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REVIEW ARTICLE

Adorned with Intelligence: The Rise of Smart Wearables and its Impact on Older Generation

Radhika Shukla[1], Rajeev Kumar Singh[2]

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ABSTRACT

Aging is a journey which is common for all who have taken birth. As we age there are certain complexities, we all have to face. A fall for an older individual can lead to a fractured hip. A constant vigilant watch is required on many elderly people particularly with dementia, paranoia and unpredictable behavior like forgetting medicines or walking out of the homes. These are a few of many challenges that the older generation face. With the advent of smart wearable devices, help can be provided quickly and they can also be a life savior. In this chapter we have pointed out the benefits of using wearable devices and their impact on the older generation. Nursing and old age homes are not the solution to old age rather being independent and aging gracefully can lead to an inspirational footprint that one can leave behind.

KEYWORDS

• Smart Wearables • Older Generation • Artificial Intelligence • Digital Life • Health Monitoring

INTRODUCTION

As the world's population continues to age it has become more crucial than ever to comprehend the psychological terrain of the elder generation. These people have a variety of intricate physical and psychological difficulties (Farahany, 2023) that calls for specific attention from academics, medical professionals, and of course family members. Most senior citizens reside at home and have a lot of free time which occupies their heart and minds. Aging is a process as well as a

AUTHOR'S AFFILIATION:

[1] Research Scholar, Department of Law, Amity University, Lucknow, Uttar Pradesh 226028, India.

[2] Assistant Professor, Department of Law, Amity University, Lucknow Campus, Lucknow, Uttar Pradesh, India.

CORRESPONDING AUTHOR:

Rajeev Kumar Singh, Assistant Professor, Department of Law, Amity University, Lucknow Campus, Lucknow, Uttar Pradesh, India. **E-mail:** singh.rajeev264@gmail.com

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journey that all of us have to go through and there is no denying of the fact that if we do not take care of our health time will diminish the quality of our life and health. Proper diet, exercise, sleeping patterns, social engagement and following certain hobbies can always keep the older generation happy and active. It is mentioned in Srimad Bhagvad Gita that one must deliver oneself with the help of the mind and not degrade oneself. (Prabhupāda, 2023) There is beauty in our holy scriptures which not only define the way of life but also how to actually lead for a healthy lifestyle. There is a specified the time to wake up, exercise, eat and sleep which if not done shudders the biological clock of a person also known as the circadian rhythm. Today, along with globalisation and advancement of technology if we club the traditional lifestyle with the modern era technology, an individual can very well heal oneself physically, emotionally and mentally. But with the busy lifestyle in the 21st century aging has become a problem rather than a blessing. Aging can now be seen leading to problematic situations one of which is loss of muscle mass which is also called sarcopenia (Larsson, Degens, Li, Salviati, Lee, Thompson, Kirkland, Sandry, 2019) that this in turn leads to less strength and endurance, diminished mobility, and diminished sensory acuity. As we age our health declines in several physiological parameters and can also lead to the development of frailty, which in turn causes an increased risk of falls, progressive impairment, the need for long-term care, and an increased risk of mortality. One of the hallmark psychological changes that occurs in older adulthood is a shift in emotional processing. As people age, they tend to place greater emphasis on positivity and emotional regulation.(Charles, Carstensen, 2010) Older adults typically experience fewer negative emotions,report higher levels of life satisfaction, and are better able to control their emotional reactions as compared to younger individuals. However, this is not to say that the aging process is devoid of psychological hardship. Many elderly individuals grapple with loneliness, depression, and anxiety as they navigate major life transitions such as retirement, the loss of loved ones, declining independence and medical issues. The prevalence of cognitive impairment, including dementia, also poses significant mental health challenges for the older generation. Deepening our knowledge of elderly psychology will be crucial for developing effective interventions and creating environments that foster wellbeing in later life. By recognizing the unique strengths and vulnerabilities of older adults, we can work to ensure that the aging process is met with compassion, dignity, and the resources necessary for a fulfilling late-life experience. Aging is natural part of life and when this happens there are certain limitations like changes in physical abilities and cognitive processes making it difficult for seniors to stay at their best. Physical activities or exercises specially planned out for people above the age of 50 can improved blood pressure, body composition, and general health.On the other hand, physical inactivity and a sedentary lifestyle are separate risk factors for chronic illness and a shorter life span.(Thorp, Owen, Neuhaus Dunstan, 2011) Wearable trackers can help people become healthier and engage in more physical activity.

We live in an accelerating exponential age. What's available on our mobile phones or smart watches is quite magical compared to what scenario of living we had a decade ago and with the brilliant technological assistance the next ten years will make this era seem slow. There's a tendency to under appreciate exponentials but there is also an undying curiosity of what is going to happen next. It is interesting to look around at the possibilities that we have today like wear ables, microbiome, genomes and digitals to match that up. This idea of the digital twin has been beautifully put together to optimize care on the continuum from putting psychologists against mental challenges at early intervention or preventions from anxiety, depression or other severe mental health illnesses.

In todays changing scenario of technological advancement most of the things are available to us at ease than it was two decades ago. A lot of people today have health monitors on their everyday use. Health care technology via wearable devices is progressing with potential to provide health care for adults. Research shows that as technology is advancing so is the response to it all around. (Wolff, 2021) The older generation is not the sole purchaser of these wearable devices and technologies but these people are more tech savvy than any other age group (Faverio, 2022) which means they respond well when given access to technology.

Innovations are being developed on a regular basis to make life easier for the people who require health care. These innovations can not only diagnose the health conditions but also monitor health conditions and treat them as well which not only improves the psychological conditions of a person but also keeps one relaxed about their wellbeing. In the last several years, wearable technology has developed quickly, going from specialized devices to necessary accessories that are changing the way we work, live, and take care of our health. Smart watches and fitness trackers are leading the way in this wearable revolution. Users are gaining unparalleled insights into their bodies and behaviours with the help of these portable, handy computers that are crammed full of sensors. Wearable technology has made it possible to track a variety of health-related metrics, including heart rate and sleep quality, so gone are the days of aimlessly striving to reach 10,000 steps per day. However, wearable technology has much more potential than just improving fitness. These gadgets are quickly becoming into essential instruments for early problem detection and healthcare monitoring. Patients can continuously monitor their vital signs with wearable ECG and blood pressure monitors, which notify them and their doctors of any irregularities. Proactive measures can save lives by facilitating earlier diagnosis and treatment.

1. Evolution of wearables

Tracing back the pages of history we find that Robert Dudley, the first Earl of Leicester in 1572 gifted Queen Elizabeth a wristwatch (Miranda, 2022).This was the first time a small piece of clock was made to be worn on the body and from this point technology started being designed to be worn in the same fashion. The Qing Dynasty was the first to miniaturize the Abacus Ring in 1644, which offered its traders and merchants a competitive edge by facilitating rapid and easy computations. As technology kept advancing in its own pace and time crime scenes started being captured by daguerreotype photography (Britannica, 2024) with the gradual advancement of the spy camera industry, cameras were capable enough to capture scenes but none of them were portable enough to fit in a pocket up until the 1922 (Mudd, 2014) the invention of the renowned Minoxsubminiaturise camera. Walter Zapp invented some of the first covert cameras in Germany between 1937 and 1943 (Mudd, 2014). But a ground breaking invention was the Button spy camera in the 1950's which was made by the American, Russian and British intelligence services (Mudd, 2014) and turned out to be the world's first button camera which was used by intelligence services in the 1950s and 60s during the Cold War. In 1961 the first wearable computer designed by Edward Thorphe described in his book "Beat the Dealer" the blackjack winning strategy he created using the probability theory of mathematics. To defeat the casinos, Edward Thorp and his colleagues created a circuit board that could be worn in the shoe. This was the first time a circuit board was useful in a piece of apparel. 1979 we got to see a modern wearable computer. Steve Mann was the pioneer of this entire sector. He is known as "the father of wearable computers"(Mann, 1997)

His earlier research also included backpacks and helmets. This research became the foundation of today's wearable devices. In the year 2000 the first Bluetooth headset came out which was invented by Jaap C. Heartsen which amazed everyone, it just did not set new standards but also and generated a revolution. In 2009 the FitBit tracker was introduced(Perry, 2024) which was a convergence of creativity. It required computation, innovation, mobility, connectivity, and communication to be combined into a single product that could be sold. The modern wearable computer's official commercial launch occurred in September 2009. (Rapp 2020)The medical relevant devices which are wearable are serving as heroes to the older generations. Instead of just tracking steps, calories burnt, heart rate, blood pressure, sleep patterns wearable devices can now also track cholesterol, glucose and things that are actually tested during a check-up by a doctor. Wearable devices such as Free Style Libre Pro. (Blum 2018) system and The Dexom G7 (Hara 2024) eliminates the need for routine checks and establishes a comprehensive picture of glucose profile. Wearable contact lenses may directly detect biomarkers in bodily fluids, they have garnered significant interest as physiological parameter monitors. Lenses like Triggerfish lens (Dunbar, Shen, Aref, 2017) contain has a tiny electronic circuit that detects variations in the eye's curvature, which are correlated with variations in blood sugar levels. This information is wirelessly transferred via the

lens to a tiny adhesive receiver that is worn on the patient's cheek. After that, a smartphone app receives the data and the user can use it to track their blood sugar levels in real time. Wearing a device called Spire (Mclntosh, 2014) one may monitor their breathing patterns and determine when they are relaxed and focused, as well as when they are becoming slightly uncomfortable or overwhelmed. We also feel we have proper control over our sleep patterns but wearing a sleep sensor will make one realise the real quality of our sleep, how many hours did we really have deep sleep and how many times we woke up from our sleep which we don't realise in the morning. Tracking helps in self-improvement. It is fundamentally important to understand that in the next 5 years this could solve a medical crisis. The baby boomer generation is an average of 59 years of age and as they retire, they are in the high-risk area. Wearable technology with a medical focus will make data collection more beneficial and efficient. If we eliminate the lab and clinic process and let the super computer power to take over we are going to learn so much more about the body that we have ever known before. Medical diagnosis through wear ables in the times to come will not only be helping the older generation by preventing illnesses, managing medical costs but also saving lives.

2. Innovations transforming digital life.

The digital realm is now embedded deep in the modern existence and happens to be a very crucial part of the world now. It has reshaped our working environment, how we communicate, learn, and entertain ourselves. In the present scenario of technological solutions as technology continues to advance at an exuberant pace, innovations are constantly emerging that transform our digital lives in profound ways. From artificial intelligence and the Internet of Things to blockchain and extended reality, these cutting-edge technologies are not only changing the tools we use but also altering the very fabric of our society and economy. The present age has given rise to some of the most significant innovations that are revolutionizing our digital experience and their potential has an impact on various aspects of our lives now. From artificial intelligence and the Internet of Things to blockchain and extended reality, these cutting-edge technologies are not only changing the tools we use but also altering the very fabric of our society and economy. One of the most transformative forces in the digital world today is artificial intelligence (AI) and its subset, machine learning (ML). These technologies are rapidly evolving and finding applications across domains for the elder generation and fundamentally changing how we interact with digital systems and process any information that is provided to us.

There are many technologies including apps that track heart rate or blood pressure. Devices like wrist bands, pedometers or smart watches have embedded sensors which can measure vital signs like breathing, steps, calories burnt, the time duration of sleep, blood pressure, mood of a person etc. Wearables can now also track stress hormones. The cortisol levels measured by doctors using urine, saliva, or blood can today be easily examined by a wearable device. A wearable may also be used to continuously measure cortisol through sweat or interstitial fluid, creating a baseline and monitoring whether a patient's stress levels are improving or declining.(Covert, 2014)Wearable technology is useful for tracking information and monitoring health, hospitals and families can utilize it to help elderly patients take better care of themselves. This in turn not only keeps the older generation aware of their health conditions but also empowers them with a sense of independence of taking care of their own wellbeing.

For elder generation patients, visiting a hospital may be an extremely stressful experience, regardless of the reason for the visit, a normal operation or a major medical issue. With other declining medical conditions that this generation faces with age, being outside their comfort zone worries them even more,being in a stressful environment as a hospital and losing control can all lead to increased worry, stress and misery. It cannot be denied that one of the most significant impact of wearable devices on older adults is in the realm of health monitoring and management. Many senior citizens deal with chronic conditions that require constant attention, and wearable devices serve as the finest tool to trackand moniter the health of senior adults. Smartwatches and fitness trackers, such as those produced by Apple, Fitbit, and Garmin, offer continuous heart rate monitoring, which is crucial for seniors with cardiovascular issues. These devices can detect irregular heart

rhythms and alert the wearer or their healthcare provider to potential problems before they become serious. In contrast to traditional methods of visiting a clinic for medical appointments, wearables can be donned anywhere, at any time, and they continuously track data to identify patterns in our health. In order to "fill in the gaps" when diagnosing, that might be very helpful for the elderlies for preventing any sort of disease or monitoring it wisely. The best part is that these wearables help in diagnosis outside of the clinic, giving elderlies more time to rest, interact at home or with their friends, or go about their daily activities or just sit in relaxation mode than face the hustle of a clinic. Not only this but wearable technology has the potential to empower people(Kang, Singh, Exworthy, 2022)by giving them relevant and in-depth information about their own medical or mental health. Smart clothes, electromyography patches, fall detection systems, and activity trackers (like Fitbits and smartwatches) are a few such examples. We are in the fastest adoption and fastest innovation of history. Engaging in some or the other physical activity like walking or light exercises are essential for healthy aging, and wearable devices have made it easier for older adults to stay active and track their progress. Fitness trackers and smartwatches provide seniors with data on their daily steps, distance travelled, and calories burned right in the grasp of their hands. Many of these devices also offer guided meditations and workout plans specially designed for this particular age sphere, only to encouraging regular exercise and enhancement of good mood, there are also carefully made provisions which provide instructions for safe, age-appropriate activities. Some wearables, include features that remind users to stand and move at particular intervals making it convenient reminders form older generation throughout the day. This can be particularly beneficial for older adults who lead a sedentary life and keep forgetting things. While not always the primary focus, many wearable devices contribute to social connectivity and independence for older adults. Smartwatches with cellular capabilities have made it easy for seniors to make calls, send messages, or even engage in video chat without needing to carry a smartphone. This feature can be particularly useful in emergency situations or for staying connected while on the go. Some wearables designed for older adults, like the Unali Wear Kanega Watch, combine health monitoring and emergency response features with voice-controlled personal assistance. These devices can help a lot by reminding and providing directions. It is now easy for the older generations to book a ride in a cab for themselves and reach wherever desired. Smart watches and other desired wearable devices have proved to help the older generation in the most efficient ways and made life easy and at hand as much as possible.

3. Wearable devices versus the brain

These days, we are accustomed to the sensors in our smart watches and rings monitoring our body temperature, steps taken, heart rate, and even our breathing. Wearable devices versus the brain,now we can monitor our brain activity thanks to the consumer neurotech gadgets that are available everywhere. Organizations such as META Apple and Microsoft (Farahany, 2023) have begun integrating brain sensors into commonplace gadgets such as wristwatches, wearable tattoos, headphones, and earbuds. Consumer neurotechnology products are evolving from specialized items to tools for understanding brain activity. While neurological diseases continue to rise 55 million people suffer from dementia around the world with more that 60% suffering from Alzheimer's disease, depression effects more than 300 million people across the globe (WHO, 2023) consumer neurotech devices help to treat our brain health and wellness as seriously as we treat the rest of our wellbeing. It is no denial of fact that as we age, we also see and undergo stress and trauma in certain cases. Older generation undergoes the trauma of loss of loved ones or multiple emotional distresses. For a lot of people suffering from traumatic memories, an innovative new approach called decoded neurofeedback or DecNef may also reprieve.(Dumouchel, Cortese, Lau, Kawato, 2021) This innovative method helps to discover particular patterns of brain activity in the brain, especially those linked to traumatic situations, by using machine learning and algorithms. It enables them to retrain their brain activity on positive associations instead. The implanted brain sensors in our everyday technology impacts majority of lives. Now researchers from Israel (Yang, Truong, Maher, Nikpour, Kavehei, 2021) have developed brain sensors using artificial intelligence in pattern recognition and

consumer electroencephalography to enable the detection of epileptic seizures minutes to up to an hour before they occur sending a life saving alert to a wearable or mobile device. According to WHO 70% (Ehn, Eriksson, Akerberg, Johansson, 2018) of epilepsy patients can live a life free of seizure if they are treated and diagnosed properly. Regular use of brain detectors can also help us to detect brain tumours. An early detection is crucial to saving lives. The same could hold true for Alzheimer's disease, ADHD, Parkinson's disease etc. Brain sensors also provide data to the part of ourselves that we hold back that we don't express through words and actions. It reflects our mental state, our emotions, our preferences, our desires etc.

4. Psychological and emotional impact on the lives of older adults

Most of the older adults live alone, especially after retirement. Their interaction with the world outsider educes. It is easier for the elderly people to experience more negative thoughts which in turn effects their mental and physical health. (Charles, Carstensen, L, 2010) In today's adaptative world of technology their dependency is more on their mobile phones and the technology around. Therefore, the degree of arousal is improved, the negative feelings of old people living alone are effectively identified, and the elderly can quickly overcome the effects of negative emotions thanks to the development and deployment of smart wearables. A lot of elderly people are health conscious and track their own health implications. These people feel motivated by the use of wearable devices such as wrist watches as they encourage them to leave their sedentary lifestyle and focus more on their health and wellness. When we live a life, which is goal oriented (Ehn, Eriksson, Akerberg, Johansson, 2018), a person is driven from within. Smart watches help the elderlies to set up a goal and this in turn keeps an active happy and passionate lifestyle as shown in figure 3,instead of a dull and sedentary lifestyle which is easy to hit an elderly individual.

A lot of times wearable devices help to personalise diet and exercise which makes an older adult feel young and active. Following a proper diet and lifestyle is a great boon to health and in turn keeps one happy and going. Especially older adults who have restricted diets and cannot exercise at the level of a twenty-five-year-old, their body requires their age level exercises, having a personalised form of exercise and diet at hand can not only keep their mood light but also keep them active all day long.

Wearables like rings and wristwatches can now measure sleep patterns to name a few there are now available rings which are Ultra Human Ring, Oura Ring's Horizon which can track sleep accurately. Wristwatches like Whoop and Garmin Epix Pro (Mack, 2021) are another major help to keep elderlies relaxed about their sleep patterns also a trio of proper diet, exercise and sleep is a major factor of happiness. Once it is tracked, the elderlies have a sense of validation of having their life under track.

A lot of times older adults feel left out when they cannot match the technological pace with the younger generation, wearables are one of the reasons they feel empowered and independent. Constant use of technology can help them keep up with the conversations with the younger generations in the family or otherwise but also most of them feel confident while interacting with the outside world when they are aware of the technology being easy at hand.

As we age our body not only loses its agility but also at times sight and the ability to hear. Many elderly individuals express gratitude and relief when they can hear their loved ones using a hearing aid. This can improve their quality of life and would allow them to participate actively in conversations and enjoy social activities. It also keeps them independent.

A lot of wearable devices now can also measure intrinsic health conditions, including blood pressure, glucose levels (Dumouchel, Cortese, Lau, Kawato, 2021) and heart rate and heart rate variability (Alugubell, Abuissa, Roka, 2022) and it can give elderly patients and their healthcare providers feedback or alarms. The aged person may feel more empowered and in charge as a result of being able to actively manage their own health. In a paper published in the Journal of the American Heart Association, Dr. Kazuomi Kario, a professor and chairman of cardiovascular medicine at Jichi Medical University, discussed the possibility of using wearable technology to control excessive blood pressure.(Shibu, 2024)

Once an older individual is aware about his health conditions, he or she can take steps to

improve his orher lifestyle in the right direction, this also gives a sense of responsibility toward self and in turn would help to prevent a big health hazard.

5. Benefits of using wearable devices

- **Health monitoring**

Wearable devices like smart watches keep a continuous check on vital signs like blood pressure, oxygen level, heart rate, this is a way to track early signs of any serious ailment which can be taken care of by medication, maintain the right diet and lifestyle and regular walk and light exercise. Wearing a smart watch can show an early detection of potential health issues can be corrected by self-care and management. Smart watches have revolutionized personal health monitoring by offering continuous, real-time tracking of various vital signs and activities Many models also include GPS for tracking outdoor activities and sleep monitoring capabilities to assess sleep quality and duration. Advanced smart watches can measure blood oxygen levels, detect irregular heart rhythms, and even perform ECG readings. They often integrate with smartphone apps to provide comprehensive health data analysis and trends over time. Some watches offer stress monitoring through heart rate variability analysis and can remind users to engage in mindfulness exercises.

- **Fall detection**

"Being down on the floor alone is a miserable, undignified experience for anyone, whether young or old. Rapid fall detection means restoring dignity."(Habas, 2024)

-Steve Moran, Senior Living Foresight.

Fall detection is a really helpful feature which gives automatic alerts to the caretakers of the older generation. Devices like Medical Guardian MGMini Lite or Bay Alarm Medical SOS Home Cellular with Fall Detection(Habas, 2024) are a huge help to monitor fall detection and control. When an elderly person is about to fall, accelerometer sensor which is embedded in a watch, necklace or any other wearable device used by that individual identifies the pace of fall. The emergency number provided by the elderly individual is then contacted and informed immediately.(Wingad, 2024)

- **Activity tracking**

Just by wearing any device, physical activity will not be enhanced. Wearable devices such as wrist watches offer a wide range of activities like walking, yoga, breathing exercises, cycling etc. Any such gadget that is designed to increase or maintain physical activity combines various behaviour change techniques such as goal setting and planning. (Schmidt, Jansen, Depenbusch, Gabrian, Sieverding, Wahl, 2022) This in turns shifts the moods of older generation towards a goal-oriented lifestyle which helps to maintain a healthy lifestyle.

- **Cognitive support**

The cognitive support in wearable devices combines AI-enabled devices with edge computing. This is a good help to the elder generation to complete their daily tasks as these also provide virtual instructions offering them virtual instructions which makes it easy for them to complete their tasks. The virtual help also helps them solve complex problems. (Miliard, 2022) There are also brain training games and exercises which keep the elder generation engaged in cognitive enhancement.

- **Medication Management**

Medication reminders are one of the most crucial features of wearable devices for the elderly. There are many ways to measure medication, the reports of patients, number of medicines to be taken, pharmacy refill records, drug metabolites or biomarker testing, and directly observed therapy. For example, the Medication Event Monitoring System (MEMS) can record every time the patient opens the pill bottle via a sensor embedded in the pill cap. (Mason, Cho, Rayo, Gong, Harris, Jiang, 2020 The setechnical systems provide a system to measure and monitor patient's medication every single day. Many older adults take several medicines at different intervals of the day, which is often times difficult to remember. Wearable devices can be programmed with personalized medication schedules which sends timely alerts through vibrations, sounds, or visual cues when it's time to take a specific medication. This feature significantly reduces the risk of missed doses or accidental overdoses. These systems can also track when medications are taken and the data can be easily provided to the family or the care takers so that the older adults are taken care off even from a far.

6. Revolution of wearables – a future

In today's world technology we have seen computers evolve into laptops and then a booming era of mobile phones and now an entire data rests on our wrists in form of wearable devices. Dr. Gordon Moore, who helped in the foundation of Intel Corporation. As the power of computer has increased the size of these devices have decreased. Dr. Moore outlined the implications of a computer-era Magna Carta and calculated the scaling principle. He projected that at least ten years of doubling the number of transistors that could be etched on a chip would result in enormous gains in computer power. (Gwynne, Heebner, 2006) Devices have been "on us", the future could be "in us" and then "a part of us" Wearables are on the way to be extension of our brains to increase our cognition and ability to perceive. As our algorithms get smarter and smarter and get better predictive capabilities there can be enhanced results. Bio computing, the interfaces of biology and computer interfaces can be together used in the treatment of older generation. (Wooley, 2005)There will be miniaturisation of devices and expansion of data. Sensors are going to be everywhere around us they will be increasingly smart and more predictive. The physical artefact from a virtual world and we will see more and more of these worlds intermingle. Sensors will increasingly be used in fashion and emotions than just measure their biological levels. The most interesting part of it is the human mind is changing and evolving with time and technology. changing and evolving with time and technology. This will be a perfect gift for older adults, if wisely used they can not only use it for their emotional and physical wellbeing but also protect themselves from various mishaps. AI-enabled wearables will be able to analyse and act upon a multitude of sensor data in addition to voice engagement. Through the integration of environmental sensors, machine learning algorithms, and biometric data, these gadgets will have the capability to continuously track our physical and mental well-being while providing tailored advice and insights. AI-enabled sun glasses which can easily measure biometric levels. for instance, a smart shirt (Khundaqji, Hing, Furness, Climstein, 2020) may monitor your heart rate, breathing, and stress levels before offering recommendations specifically designed to enhance your general well-being. This can be such an interesting phenomenon for the older generation, a simple voice recognition can be of such a great help merely by wearing such devices. As simple as wearing a piece of cloth can benefit the older generation in the best possible direction and keep them hassle free.

Additionally, wearable technology will have new opportunities in the areas of accessibility and assistive technology thanks to the integration of artificial intelligence. Wearables have the potential to become digital companions for people with impairments, improving their freedom and quality of life by utilizing AI-powered features such as speech recognition, computer vision, and other related skills. For example, a smart hearing aid may selectively enhance speech in noisy environments, or a pair of smart glasses (Lingawar, Nilakhe, Kamble, Shinde, 2023) could describe the visual scene for individuals with vision impairments. The way we interact with and depend on wearable technology will likely change significantly as the lines between it and artificial intelligence become increasingly hazy. AI-powered wearables will develop into proactive, intelligent companions that are effortlessly integrated into our daily lives and enable us to live wiser, healthier, and more connected lives, rather than just being instruments for tracking and monitoring. As time passes there would be better use of technology for the older generation and this would make them feel more confident in every sphere of life and not be limited to just bodily inflictions.

7. Suggestions

- **Protection of privacy**

Our increasing understanding of neuroscience, AI, and machine learning may allow us to understand a great deal about what goes on within the human brain. It is crucial that the elder age understands the law and that everyone has the basic right to cognitive liberty, which must be upheld. Ideas can be accessed with peril, as can mental privacy and brain control.

Every day, an average individual has hundreds of thoughts. Neurons in the brain interact with one another to produce a little electrical discharge. (Scherer, Vidaurre, 2018) The older generation has more free time, and during this hour, the brain fires thousands upon

thousands of neurons, resulting in simultaneous electrical discharges in unique patterns that may be measured by electroencephalography, or EEG. Without saying a word, we can use a basic wearable gadget to see inside a person's brain and observe various aspects of their mental landscape. We can also use this technology to determine a person's mood and use artificial intelligence to interpret single-digit numbers, shapes, or words that a person is seeing or hearing. With the advancement of technology more and more of what is happening inside of a human brain can and will be decoded over time. A paraplegic can type on a computer with their their thoughts alone. (Mack, 2021) An epileptic patient can know he is having a seizure before it happens. By providing access to information about oneself, this may empower people and encourage them to take responsibility for their own health and well-being. But in doing so, we have unintentionally destroyed our last stronghold of mental personal independence. The elder generation's mental activity will only be exchanged for insurance discounts or unrestricted access to social media profiles. Without the subjects' knowledge or consent, wearable cameras and microphones have the ability to record private conversations and activities. If sufficient security measures are not implemented even wearables' sensitive location and health data may be susceptible to theft, hacking, or unintentional disclosure. Wearable device activity logs in great detail may enable businesses to profile consumer behaviour, habits, and preferences for marketing initiatives like targeted advertising. Employees or patients may feel under pressure to utilize wearable technology and disclose personal information against their will in specific settings, such as the workplace or the healthcare system. The busiest high-speed rail line in the world, the Beijing-Shanghai line, requires its train drivers to wear an EEG device (electromyography) to track their brain activity while operating the vehicle. (Farahany, 2023)We are on the cusp of a world where brain transparency could fundamentally alter our understanding of data privacy. The Indian Constitution recognizes each person's right to privacy as a basic freedom. This suggests that each and every person is entitled to their own data. They can choose when to withdraw their consent or object to the processing of their data, as well as how they want their data to be used. Laws protecting data empower individuals in a number of ways. They have a right of recourse in the event that this is breached, as well as information about how personal data is gathered, stored, and transferred. They are fairly compensated for any compromised information. People are informed of their rights regarding their data, and an effective grievance redressal framework is established. The older generation must also understand that with the picked-up pace that artificial intelligence is accelerating it can even harm their digital personal rights which are very well enshrined in Digital Personal Data Protection Act 2023. If this is understood and taken in consideration regarding being updated with all the laws and the knowledge of when and what to give personal access to, there will never be negative psychological implications on the older generation. One just needs to be aware. Comprehensive data privacy laws that require user agreement, limit the use of wearable data, and apply severe consequences for noncompliance must be established by governments. It should be ensured by law that access to services or employment cannot be contingent on providing personal information.

- **Understand the limitations**

It is important for the elder generation to understand the limitations of wearable devices, especially for health monitoring. They should not solely rely on the wearable devices for critical health conditions. It is always wise to listen to the doctors and experts, understand their own medical conditions and then use the devices to track their health. The constant use of wearables will surely help the elder generation to keep a track of their health conditions but solely relying on this can be risky. It is always advised to listen to a medical expert, keep a regular check on their health conditions and medication. A critical health condition should not be avoided and must be first consulted with a doctor. Simply relying on the wearable device such as a smart watch may not at all times be sufficient but it can always be used to track health.

- **A helping hand for a better future**

The younger generation must help the older generation if any such need arises to impart knowledge or to help elders regarding settings of complexed devices. The youth stays updated with the current scenarios of

technical advancements and must help the elderlies to make wise decisions about which gadgets to use and what information to give. If the younger generation helps and updates the elderlies regarding technical assistance or updates, it will be much easier for our elderlies to handle the latest technologies. Risks can be reduced by using privacy modes, checking permissions, and installing programs that improve protection and privacy.

- **Determination**

With the passion and determination to stay healthy, to do regular exercise that is prescribed, be aware and more updated about their devices and health elders should themselves keep a check on frauds by reading relatable news, being updated with the terms and conditions of the device and by keeping insightful knowledge regarding their own devices which track health conditions and by doing this they can help their own friend circle and family, this will not only inculcate a sense of independence but also give them anencouragement to socialise and by adapting this in life the older generation will not only match the pace with world today butthis will also make them feel empowered with the ability to move ahead in life with advanced technology, understanding both its pros and cons.

CONCLUSION

Our bodies almost all the time are transmitting data, which we typically choose to ignore until something catastrophic goes wrong. We don't realize we need to get more rest, take more vitamins, eat better food, or drink more water until we wake up one morning with a sore throat and back ache. However, with the development of wearable sensors, we now have gauges, dials, and sensors that gather all the data that our bodies emit and provide. At times a lot of us feel technology is separating us from being human but we can also look at the other side to understand that technology helps us to expand our humanness. We need to learn that what data our body is radiating and how to make most of the use of our body and mind. We can do a lot with that power. "self-knowledge through self-tracking". We don't have to use computers in the long run we are and will be in the future to come be wearing sensors that analyse data in the real time. We used to have to rely on the doctors to tell us everything, like whether our hearts are beating normally or if the unsettled mole on our skin is cancerous. However, thanks to wearable sensors, we can now take our own EKGs, take pictures of our hearts instantly, and avoid visiting the doctor by simply connecting a device to the back of our smartphones. Our bodies continuously emit data, which helps us understand how we develop over time and makes progress possible. This is the power of wearable sensors. The older generation is at the best possible stage to make goodof wearable devices for their illnesses and wellbeing. Technology has progressed harmoniously. The best possible use of it will make one be connected with the benefits of it as well as the swiftness of the world. Its paramount to understand that knowledge is the only sword that will give protection from any sort of infringement of data. In the coming future our wearables will be extensions of our own brains. Smart wearable devices are tremendously bettering the lives of elderly people by adding to their safety, keeping a health check, and giving them a sense of independence. By features like fall detection, emergency alerts, and medication reminders, these devices continuously monitor vital signs like heart rate, blood pressure, and sleep patterns, providing valuable data to them and their family members. For seniors with chronic conditions, wearables can track symptoms and alert caregivers to potential health issues before they become serious. GPS-enabled devices help those with cognitive impairments navigate safely and allow family members to locate them if they wander. We are approaching the era of really ubiquitous computing, where the digital future will be imprinted on our skin, our eyes, and even our wrists. The wearable revolution is just getting started, so let's buckle up to convert the tedious aging process into a graceful journey and a blessing in disguise.

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