INTRODUCTION

Marketing of textiles and fashion clothing has become a very important sector in global trade. With technological developments, enhancements competition in the market and changes in the society leads to the need for new solutions and especially in the field of textiles applications which is expanding in all walk of life. Advancements in science and technology has transformed fabrics from the early cave men's interlacements of animals skin's, twigs and reeds for protection to digital era men's hi tech interlacements of textured yarns to develop 'Smart' or 'Intelligent' textiles. About 90 per cent of our lives are associated with textiles and they are starting to become intelligent. To be more accurate recent developments involving in the integration of electronic systems into or onto textiles and here by enabling the growth of new industry called wearable electronic textile industry. Wearable electronics are becoming more popular day by day. These textiles are enhanced with upcoming fibers, yarns and fabrics and innovative products. They are woven with great care, modified, finished and developed to suit various needs like the digital curtains which slowly throw light on ones face with a 'Good Morning' wake up song. The so called 'Smart' or 'Intelligent' textiles progresses from classical form towards functional, technical and reactable textile products which is intimately linked with other engineering, scientific and design sectors resulting in new breed of functional and smart technologies (Dhumal,et al., 2016). Addition of functional values like sensing the environment around and reacting accordingly has converted the basic properties of conventional textiles into smart wearable textile materials. Sometimes such products are accompanied with wearable electronics which is often an indispensable part of intelligent textiles (Kirboon and Byluppala, 2011).

Intelligent textiles are variously known as smart fabrics, electronic textiles, or e-textiles and have aesthetic appeal, besides being a part of protection. The textile industry has attained fundamental breakthroughs that have been admired by others there by motivated to transform their fields and society through the industrial and computer revolution and in the recent times by wearable revolution. The vision behind this

wearable computing revolution clearly depicts the upcoming electronics to be the base to satify the clothing used in day to day life. Such electronic devices have to meet special requirements concerning wearability (Kirsten, 2013).

Smart textile is a very broad field and its fabric technology has a great deal in all aspects of wearable textiles and in specific for health monitoring. Smart textiles is an elegant structure which can able to sense stimuli from the surroundings, to counter to that sensed stimuli and adapt to them by integration of suitable functionalities in the textile structure. These fabrics are gaining more attraction, curiosity and attention across the globe bring about a new civilization in the life of every man. Recent years has witnessed an explosive growth in the field of wearable technology. "Wearable Electronics or Textiles Wearable" as the word itself expresses that it is a device worn on the human body that incorporates intelligence (sensors and electronics) into the clothes. Wearable technology is a term that denotes to the fashionable electronic garments associated with clothing and soft or hard accessories which are integrated with electronic components (Zhu et al, 2015). A wearable device is essentially a tiny computer that has sensing, processing, storage and wireless communication capabilities. This branded collection of electronic clothing is noted for its uses in the public safety, space exploration, healthcare, military and sports. They can be also extended to many new upcoming fields. Using modern electronics and computer technologies in textile brings huge exciting possibilities for techno-textiles (Shaughnessy, e al, 2011).

Smart textiles also provide answers for varies diseases and health related disorders. (Mechika et al, 2014). Electronic textiles refer to two types of systems. The first concept involves electronics on a textile, where typically flexible electronics can be attached or laminated into textile substrates. Whereas second refers to electronics in textile sometimes called fibertronics, where the fiber itself is the electronic component. It can be conductive fiber that should be able to incorporate everything from multi-mode energy harvesters to simple transistors in the future.

A wearable system for continuous health care monitoring is a key technology in medical science for the transition of present to more proactive and affordable healthcare.

This system allows an individual to closely monitor changes in vital signs of his/her own physiological conditions and provide feedback to help one self it maintaining an optimal health status. Even this can alert medical personnel during life threatening changes occur in patients by integrating them into a telemedical system. Apart these wearable systems can be used for health monitoring of patients in ambulatory settings (Istepanion et al, 2004). Extremely effective, durable, effective, flexible and even washable multilayer electronic circuitry can be constructed on textile apparel using conductive yarns, metal filaments and suitably packaged components.

Wearable technology can be rightly called the future backbone of our economy as it allows the users to monitor every move, physical conditions and much more. Electronic textiles and wearable electronics are the terms that cover a broad range of textile products and its application possibilities are only limited by our imagination and creativity. Electronics textile belongs to newly emerging discipline in the field of research, which combines specialists in respective discipline of information technology, wireless communication network, sensors, microsystems, electronic hardware and textiles.Wearable will become the world's bestselling consumer electronics products after smartphone. Smart electronic wearable's are projected to exceed 305 million units production in 2020 with a compound annual growth rate of 55 percent reported by CNBC (2016).

The world is becoming more and more "health conscious" and there is an important need for the improvement of the quality of the health in medicine. Textile is playing a great role in such development. Conductive textile materials is a gifted tool in advancement of wireless communication between medical personal and individuals who needs care or patients through wearable technologies integrated into clothing. In electro-textiles, new techniques such as using conductive yarns have been developed to provide an innovative soft textile interfaces that are highly acceptable to the end user in this present world. The impact of new technology on improving health and wellbeing of individuals and populations is unprecedented which even makes us talk about a digital revolution in health care (Birkler and Dahl 2014). Monitoring of the human body has

advanced over the years from bedside monitors in the hospital to wearable devices that can monitor individual's physiological functions 24 hours a day (Omoogun et al 2017).

To ensure a sustainable and secure development in health and welfare there is a need for future professionals to have an understanding of the new digital data on individuals, clients and patients that are emerging in health care with the new wearable devices. The analysis of this data will play a vital role in healthcare and to move forward the practitioners and researchers to work together and also open a constructive dialogue on how to approach and accommodate these technological advances in a way that ensures wearable technology which can become a valuable asset for health care in the 21st century (Piwek et al 2016). Monitoring data which can be transferred into fabrics that act as sensors based on electromagnetic shielding has called the interest of academicians and the researchers. This has resulted in the application of electro textiles in various fields especially medicine which has added value to jackets, band and vest to transfer signals which can monitor ones health (Melanie et al, 2010).

The recent technological advancements in the fields of electronics and textiles jointly has showcased the dream of accurate, continuous and real time monitoring of health through wireless signals. This monitoring using wearable systems is unique in nature and lays a strong foundation for inventive and novel design development. In recent years physiological health monitoring has significantly advanced from developments in the area of flexible wearable circuits and the integration of sensing technology into clothing. The sensor is suited for long term monitoring due to its location and modest design. Innovative solutions for identifying emergencies in the home can be successfully attained by the combination of monitoring vital parameters of the person living at home, by the medical person within a short elevations which in turn can avoid mishappenings.(Patel et al 2012).

In the concept of health monitoring the problem starts with people who are unable to express their health conditions like infant and old aged persons. Based upon high mortality rate of infants a smart wearable electronic fabric for them is the need of hour. This research work focuses the design development of a very low cost remote baby

monitoring system which can measures heart rate and body temperature of an infant and sends the data to a remote end where the data will be displayed in a smart phone which will enable the parent or caretaker to act as per needs. This device will be much needed during emergency period or for saving life.

Considering the above facts, a research entailed "**Design, Develop and Evaluate the Smart Wearable Electronic Fabric for Monitoring Healthcare**" was planned.

The major objectives of this research work are:-

- To identify the current scenario of smart textiles and its awareness.
- To weave fabrics with different conductive yarns and combinations.
- To prepare knitted fabrics with selected conductive yarns.
- To evaluate the physical, mechanical, absorbency and conductive properties by standard test methods,
- To embedappropriate sensor on the above mention fabrics to develop smart wearable electronic fabrics and
- To evaluate the efficiency of the prepared smart wearable electronic fabrics.