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Designing IoT based Posture Monitoring System

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Abstract— With the existence of vast increase in the usage of digital equipment such as computers and other smart devices in their work, people tend to face several health issues. This utilization of digital technology makes people spend most of their time by sitting in one place for a long time. This results in creating several illnesses to them. People do not realize their sitting posture which might hurt their body over a long run of inappropriate sitting practice. As a result, this paper aims to design a system to monitor the posture of the neck and body of a person in sitting position. This proposal utilizes the Internet of Things (IoT) such as microcontroller, sensor, etc., to monitor the body posture of a person and help people to correct their body posture.

Keywords—body posture, IoT, posture monitoring system, Arduino, Bluetooth, IoT sensors

I. INTRODUCTION

In recent years, the use of interactive electronic devices such as smartphones, personal computers and other personal digital devices are booming up in the world. There is a great escalation in the usage of the smart devices. Such devices with the latest technologies and high computing and entertaining features makes the users spend more time with it [1]. However, when people are using such smart devices, there is more tendency among people slowly changing their sitting posture when using smart devices over long hours.

Smart device is an electronic device, which can connect to a network, operate interactively and autonomously to an extent. Some notable types of smart devices are tablets, smartphones, and smart watches. Smart devices are capable of understanding simple commands that are sent by the users and support in daily activities, such as making phone calls, taking photos and playing mobile games [2,3].

Nowadays, worldwide the number of smartphone users surpass three billion. In next few years, it is forecast to increase further by several hundred million. There are several countries with the highest number of smartphone users. This shows an increasing trend of the amount of smartphone user throughout recent years [4]. Apart from that, computer users also increased in number throughout recent years as well, because computers are more convenient and reliable than the older ways of doing thing [5]. However, with the increase of smart device user reflects the potential growth in number of smart device user which does not sitting in a good posture as well. Apart from that, people often do not realize they sitting out of form once they sitting for a long time, this might hurt their body over long run of impropriate sitting practice.

An IoT system consists of sensors and devices interconnected through any kind of connectivity (Bluetooth, Wi-Fi, ZigBee, etc) [6]. To achieve certain purposes through an IoT system, sensors take reading from peripherals and the environment, then send it to a data center or cloud, the data will be processed by software and algorithms, then finally the system automatically decides whether to perform any kind of action in further, such as trigger an alarm [7].

The posture monitoring of people could be done in many ways. Y.Fan et al, monitored the motion posture of human by using the sensors and further data are analyzed using frequency domain characteristics. The authors used the wearable sensors to capture the motion data of the human body. The sensors used in the system are accelerator, angular velocity sensor and pressure sensor. The wireless technology used is ZigBee. Posture related to this study is walk, run and fall posture. The system is deployed on user's waist and below user's feet [8].

Pentapati N et al., designed a system using IoT. The author monitored the sitting posture of a person by using a wearable device on the backbone of human body. The sensors used in the system are accelerator and gyro meter. The wireless technology used is Bluetooth. The system is deployed on the backbone of the user [9].

M.Tariq et al proposed an IoT based system to assist the users in sitting postures. The authors utilized Kinect and pressure sensor to capture the motion data. The further data was analyzed using hidden Markov model. The authors reduced the noise of the motion data. Posture related to this study is sitting posture. The system is deployed on the arm and thigh of the user [10].

The proposed IoT Based Posture Monitoring System is aimed to help people to sit with a good posture on a chair for a long time. Most people tend to have a bad sitting posture after they sit on a chair for a long-time as they focus on their tasks instead of maintaining a good sit posture. People often do not realize their sitting posture. This might potentially lead to back pain problems or damaged spinal cord.

The organization of rest of the paper is as follows: Section II discusses the preliminary setup in the proposed method, Section III discusses the implementation details and