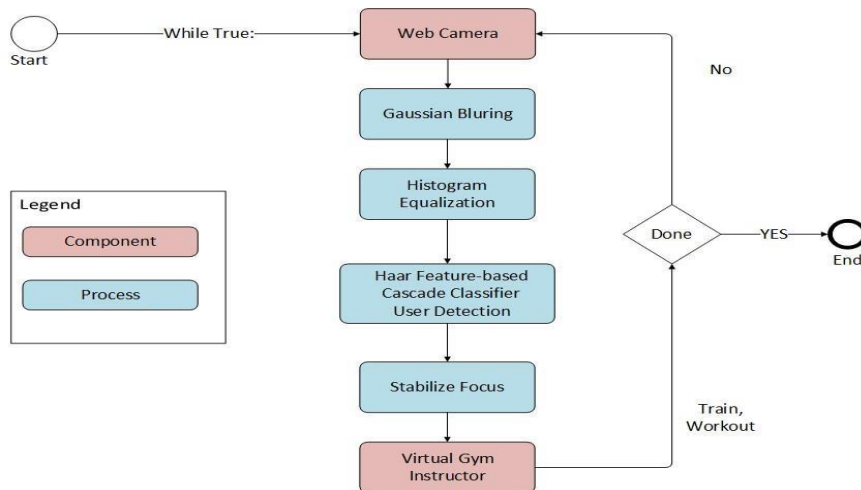


Fig: Proposed Algorithm

The Virtual Gym Instructor focusses on tracing body parts of a trainer or user in the same way. The trainer's data is, however, stored as training data. On the other hand, the user's data is captured and processed in real-time for comparison with the trained data.

WORKING PRINCIPLE

The Virtual Gym Instructor focusses on tracing body parts of a trainer or user in the same way. The trainer's data is, however, stored as training data. On the other hand, the user's data is captured and processed in real-time for comparison with the trained data.

CONCLUSION:

Human pose estimation localizes body key points to accurately recognizing the postures of individuals given an image. This step is a crucial prerequisite to multiple tasks of computer vision which include human action recognition, human tracking, human-computer interaction, gaming, sign languages, and video surveillance. Fitness exercises are very beneficial to personal health and fitness; however, they can also be ineffective and potentially dangerous if performed incorrectly by the user. Exercise mistakes are made when the user does not use the proper form, or pose. In our work, we introduce Pose Trainer, an application that detects the user's exercise pose and provides personalized, detailed recommendations on how the user can improve their form. Pose Trainer uses the state of the art in pose estimation to detect a user's pose, then evaluates the vector geometry of the pose through an exercise to provide useful feedback. We record a dataset of over 100 exercise videos of correct and incorrect form, based on personal training guidelines, and build geometric heuristic and machine learning algorithms for evaluation. Pose Trainer works on four common exercises and supports any Windows or Linux computer with a GPU.

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