

A REVIEW STUDY OF TECHNOLOGICAL HEALTH GADGETS: 2019

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ABSTRACT

In current scenario the intervention of technical gadgets has attracted the users to a greater extent across the world population. The level of dependency has greatly increased and users are totally got adapted to gadgets and its wide applications. This secondary data research paper focusses on the understanding the meaning of gadgets and grouping its usage under various areas like industrial, military, mobile communication, entertainment and health. The global market for mHealth solutions comprising of gadgets, internet and mobile technology is estimated to reach an unprecedented growth and there lies an acute need of structured health care services. This study explicitly highlights the application of gadgets in health care sector with its classification and importance and concludes that there is paradigm shift in usage of health gadgets with wearable gadgets as future technology.

Keywords: *Gadgets, Health gadgets, Wearable health gadgets*

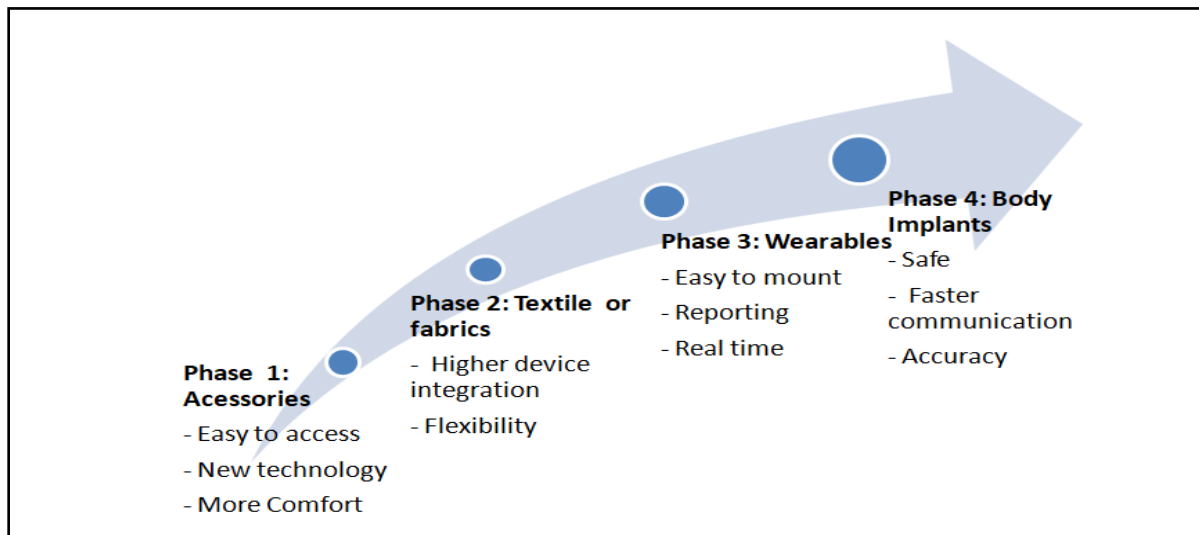
Introduction

The Merriam Webster & Oxford dictionaries define ‘Gadget’ as a small mechanical or electronic device or tool with a practical use but often thought of as a novelty. The term ‘gadget’ originated in 19th century from the combination of two French words – *gâchette*, means ‘lock mechanism’ and dialect word *gagée* means ‘tool’. In the second decade of twentieth century, Vivian Darke describes gadget as a Flying Corps (Wikipedia). By the mid of the 20th century gadgets were started to be treated as synonyms of confinement and movement. The series of evolution in gadgets can be viewed at The Museum of Technology- Gadgets & Gizmos located in England. Here the collection features the progression of gadgets and their technological development from the year 1850 to 1980. The term technology is derived from a Greek word “*techne*” which means an art or skilful used to execute the work intended for a purpose or to derive a solution. Technology means the advancement in the tools surrounding the people for enhancing their day to day operations, work procedures, communication, value and development tasks (Flanagan J, 2008). Technology accelerates and enhances the learning mechanism (Iserhagen. 1999). Now the technological interventions / advancements are evident in all the sectors and are drastically affecting the consumer behavior. Gadgets are also technology advancements tools which enhance our ability to do work but these are different from a device. The device is an instrument to execute a task and to obtain some results or solution but gadgets are those technical devices which extend our capacity to execute same work with added features and functionality, moving ahead the limitations (website1). Gadgets can make the work of the user easier and enjoyable. There is a need to classify the gadgets because of multiplicity of their use in industry apart from multiplicity of their design and types. So, the Gadgets can be classified on the basis of technology, usage and industry sector. Due to linking of different technologies now the nature of consumer behavior for gadgets is shifting from easiness and convenience to portability, mobility, real time access and embeddedness in surroundings (Laxmi, S. et.al. 2015). Gadgets can be mechanical and technological both. They can be used as handheld tools, software and wearable devices. Gadgets as software are referred as *widgets*. For healthcare sector the gadgets (health gadgets) should have added mobility and dynamic access to health care services and health data. The commencement of health gadgets is evidenced since sixth decade of twentieth century. In 1960 Ed Thorpe and Claude Shannon introduced first cigarette packet sized pocket computers as a gadget which was designed to predict roulette wheels. The potential of electronic gadgets in healthcare sector specifically estimated when Hubert Upton invented the eyeglasses which were synced with lip reading pattern for hearing-impaired users. The market for wearable devices is wide and varied. Health gadgets range from simple wristwatches that measure real time calories consumption of the users & continuous glucose monitoring applications. Gadget manufacturers are creating new designs to fit gadgets on and with the human body. The wearable devices’ market is poised to accelerate over the next few years as innovative ideas come to market and consumer interest and knowledge grows. Markets and Markets, a research firm, predicts an expected growth of 134 million units in the total shipments of wearable gadgets by 2018 while the global market revenue is expected to grow from \$4.65 billion to

\$9.17 billion (Flanagan. J, 2008). According to a report by Deloitte, smart gadgets market in India currently holds 60 million users and expected to grow to 1.9 billion by the year 2020 (Chong, Z .2017).

There lie various elements for the adaptation of technology like economic balance, positive political intervention, infra functionality, proper communication, and accommodating sociocultural and environmental dynamics etc. (tanner, M & Harris, E. 2000). Considering a huge growth, the earlier technological adaptations were larger because of internet but after “dot com fall” users started seeking for more convenience, security and networking. As a consequence, many of such digitally funded tech initiatives slowed down and their effect was evident in health care sector also (Jadad, A. 2003). Based on development and evolution gadgets can be classified in a phase- wise manner. Initially gadgets were introduced as an accessory to some device to develop consumer inclination. So, users were more interested to access their personalized gadget seeking their individual requirement prime. Then in the second phase the gadgets took form of the alluring textiles and fabrics integrating with other gadgets and electronics devices. Third phase was of shifting gadgets from near body electronics concept to over body concept. Now it’s the phase of wearable gadgets. Finally, by 2025, in last and fourth phase the gadgets will assume the shape of body implants where its synchrony with organs and human safety will be essential.

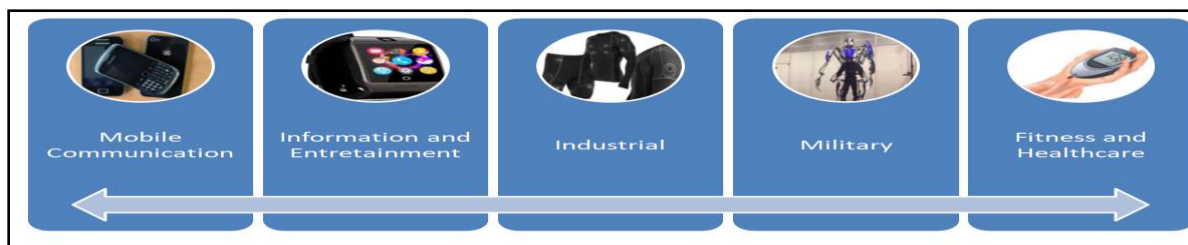
Diagram 1: Showing the phase wise growth of body mounted gadgets



Source: Process Diagram constructed by Author based on data from Ministry of Trade, Industry & Energy of Korea

Another way of classifying gadgets can be based on applications and technology adaptation

- (i) Mobile communication (ii) Information and entertainment (iii) Industrial (iv) Military (v) Fitness and Healthcare
(European Commission, 2016)



Source: Block Diagram constructed by author on data based on European Commission, 2018

Gadgets for Mobile Communication

Nicola Tesla and Guglielmo Marconi found the technology of wireless communication which serve as the basis for mobile phones. And the first cell phone was seen in 1973, it was developed by Martin Cooper of Motorola. In 1991 the Global system of Communication started in Finland and in the year 1993, first ever text message was sent. Gradually the digital content like ringtones, audio and advertising data was also started moving over the mobile technology. This era also marked the commencement of 2G technology (Clark, J. 2012). Usage of Mobile phones was shifting from cellular device to gadgets in the form of smart phones, tablets and notebooks, allowing the user to browse, send email, voice calls, recording of audio and video and providing storage flexibility (Shodhganga). Basically it's allowing an access for the user to get in communication with the destined receiver. The reason behind the communication can be related to job or it can be personal also. It provides a real time communication setup for the sender & receiver. Mobile phones as a gadget have increased the capacity of an individual to share data and information. (Kendrick, J. 2013). Mobile phones as gadgets can be further classified into two types as per features: (i) actual cell phones feature (ii) gadgets connected to the Smartphone. Actual cell phones feature are mobile features i.e. calling, texting, digital usage wherein the gadgets connected to the Smartphone focus over the compatibility of the gadgets with Smartphone. It includes various features such as portable charging, accessories enhancing call quantity, extended lenses for better camera focus (Website, 2010)

Gadgets for Information and Entertainment

In our day today life, gadgets have become an integral part of our life. It is a common observation that for finishing the over listing in our daily life it we need to assist our daily activities with gadgets. These gadgets simplify our work and adds luxury to it, provide comfort and an ease of completion. They have become an important source of entertainment and fun and apparently play an essential role in improving our living standard also. (Agazoo, 2015). The *Osim uComfort massage chair* is a complete utility and customize gadget which provide full massage of the body with magnificent Pro functionality. It is loaded with programmable sets of functions which as per user requirement delivers a relaxing and effective massage therapy (gadget flow, 2017) *The laser beam projector* is unleashing the untouched horizon of picture viewing. Its flexible connectivity with source devices and an easy access to the online data pool creates a theatre experience for user. *All in one display* is another gadget which enables to play video stream from various different sources simultaneously; user can shift to multiple streams with a click of a button. *Microsoft Xbox* has given a bigger and entertaining definition to the gaming experience to the users. Inclusion of the features like gesture control and motion sensors have created environment which provide augmented reality for the gamers (Business Today, 2012). Gadgets have not only enhanced the entertainment level for the users but also have added a mobility to the users, through which the users are now going beyond the cluster of wires & can access entertainment. It not only about Bluetooth technology used wireless streaming but the intervention of *SMART TV's*, *DVD Blue ray*, *Digital Living network alliance (DLNA)*, *Wi-Fi Direct* (website, 2012). The information sharing also became easier through the usage of gadgets. *Kindle tablet for book reading is one such device which has made book reading possible anytime and anywhere*. It being a tablet allows for download and buying of e-books from stores as per reader requirements (Donegan, TJ. 2017)

Gadgets for Industrial Use

Integration of technology with industrial operations through gadgets provides faster access of information, effective monitoring, better automation control, increased efficiency & productivity and decreased accidents and mishaps. From machine learning, machine to machine communication to artificial intelligence, industrial concerns are largely addressed. Smart industrial gadgets carry the ability to interact with actual environment and adapt to the changes also. They monitor, track and react towards the industrial conditions and various external environmental stimuli from mechanical, electrical, thermal, chemical and cold environments. They are multifunctional gadgets with artificial intelligence which is supported by different sensors embedded in the textiles. These sensors sense various real time parameters such as strain, force, heat index, chemical type and this tracking is done in reference to pre-fed standard threshold value (Krebbber, K. 2013). The concept of smart dust, a tiny sensor with the size of grain of sand which carries unique ability to detect chemicals and vibrations have been in use in industries since 1990s. Such tiny sensors allow the operators in Oil extracting firms to track movements. To minimize the industrial critical incidents, *man-less aero based drone* vehicles are the latest entrant in the list of gadgets and are being used for various applications. They perform land survey, add mobility to surveillance and can mount various devices over it for broader reachability. These drones also collect data through field operations and stream the same over network allowing real time field

monitoring. Streaming of data enables the real time access of complete industrial premises (Toesland, F.2017). *Wearable and portable mini-computers* are used in assembly lines and industrial environments for *hands-free real time barcode scanning* applications within warehouse. These devices collect data using Bar Code Reader, Smart card, GPS etc. and manage the interaction of these devices with remote servers via wireless data communication through Wi-Fi, cellular modems, and Bluetooth (Eurotech, 2018)

Gadgets: Military

For decades' military is continuously transforming itself to improve the preparedness, proactiveness and superiority against dynamic threats and enemy attacks. Transformation is not one-time activity or situation based requirement but it is the basic and operational principle of warfare since the time of bow and arrow (Evans, N. 2003). The higher technology gadgets synchronize the defense systems which in turn enhances the operational efficiency and safety of the soldiers in the battle field. Some Gadgets enable them to navigate accurately in the enemy area and to communicate in a secure network. In US army Land warrior program is incorporated wherein the soldiers are equipped with GPS devices, hi-tech cameras and recorders in order to increase their alertness and awareness in the battlefield (Chandler, N. 2018). To optimize the efficiency of the defense task force another newer technology is *portable x-ray viewing system*. Generally, in the normal x-ray viewing the object need to move to the x-ray source for the scan but in the portable system the suspected object remains at its position and x-ray source is moved towards the object. It enhances the ability of defense task force to scan and track the possibility of bombs and explosive material (website, 2018). Seeking the future warfare techniques now new defense system is enabling each soldier to get linked over the private and encrypted cloud networks. Getting aligned over such network, the activities of each soldier can be tracked and monitored and centralized decision making can be executed from the central headquarters. Recently, the military is being equipped with drones which have several benefits like anytime the drone can be assisted with high-definition cameras and video recorders which provide the LIVE feed of the enemy territory and accurate information of the ground troops. Drone cameras help for investigating unknown civil establishments, enemy movements and ensuring the safety of the troop. It also enables the search of lost soldiers, fighter plane or complete troops. The real time feed allows the commanders to make better decision making. Drones can also be loaded with missiles and explosive to invade enemy area and accomplish surgical strikes (Smith, S. 2018).

Gadgets for Fitness and Healthcare Use

The newer adaptations of healthcare technologies are in laboratories, whereas artificial intelligence and robotics are being used for transmitting and diagnosing health data. Also the security of health data of patient being transmitted over the network is critical and is a matter of great concern. Despite this challenge, the acceptance of health care data flow over network is increasing because of the benefit of mobility it is able to provide in healthcare services (J. Soar 2006).

Three kinds of innovations can make health care better and cheaper. Firstly, changing the ways the consumers access the healthcare services, their buying behavior and their confidence level. Secondly, technology also intervenes in the research and development of new healthcare services and facilities. The technology broadens the scope of improvement in complete health care delivery model. And lastly the technology updates the healthcare business process and creates various horizontal and vertical integration in healthcare related activity. Technological enhancements in the delivery of health care services result in convenient, effective, and less-expensive treatments now a day as it's difficult for users to keep in mind their stress level and day to day hassles. Health planning can be focused to be more user-friendly. Patients, after all are like other consumers: They want not only a good product i.e. quality care at a reasonable price but also ease of its use. According to a study by American Medical Association, in United States health care seekers have to wait for three weeks for fixing appointments with doctors, need to travel a substantial distance and in case of chronic diseases they need to shift from one set line of treatment to another and all these things only for thirty minutes of interaction with a doctor (Herzlinger, R. 2006). The technology enabled health care delivery is more systematic and integrated & results in improved outcomes. Systematic approach means more training of healthcare workforce, increased interaction with patients and encouraging innovative health technology tools. One of such innovative method is introducing mobile technology for health care services. The increasing intervention of mobile based health care services is capturing greater mass attraction. Agile ecosystem of mobile health services allows the shifting of health applications over handheld devices, Smart phones and gadgets. Data security is confirmed through encryption over mobile technology and mobility carries the real sense by health gadgets. Easy access to telecom market, strengthened availability of telecom services and de-regulations in FDI policies has significantly increased the usage of smart phones which has eventually increased the health gadgets. Main issues which were

coming with desktop based telemedicine system were infrastructure deficiency. Major infrastructure was internet bandwidth; connectivity and electricity, the dependency of health care applications over it decrease the efficiency health care delivery model (Tiwari, P. 2010). Health gadgets either mounted over the body or can be handheld for a specific activity or for a time bounded need. Handheld gadgets allow the users to monitor chronic disease situation and to manage precaution necessary from diseases and basic hygiene (Corneanu, M, 2018)

Diagram 3: Market Segmentation Mobile HealthCare



Source: Market Research Engine 2018

Table 1: Showing the classification of various handheld health gadgets

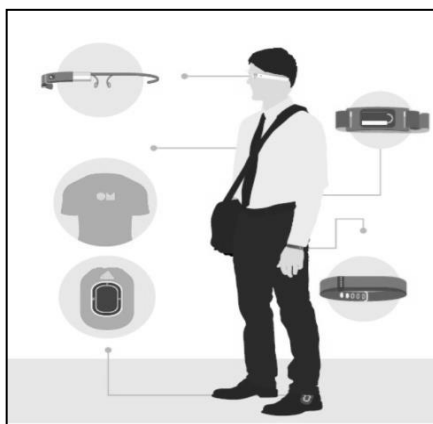
S.No	Purpose	Health gadget
1	Track your heart rates, respiratory rates, blood oxygen levels and heart rate variability	Tinke
2	For whitening teeth up to 5 shades	Teeth Whitener
3	Monitor heart rate and deliver ECG to your Smartphone	Your Personal EKG
4	uses hot/cold therapy to treat aching muscles, reduce pain, and stimulate circulation	Instant Hot/Cold Pain Relief Wand
5	alerts you in real time about the presence of harmful gases (CO) and volatile organic compounds (VOCs), while also measuring air temperature and humidity in the surrounding	Compact Air Pollution Monitor
6	Easy to measure blood pressure with Smartphone synced app	Blood Pressure Monitor
7	Uses ultraviolet (UV) light to destroy 99.9% of all the harmful bacteria, organisms, and viruses that can exist in water.	Prizewinning Water Purifier

8	Connects to your Smartphone and helps you keep track of your Blood alcohol content levels.	World's Most Advanced Smartphone Breathalyzer
9	Eliminates up to 99.9% of bacteria and viruses found on the surfaces we come into contact every day by destroying their DNA.	Germ Eliminating Travel Wand
10	Enables medical professionals to diagnose patients in remote areas.	Smartphone Ultrasound Device
11	Delivers low-voltage pulses to the skin to stimulate nerve fibres, blocking the pain signal to your brain. Helpful in sciatica, arthritis, or Carpal Tunnel pain	Pain Relief Device

Source: Table constructed by author on the basis of Hongkiat, 2018

Body mounted health gadgets have computer based logic and integrated with sensory signals to set up an individual based health environment where smallest changes of the body dynamics is tracked and monitored. Even it allows the transmission of data over wireless network or even through any external storage device. The collected data can be further processed and analyzed for seeking the required treatment or necessitate health care action. Complete health data can be stored at a centralized server present locally or over an external server. The result is sent back to the user as a course of action in real time. Wearable health gadgets enable the user to have real time control, communication. Data storage and analyzing features.

Diagram 4: Usage of gadgets over various zones of body parts



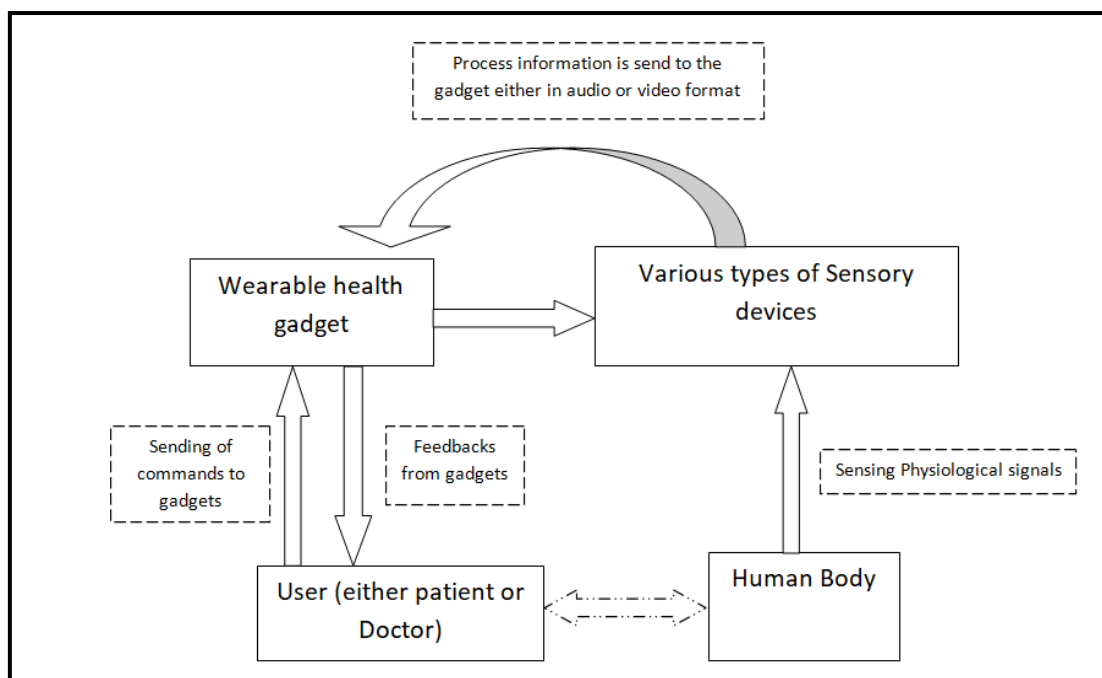
Source: Adopted from MaRS Market Insight, 2014

There lies a vast base of applications for wearable technology for medical and health care services. Through such gadget, patient's vital information such as heart rate, brain activity, sleeping patterns, sugar levels, blood pressure measure, stress index etc. can be collected and be shared with doctors, physicians and healthcare service providers. For instance, a cardiac sensor based wearable device – Body guardian Remote Monitoring by preventive, tracks patient's biometric signals. One such wearable device approved by FDA monitors non-lethal arrhythmias in ambulatory patients and connects the health information in real time through wireless network to doctors. Through body mounted health gadgets doctors and physicians have extended capacity to access their patients outside their clinic also. Mobility is attached to their healthcare services due to such gadgets. With further extensions now healthcare professionals are experimenting with the usage of health gadgets for providing better health care services such as Dr. Pierre Theodore from University of California San Francisco, is using Google glasses while performing surgeries. Through head mounted Google glasses Dr. Pierre is able to browse, record and run third party functions simultaneously

at a time of operation. Also he can preload the X-ray and CT –scan reports while operating. Health gadgets enabled Dr. Pierre to access the ample data parallelly while performing surgery and he not even need to move out of the operation theatre also. Thus the prime benefit of wearable based health gadgets used for medical and health purposes is connecting with real time health data, hence the accuracy and reliability are two dimensions which must be high. To assure this approval from regulatory body is must. If compared such health based wearable gadget are more beneficial then simpler fitness based gadgets. It is observed that insurers don't trust linking of health care services with digital or internet technology and summing up its application to a smart health gadget, due to this reason many times health care providers discourage usage of health gadgets. But on the other hand to enhance their healthcare delivery services with usage of telemedicine and tele diagnosis, e-prescriptions, and an electronic medical record is also becoming necessary for them to use. Shifting from legacy line of treatment to digitalize and gadget based treatment is must.

Wearable health gadgets are further classified into near-body electronics, on-body electronics, in-body electronics by The International Electro Technical Committee (IEC) Standardization Management Board. Also, the Moving Pictures Expert Group (MPEG), a working group of ISO/IEC, sets new conceptual model of wearable health gadgets.

Diagram 5: Representation of working process of body mounted gadgets.



Source: Flowchart constructed by author from MPEG standardization

Wearable health gadget contains various sensory devices which are integrated under a single system. These sensors are continuously monitoring the physiological changes happening on the body over which they are mounted and also tracking the changes occurring in the environment. Once they sense the changes and collect the information they send the alert and feedback to the users in the form of audio or video content or text information. Over which user can further interact with the gadget with set of command signals. Various body dynamics can be sensed and monitored in real time (European Commission, 2016)

Health gadgets provide various benefits to the users whether it is physician or any individual user. It allows them to capture, monitor and analyze the real the data which in practical sense often remain un-captured in the absence of gadgets. The real time quotient here defines each moment and daily life activities. Hence the patient need not require fixing an appointment and undergoing nervousness and stress. Such efficient monitoring and tracking also catalyze the line of treatment provided by the physicians and doctors with improved diagnosis and better disease management. Gadget boost up the complete health care delivery services (Forester, 2014)

The mobility and handy features allow the health professionals to use the gadgets in more hygienic way as they need not to touch or get exposed to any surface. Like in operation theatre where hygiene is essential, through Google glasses doctors can access the information in a continuous mode and can engage their hands in other surgical actions. It maintains the hygiene also and increases the efficiency too (Forester, 2014) Enabling multi-tasking through hands-free information or communication also assists these professionals by increasing work efficiency (BCC Research, 2014). Gadgets allows an easy access of audio and video content which creates unique training collaboration opportunities for health care providers. Through gadgets physicians can record the LIVE surgery procedures which can be accessed as an effective training material or referred case study for future use. Also while conducting the surgery they connect with other surgeons and can fetch real time assistance (Forester, 2014). In United States, the insurance firms are extending additional benefits to those who are using health gadgets for tracking and monitoring their health in a better way. Firms are leveraging reduction in the premium amount which is needed to pay by the user. Firms firstly identify their members who are using health gadgets and then confirm that an improvement is observed in their health care planning. Those plan members who exhibits improvement are offered by point based or cash incentives by the insurance firms. They also inject the usage of gadgets among plan members by conducting motivational programme or corporate activity. This initiative by insurance firms is cost benefits action for plan members with improved health (Forester, 2014) Today, the majority of wearables are fitness-focused, and so smartest clothing provides benefits such as fitness metrics and detailed analysis of workouts. However, consumers also see smart clothing playing a role, beyond fitness tracking. Wearable technology could support the creation of an entire user-generated, non-verbal language. With a single swipe, consumers could send a loved one a message they can feel through unique light, sound, and vibration patterns on their wearable device. The Apple Watch's Digital Touch feature and other wearable's like Smartstones' Touch already enable consumers to send similar sensory messages today. (Ericson, 2016)

Table 2: Showing on-body and in-body wearable health gadgets applied over different parts of human body

S.No	Type of health gadget	Health gadget	Application use
1	On - Body	Smart T-shirts	Provide complete fitness metrics and workout analysis
2	On - Body	Smart Shoes	Tracking time , distance , pace and calories
3	In - body	Pacemaker	Placed in chest or abdomen region to control rhythm of heartbeat
4	On - Body	Smart Watches	
5	On - Body	Wrist bands	
		Nike Fuel band	Track daily calorie count and steps taken
		Fitbit Force and Fitbit Flex	Track steps taken , distance covered, calorie count , floor climbed , sleeping efficiency
		Jawbone UP wrist band	calorie count, steps taken ,distance and pace, active & inactive time and sleep quality and efficiency
		Aoir health	Nutrition management, exercise analysis, stress index and sleep tracker
		Arm band	
		PUSH by Design Solution Inc.	Complete fitness metrics , pace tracker and collaboration platform with coaches and trainer through mobile app.
6	On - Body	Chest	

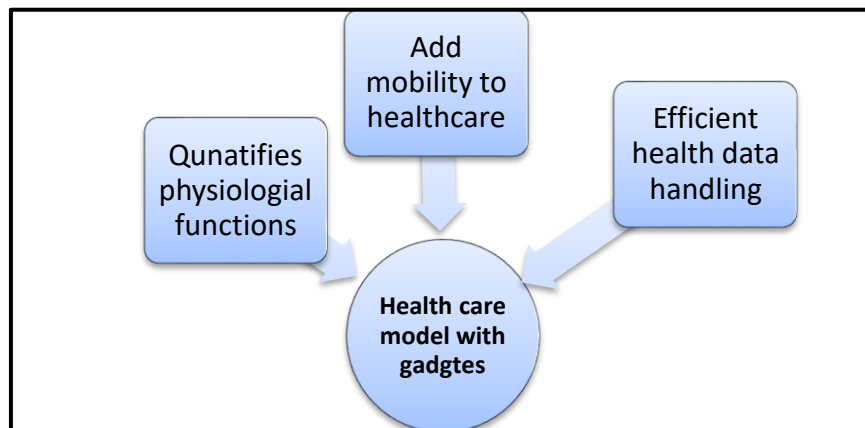
		Posture Pod by Engage Biomechanics	Prevent occurrence of ulcers due to pressure , commonly termed as bed sores. It monitor patient's position and intimate the same to nurse or health service provider
		Playbox	Monitor sports performance and provide collaboration with trainers or coaches.
		Hexoskin	For monitoring heart rate, breathing, steps, calories,
		OM Signal	User can track heart rate, breathing, steps, calories burned, and the unique OM index (relaxation/ lack of stress).
7	On - Body	Head	
		Shock Box	Sensor is placed in helmet and measures the degree of shock over helmet at time of accidents or sports
		Muse	Equipped with sensors to detect the brain activity and monitor it. The complete brain movement are decoded into audio and video signal which can be analyzed over Smartphone or tablet through application
8	On - Body	Knee	
		Lynxio	User can track their physiotherapy treatment plan and share it with their physiotherapist for review.

Source: constructed by author on the basis of MaRS Market Insight, 2014

This is a secondary data based descriptive study done to explore the various uses of health gadgets. The sources of data included related books, internet, project reports of various agencies, programs and applications in mobile devices etc. tables and charts based on secondary data will be drawn with help of MS- office. Past literature had focused over the consequences and effects of gadgets either for a specific gadget or for a specific application. No work has done to classify the gadgets depending upon the application or usage pattern and understanding their importance.

The Functions of Health Gadgets can be viewed as Enhanced Physiological functions: Gadgets and wearable devices allow patients to rehearse on their body and participate in self health analysis on a continuous basis. **Mobility:** Wearable gadgets allow real time health checkup and access to track alarming situation providing incident based health treatment. **Health Data:** Gadgets make reporting of body dynamics through graphs and indicators which are easy to understand, easily viewed over Smartphone and tablets and can be shared through mobile network. The vicinity of health data increases for health care providers also.

Diagram 6: Block representation of various functions of Healthcare gadgets



Source: Constructed by author

The global presence of m-Health solutions is estimated to reach USD 90.49 Billion by 2022 at a CAGR of 33.7% (Research & Markets, 2017). Healthcare is critical and dynamic segment with aging population and adverse behaviors such as obesity and smoking epidemics disease like diabetes, heart problems, and other chronic diseases are increasing and difficult to treat. They require real time, team-based, multi-disciplinary care. The primary care health care provider must become more organized and automated. The internet and digital medical information will have a major disruptive effect on the practice of medicine. Gadgets enable the health care providers to extend the services in real time manner. With handheld gadgets and mobile apps, the usability index has automated but still due to various iterated movements like typing password, choosing the app, entering the data etc. user time get elapsed. Wearable gadgets replace this time consumption by micro-interactions. The application of wearable gadgets has potential in any industry where hands-free data collection is highly valued. They can be generally divided based on consumer or non-consumer applications. Wearable gadgets for health for fitness, wellness and medical applications have already gained traction. the growth of wearable gadgets the market promises to grow from an estimate of 325 million in 2016 to 830 million in 2020 (Staistas, 2018) while the growth in the revenue is from USD 15.74 Billion in 2015 to reach USD 51.60 Billion by 2022, at a CAGR of 15.51% between 2016 and 2022 (Markets &Markets, 2018). A hands-free interface is helpful and consistent monitoring is beneficial through wearable The current generation of fitness bands and smart watches are just the beginning of a momentous change replacing traditional device. As per a report by CC insight the wearables market which will include fitness trackers, augmented and virtual reality headsets and wearable cameras will grow from 84 million units in 2015 to 245 million units in 2020. (CC insights, 2019). Global Wearable Forecasts that Sale in Fitness trackers will increase by 50 % by 2020 and Smartwatches will contribute 50% of the total revenue generated by wearables health gadgets in 2020.

Table 3: Health Gadget market analysis

Device	2017	2018	2019	2022*
Smart watch	41.50	53.00	74.09	115.20
Head Mounted Display	19.08	28.40	34.83	80.18
Smart Clothing	4.12	5.65	6.94	19.91
Ear worn devices	21.49	33.44	46.12	158.43
Wristband	36.00	38.97	41.86	51.73
Sports Watch	18.63	19.46	21.28	27.74

Total	140.82	178.91	225.12	453.19
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*Projected

Source: Gartner Report, 2018

This study concludes that future belongs to health gadgets. The health gadgets are one among various types of Gadgets in use. With disruptive technologies the availability of health gadgets may be as popular as watches, newspapers or Radio and TV. The wearable implants will be fourth and final phase of health gadgets development

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