Chapter 10
Patient Health Monitoring System and Detection of Atrial Fibrillation, Fall, and Air Pollutants Using IoT Technologies

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ABSTRACT

The objective of IoT in healthcare is to empower people to live healthy lives by wearing connected equipment. The healthcare industry has perpetually been in the forefront in the adoption and utilization of information and communication technologies (ICT) for the efficient healthcare administration). Detection of atrial fibrillation is done by checking the variations in the period of the heart rate. If a patient has atrial fibrillation, the period between each heartbeat will vary. A gas sensor is used to check the quality of air and a MEMS sensor to detect the fall of the body. The MEMS sensor is a compact device that collects comprehensive physical information and uses the gateway and cloud to analyze and store information.

INTRODUCTION

In the recent decades, technology is being incorporated in almost all health applications, leading to

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highly digitized systems which give accurate results. Healthcare demands are changing due to increase in number of healthcare-based problems around the globe, and patient's preferences are shifting towards more technological healthcare-based solutions.

There are more patients which require more careful attention and less doctors in comparison. These demands need to be met by this industry which is facing a rise in patients expenses due shortage of caretakers/solution to solve the problem.

Rapid climate change over the years, and unpredictable weather conditions and global warming has also led to increase in number of healthcare issues around the globe. Atrial fibrillation, a starting symptom of heart failure is a problem faced by 2.7–6.1 million of the US population due to unhealthy eating patterns and air pollution (Raja, 2018). There is increase in number of respiratory diseases, which is not known by general public and due to this non-awareness of issue leads to serious disease in the future. Modern healthcare-based solutions can be used to prevent the issue of healthcare using IoT based smart solutions to monitor patients and to store and analyze the patient's data and come up with better solutions.

OBJECTIVE

To create a compact device that collects comprehensive physical information and uses Gateway and Cloud so that information can be analyzed and stored so that the data analyzed can be sent wirelessly for further analysis and review. The objective also includes the detection of Atrial Fibrillation which is caused by irregular rate of heartbeat increasing risk of stroke and several heart diseases. also aiming to provide a better environment for the affected patient by using sensors to analyze the quality of air in the surroundings corresponding to the patient and suggesting a better healthier surrounding in terms of air pollution if required.

MOTIVATION

The concept of connected health care systems and smart medical devices is not only for companies but also for the well-being of the people in general. Patients admitted to the hospital whose physical condition is needed to be carefully looked after, they can be constantly monitored using IoT-driven surveillance. It replaces the process of coming to a health professional at regular intervals to examine the patient's important signals rather than providing constant automatic flow of information.

With rising global population and increase in number of healthcare issues around the globe, we are aiming to provide a better and an economical solution to this problem by making the use of IoT technology by constantly monitoring the patient's body (heartbeat, temperature, etc.) and his surrounding (air quality) and storing the data for analyzing for future scope.

BACKGROUND

Fall Detection- Falls are responsible for 40% of all injury related deaths and need immediate medical attention. The reason for a fall may be heart problems, loss of consciousness, fatigue, exhaustion, diseases and loss of balance. The two major factors that affect a fall is that, firstly, it requires an immediate