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A Comparative Paper on Intelligence Fitness System Using the Concept of IoT

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Abstract: ***As we know after covid-19 usage of Gym and yoga center is really difficult so most of us using the online gym and yoga session , where we use multiple fitness equipment but some time we use those fitness equipment in wrong direction which causes serious health issues in future to avoid those issues there is need of smart fitness equipment which is able to give the suggestion once we use the equipment in wrong direction. , in this paper basically we did the study about the previous existing work on emotion analysis and try to find out the research gaps and there future scope.***
Keywords: IoT, Smart, Fitness, Health, Connectivity, BLE

I. INTRODUCTION

A survey undertaken by GFK in 2016 across 16 countries shows that 33% of people currently track and monitor their fitness via an online app or device. These wearable devices detect basic fitness activity through their inbuilt Global Positioning System (GPS), accelerometer, gyroscope and heartbeat sensor technologies, which are linked to a custom smart phone application providing the user with a visual display of the data. This wearable technology has effectively taken fitness out of the four walls of the gym and into people's everyday lives. They have handed ownership directly back to the individual user helping to maintain constant engagement with their personal fitness activity. They offer regular reminders and incentives to keep people motivated and invested in their own development. However, further research and experimentation could provide a possible solution to evaluate performance and muscle gain for the upper arms that can be applied for both recreational activities in the gym as well as medical purposes such as physiotherapy. In 2014 Apple Inc. announced the launch of their Health Kit Framework at their Worldwide Developers Conference (WWDC). The main purpose of this framework is to provide a platform that can collect meaningful data such as heart-rate, calories burned, blood pressure, blood sugar and cholesterol. The data can be automatically shared with medical institutions or hospitals using an iOS application, enabling them to monitor their patients remotely. This Health Kit framework is still in its infancy, with a majority of the data collected still only being shared between users on social media or proprietary frameworks. This valuable data is rarely shared with medical institutions for further research and statistical analysis, and it is typically not platform independent. However, as these frameworks become more common in our medical establishments, it has the potential to revolutionise the way medical treatments are managed. The use of wearable devices and performance tracking is commonplace in more cardio based fitness activities but the ability to track arm movements and weight lifted using wearable devices still remains a relatively unexplored area. Strava, is an example of an existing application which records user's activities. It combines data retrieved from the GPS embedded in the phone to calculate distance run or cycled, and compares performances over time.

Internet of Things (loT) is extension of current internet to provide communication, connection, and internetworking between various devices or physical objects also known as "Things". IoT term represents a general concept for the ability of network devices to sense and collect data from the world around us, and then share that data across the Internet where it can be processed and utilized for various interesting purposes. The IoTis comprised of smart machines interacting and communicating with other machines, objects, environments and infrastructures. Now a day's every persons are connected with each other using lots of communication way. Where most popular communication way is internet so in another word we can say internet which connect peoples [9].

The Internet of things can be defined as connecting the various types of objects like smart phones, personal computer and Tablets to internet, which brings in very newfangled type of communication between things and people and also between things [2]. With the introduction of IoTs, the research and development of home automation are becoming popular in the recent days. Many of the devices are controlled and monitored for helps the human being. Additionally various wireless technologies help in connecting from remote places to improve the intelligence of home environment. An advanced network of IoT is being formed when a human being is in need of connecting with other things. IoTs technology is used to come in with innovative idea and great growth for smart homes to improve the living standards of life. Internet helps us to bring in with immediate solution for many problems and also able to connect from any of the remote places which contributes to overall cost reduction and energy consumption [3].

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In recent years, there has been a growing interest among consumers in the smart home concept. Home automation system represents and reports the status of the connected devices in an intuitive, user-friendly interface allowing the user to interact and control various devices with the touch of a few buttons. Some of the major communication technologies used by today's home automation system include Bluetooth, Wi-MAX and Wireless LAN (Wi-Fi), ZigBee, and Global System for Mobile Communication (GSM) [1].Here we are using Wi-Fi module. It offers the user complete access control of the appliances through a remote interface. Automation is the use of control systems and information technology to control equipment, industrial machinery and processes, reducing the need for the human intervention [2].

The wide variety of potential IoT applications needs a software development environment that ties together the applications, the command, control and routing processing and the security of the node and system. While the importance of software in MCU solutions has increased during the past few years, for MCUs supporting the IoT, even more software, tools and enablement will be needed. A broad ecosystem with easily accessible support is key to enabling the development of embedded processing nodes and IoT applications.

Internet of Things (IoT) term represents a general concept for the ability of network devices to sense and collect data from the world around us, and then share that data across the Internet where it can be processed and utilized for various interesting purposes. The IoT is comprised of smart machines interacting and communicating with other machines, objects, environments and infrastructures. Now a day's every persons are connected with each other using lots of communication way. Where most popular communication way is internet so in another word we can say internet which connect peoples [1].

Today, we are seeing the electrification of the world around us. Almost any manufactured good now includes an embedded processor (typically a microcontroller, or MCU), along with user interfaces, that can add programmability and deterministic "command and control" functionality. The electrification of the world and the pervasiveness of embedded processing are the keys to making objects "smart." Your old toaster that mechanically controlled the color of your toast now has an MCU in it, and the MCU controls the color of your toast. The toaster completes its task more consistently and reliably, and because it is now a smart toaster, it has the ability to communicate with you electronically using its touchpad or switches. After a device becomes smart through the integration of embedded processing, the next logical step is remote communication with the smart device to help make life easier. For example, if I am running late at the office, can I turn on my house lights for security reasons using my laptop or mobile phone?

Communication capability and remote manual control lead to the next step … how do I automate things and, based on my settings and with sophisticated cloud-based processing, make things happen without my intervention? That's the ultimate goal of some IoT applications. And, for those applications to connect with and leverage the Internet to achieve this goal, they must first become "smart" (incorporate an MCU/embedded processor with an associated unique ID) then connected and, finally, controlled. Those capabilities can then enable a new class of services that makes life easier for their users [1].

The term Internet of Things was first coined by Kevin Ashton in 1999 in the context of supply chain management. However, in the past decade, the definition has been more inclusive covering wide range of applications like healthcare, utilities, transport, etc. Although the definition of 'Things' has changed as technology evolved, the main goal of making a computer sense information without the aid of human intervention remains the same. A radical evolution of the current Internet into a Network of interconnected objects that not only harvests information from the environment (sensing)and interacts with the physical world (actuation/command/control), but also uses existing Internet standards to provide services for information transfer, analytics, applications, and communications. Fueled by the prevalence of devices enabled by open wireless technology such as Bluetooth, radio frequency identification (RFID), Wi-Fi, and telephonic data services as well as embedded sensor and actuator nodes, IoT has stepped out of its infancy and is on the verge of transforming the current static Internet into a fully integrated Future Internet. The Internet revolution led to the interconnection between people at an unprecedented scale and pace. The next revolution will be the interconnection between objects to create a smart environment. Only in 2011 did the number of interconnected devices on the planet overtake the actual number of people. Currently there are 9 billion interconnected devices and it is expected to reach 24 billion devices by 2020 [3].

Technology has allowed greater user-centered design solutions for various industries. There is a growing trend of increasingly quantifying achievements being used by consumers daily, whether it is fitness, health, or work related. Wearables that possess sensors to monitor how the body is maneuvering gives the user greater understanding of themselves [1]. The reason behind the measuring of data can be related to one's desire to quantify their ability in an area they want to gather more information (tracking) [2]. Advances in sensors allow deeper measuring capability. Users learn more about themselves, thus changes to their lifestyle can be made under their control. Applying sensors to equipment is another way to show progress in sensor technology [3].

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The uses for wearables dier. Some need it, some want it. Examples of when it is needed are mostly common in work spaces. An individual will benefit from wearable intelligence if the body worn item can sense relevant data to educate them on a procedure or identify safety concerns [4]. Examples of when it is wanted is when an individual sees an opportunity for personal benefit, gaining valuable data from the sensing's function (e.g., Fitbit, or tracking how many calories the user burns) [5]. The trend in wearables are crossing that fine line of being wanted to being needed. This is due to most applications becoming more user-oriented, and the data that is being produced to improve oneself. This can start from an interest but adapts to necessity. The adaptation process is based on perceived usefulness against actual ergonomics in wearables (including external factors) [6]. Presently, there is this self-obsessed era where success is being graded on quantity data (heaviest bicep curl rep, number of followers, amount of views, etc.). Factors such as social media are allowing wearable manufactures to thrive in this era [3]. Human centered advancements are making accessibility easier (e.g., voice This only causes an increase in people's interest to be involved with this sort of application in their daily lives, (e.g., controlling home appliances from a smart watch) [7,8]. When a new technology has been trialed and tested, just as it is marketable, the best suited industry will always have it first. Only after this can the wearable become available for other mainstream markets. An example of this is Smart-body worn trackers, which the military benefited from first before they became useful for different purposes [1]. Instances where the same wearables are used in multiple industries means the sensors that are involved produce data that can be processed for different uses, hence different users [9]. Its influence is increasing due to needs being solved constantly by wearable technology. The military and space industries are continuously big influencers in this market [8]. The perception of wearable technology commenced from a computer that's worn, and is part of the user which is fully controllable, but can work without any thought or effort [10]. This form can somewhat be seen in present day wearables, as they are considered Smart due to operating themselves with minimal human input in controls but also due to giving the user the freedom to take actions from the data that are presented from the wearables. Vital writing overview related past research on leaf deficiency identification are given in II recognition based past work are given in segment ii though area III portrays explore issue and future degree philosophy and IMPLEMENTATION FOR THE PREVIOUS EXISTING APPROACHES. IV portrays philosophy and IMPLEMENTATION FOR THE PREVIOUS EXISTING APPROACHES. Trial results and its examination are given in area V. At long last, area VI closes the paper.

II. LITRECTURE REVIEW

What the Internet of Things (IoT) needs to become a reality ,2013: In this paper author talks about the a new era of computing technology that many are calling the Internet of Things (IoT). Machine to machine, machine to infrastructure, machine to environment, the Internet of Everything, the Internet of Intelligent Things, intelligent systems—call it what you want, but it's happening, and its potential is huge. Author see the IoT as billions of smart, connected "things" (a sort of "universal global neural network" in the cloud) that will encompass every aspect of our lives, and its foundation is the intelligence that embedded processing provides. The IoT is comprised of smart machines interacting and communicating with other machines, objects, environments and infrastructures. As a result, huge volumes of data are being generated, and that data is being processed into useful actions that can "command and control" things to make our lives much easier and safer—and to reduce our impact on the environment.

Research directions for the internet of things, 2014: In this paper author talks about the many technical communities are vigorously pursuing research topics that contribute to the Internet of Things (IoT). Today, as sensing, actuation, communication, and control become ever more sophisticated and ubiquitous, there is significant overlap in these communities, sometimes from slightly different perspectives. More cooperation between communities is encouraged. To provide a basis for discussing open research problems in IoT, a vision for how IoT could change the world in the distant future is first presented. Then, eight key research topics are enumerated and research problems within those topics are discussed.

Internet of Things (IoT): A vision, architectural elements, and future directions,2013: In this paper author talks about the Ubiquitous sensing enabled by Wireless Sensor Network (WSN) technologies cuts across many areas of modern day living. This offers the ability to measure, infer and understand environmental indicators, from delicate ecologies and natural resources to urban environments. The proliferation of these devices in a communicating-actuating network creates the Internet of Things (IoT), wherein, sensors and actuators blend seamlessly with the environment around us, and the information is shared across platforms in order to develop a common operating picture (COP). Fuelled by the recent adaptation of a variety of enabling device technologies such as RFID tags and readers, near field communication (NFC) devices and embedded sensor and actuator nodes, the IoT has stepped out of its infancy and is the the next revolutionary technology in transforming the Internet into a fully integrated Future Internet. As we move from www (static pages web) to web2 (social networking web) to web3 (ubiquitous computing web), the need for data-on-demand using sophisticated intuitive queries increases significantly.

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This paper presents a cloud centric vision for worldwide implementation of Internet of Things. The key enabling technologies and application domains that are likely to drive IoT research in the near future are discussed. A cloud implementation using Aneka, which is based on interaction of private and public clouds is presented. We conclude our IoT vision by expanding on the need for convergence of WSN, the Internet and distributed computing directed at technological research community.

The use of mobile devices with multi-tag technologies for an overall contextualized vineyard management, 2009: This paper describes a Viticulture Service-Oriented Framework (VSOF) which turns around context elements or tags that are placed in the field and which can be decoded by mobile devices such as mobile phones or PDAs. The tags are used to automatically associate a field location to the relevant database tables or records and also to access contextual information or services. By pointing a mobile device to a tag, the viticulturalist may download data such as climatic data or upload information such as disease and pest incidence in a simple way, without having to provide coordinates or any other references, and without having to return to a central office. This work is part of an effort to implement a large-scale distributed cooperative network in the Douro Demarcated Region in Northeast Portugal, a region in which the effort makes particular sense due to the extremely variable topography and mesoclimates. The possibility of exchanging contextualized information and accessing contextualized services in the field, using well-known devices such as cell phones, may contribute to increase the rate of adoption of information technology in viticulture, and contribute to more efficient and closer-to-the-crops practices.

Review on wearable technology sensors used in consumer sport applications,2019: This review paper discusses the trends and projections for wearable technology in the consumer sports sector (excluding professional sport). Analyzing the role of wearable technology for diff

erent users and why there is such a need for these devices in everyday lives. It shows how different sensors are influential in delivering a variety of readings that are useful in many ways regarding sport attributes. Wearables are increasing in function, and through integrating technology, users are gathering more data about themselves. The amount of wearable technology available is broad, each having its own role to play in different industries. Inertial measuring unit (IMU) and Global Positioning System (GPS) sensors are predominantly present in sport wearables but can be programmed for different needs. In this review, the differences are displayed to show which sensors are compatible and which ones can evolve sensor technology for sport applications.

Tracking Free-Weight Exercises,2007: In this paper, author study methods that automatically recognize what type of exercise you are doing and how many repetitions you have done so far. We incorporated a three-axis accelerometer into a workout glove to track hand movements and put another accelerometer on a user's waist to track body posture. To recognize types of exercises, we tried two methods: a Naïve Bayes Classifier and Hidden Markov Models. To count repetitions developed and tested two algorithms: a peak counting algorithm and a method using the Viterbi algorithm with a Hidden Markov Model. Our experimental results showed overall recognition accuracy of around 90% over nine different exercises, and overall miscount rate of around 5%. We believe that the promising results will potentially contribute to the vision of a digital personal trainer, create a new experience for exercising, and enable physical and psychological well-being.

WEIGHTBIT An advancment in wearable technology,2017: In this paper, author present WeightBit: a system consisting of technologically enhanced gym gloves, comprised of the aforementioned sensor's as well as an additional weight sensor to detect weight and arm movements. Using this data in combination with a smartphone application, it will be possible to monitor a new series of sports activities with specific focus on weight training. Furthermore, the data collected by the application will enable broader research by medical researchers or institutions. The goal is to keep users focused and keen to live a healthy life, providing them a great tool to track their progress, and to develop a system that will allow medical institutions access to this data for further study.

III. RESEARCH ISSUE & FUTURE SCOPE

In this section basically we talk about research gap which need to be solved, As per the all previous work there is no any researcher who solve the most important and critical factors and that are:

As per the all previous work there is no any researcher who solve the most important and critical factors and that are:

1) *Battery Life:* Smartly utilize the power consumption & increase the battery life.
2) *Form Factor:* This a serious problem as we know it's a wearable device but most of the design have the issue with its form factor
3) *Cost:* If we are talking about the IoT device so cost a big problem for any IoT device , so there is need of cost cutting which is not done by any previous researchers Future Objective

In this future our main is to resolve all previous existing issue and create a balanced system which will give a quality result in all parameters:

a) Smart power Management system and increase the battery Life
b) Smartly utilize the component so the form factor will be small
c) As per the application we will select those components which will full fill our requirements and reduce the cost factor

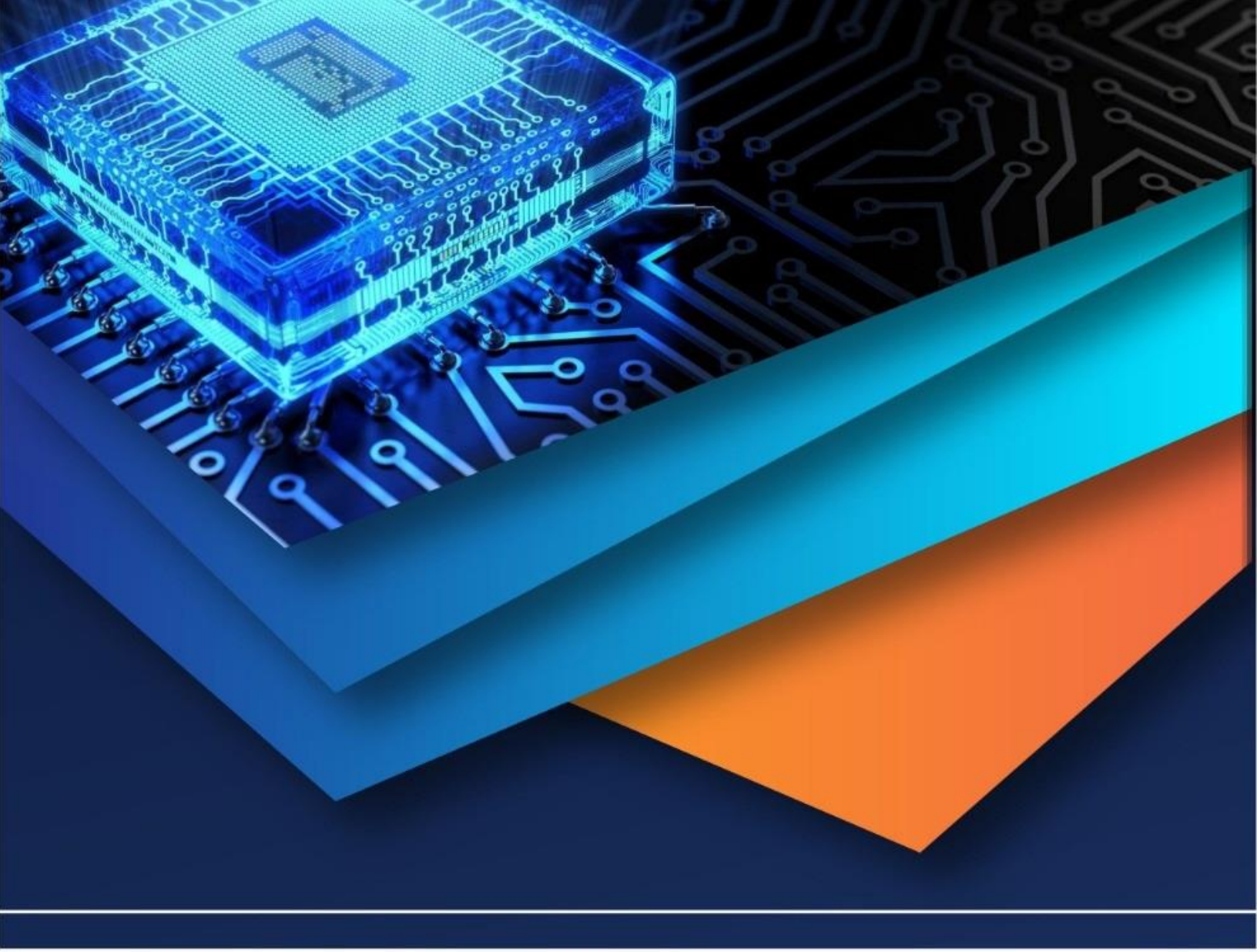
IV. CONCLUSION

Health and fitness are increasingly becoming a part of people's everyday lives. With a greater awareness of the direct correlation between health, fitness and different medical conditions, it is no wonder that people are becoming more committed and invested in achieving their optimum health. This greater focus on healthy living is in no small part due to the large quantity of information that is now available through the use of the internet and access to social media. In conjunction with the massive boom in wearable devices, which is supported by ACSM listing wearable technology as the No. 1 trend for 2016, there is no doubt that wearable devices have become a must have gadget for those tracking their fitness and training activities. In this paper basically we did the detailed study about the all-previous existing approaches and based on that we found multiple future scope on this area.

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