

Wearable devices in medical sector

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Abstract - Wearable devices are the electronic devices that can be worn on particular body parts which detects, analyze and transmit data. Wearable devices plays a major role in various fields and also plays a significant role in the medical sector. Wearable devices are present from a long time but are limited to few devices but in the recent times but in the future wearable devices will play a significant role as many researches are been undertaken to explore various wearable devices for the medical sector where many devices can be identified and cured using these devices. In this paper we will be discussing about the implementation of wearable devices in medical sector, their application and the future of the wearable devices in the health-care sector.

Key Words: wearable devices, medical wearable, smart wearable

1. INTRODUCTION

Wearable devices are the devices that are designed such a way that they can be worn on body parts. The wearable devices includes smart bands, fit-bit, smart watches etc. The wearable devices are making a impact in the health-care sector. They are playing a huge role in analyzing and detecting various health relater problems. It has been predicted that the wearable devices will increase by ten percent every year in medical sector in the coming years.

Wearable devices are mainly consists of smart watches, fit-bit and smart bands but these devices are not only limited to this there are many other wearable devices also which can be used in detecting the cancer cells, finding out the glucose level and also in treating various blood related diseases and also used in the treatment of asthma.

Wearable devices are very beneficial to the patients because many times a patient can himself track a disease and easily know how his health is performing just by wearing a device. It is also beneficial because the patient need not attend the doctor every time as they only can get the updates through the device and they can update the status to the doctors or health-care center personnel from home. These reduces the work of traveling to the health-care center often. The data updated by the patient will be seen by the doctor and further assistance will be given to the patient and also the updates can be sent back to the patient along with the prescribed medications. This helps in maintaining the time space and also the manual work of checking for various health conditions.

2. Implementation of design

The main concept upon which the wearable devices are built is Internet of Things. The other devices for building wearable device include sensors, connecting wires and adapter. Artificial Intelligence are also implemented in many wearable devices which makes these devices smart. Power supply has also be provided for these devices to work.

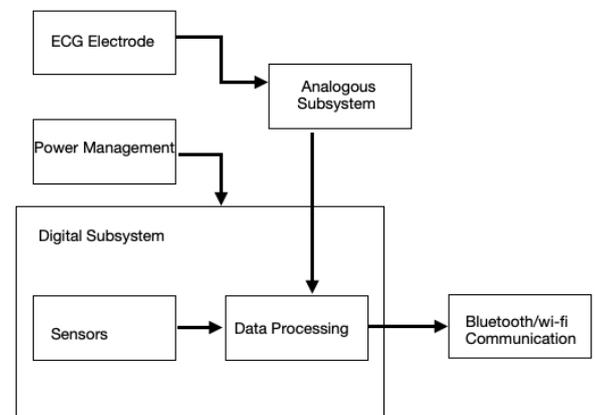


Fig: Block Diagram of Implementation of wearable device

Wearable devices are the examples of Internet of Things. The IoT devices are the main components in building a wearable device. These devices are used to process the data. The software will be uploaded in these devices. These devices will be connected to the sensors. Sensors are the components which sense some information. There are various sensors that are used in different wearable devices in medical sector. For ex. Temperature sensor, sensors to calculate pulse rate etc.

The Internet of Things are the main building blocks of these wearable devices. These devices connect various other device with itself and helps in processing the data provided by the sensors. The software will be loaded into these devices for the functioning. Other than the IoT devices various sensors are used in the implementation of the wearable devices. The sensors can be temperature sensor which detects the body temperature or it can be a sensor which detects the pulse rate of an individual. These sensors read the data and transfer those data back for the processing.

Artificial intelligence is also implemented in various wearable devices. This makes these devices understand certain human behavior and then react to those behavior. If something is not going accordingly these devices will alert through notifications or updates. For the analyzing of the data machine learning Algorithms are used. These algorithms gather the data from the sensors that has been processed and then analyze the data and make them available for further

displaying. Various other things necessary for these device to work includes power supply and internet or Bluetooth connection and connecting wires and chips.

This shows of how the wearable device work in the health-care sector. It shows how the data is analyzed and transferred through a smart watch to the health-care personnel. The person wears the smart watch, the smart watch here can detect various factors such as pulse rate, calories burnt and also about the medications. Here the device is connected to a smart phone the various updates from the device will be sent to the smart phone in the form of notification. These devices are connected to each other though internet or Bluetooth connection. The data reading will also be sent to the health-care personnel's device through which they can get the updates of how the persons health is and if something goes wrong updates will be sent.

The sensors used in these devices play a major role in detecting the health conditions. The sensors mainly used include the temperature sensors which is the kind of sensors which detects the body temperature of an individual which helps in identifying various diseases and also their symptoms. There also other sensors which detect the pulse rate of an individual. This counts the number of pulses per minute and finds out whether it is normal or not. There are also other devices such as electrode which will be stick to the veins of the individual where the blood flow happens which is in turn used to detect the cancer cells.

APPLICATIONS

The wearable devices has a broad application in the medical field.They are used from tracking minute information such as calories burnt, number of steps moved to detecting major information such as detecting the cancer cells or the glucose level.

Monitoring Mental heath - Wearable devices can be used in monitoring the mental status of an individual. Various sensors are been used in the devices which checks for the heart beat, blood pressure, body temperature which can be further used to detect a persons mental status.

Cancer Treatment - Wearable device can be used in the detection of cancer cells. An electrode is planted on the veins which detects the cancer cells in the blood. It has come into light that using wearable devices for the detection of cancer cells are three and a halves time better than a normal manual test done. So these wearable devices plays a very vital role in the detection of cancer cells.

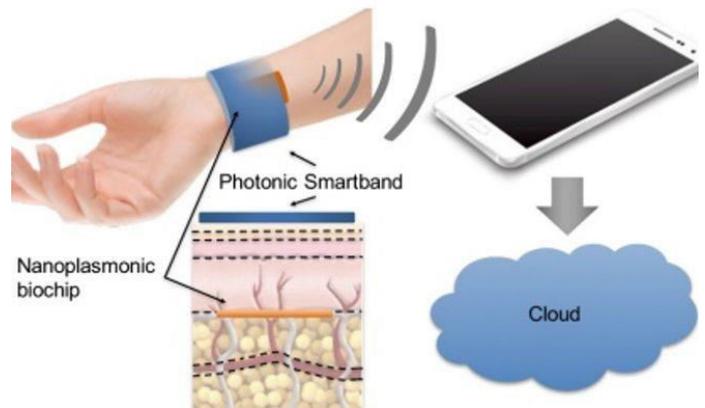


Fig: wearable device for treating cancer.

Autism - It is important for autistic children to recognize and classify their emotions, such as anger, disgust, fear, happiness, sadness and surprise. Google Glass was used to study the feasibility of a prototype therapeutic tool for children with ASD to see if the children would wear such a device. The feasibility study supported the utility of a wearable device for social effective learning in ASD children and demonstrated subtle differences in how ASD affected neuron typical controls children perform on an emotion recognition task.

activity - Wearable devices such as fit-bit, smart bands and smart watches tracks the human activities such as the pulse rate, calories lost and also to determine the movements of the individual like how many steps he had walked or ran. These devices provides with regular notification and updates such as to drink water or take medicines etc.The wearable devices is also used in medical field for the treatment of asthma and also glucose level of the individual can be Identified using the wearable devices. The various other applications of wearable devices include ECG and also in detecting various diseases related to heart and lungs. In the coming future various other applications of these devices will come into play such as detection of viruses and also various infections which helps in pandemic situation.

CONCLUSION

Wearable devices are limited to only a few devices like bands and watches as of now .There are many other fields where wearable can come in handy like detecting the cancer cells and detecting the virus and detecting symptoms of many diseases in the initial stages. In the future steps will be taken to secure the data as data should not be leaked and also developing various wearable devices that detects diseases such as viral infection.In the future care will be taken about the data security and privacy of the data and this is also one of the concerns and the other concern is Wearable devices and IoT will reduce human intervention in health-care, enabling context-based automation.So it is predicted that in the future the wearable devices will be utilized more in not only detecting the diseases but also in curing them.

REFERENCES

- [1].Jesse Jayne Rutherford, “Wearable Technology”, IEEE Engineering in Medicine and Biology Magazine (Volume: 29 , Issue: 3 , May-June 2010) 10 May 2010 ISSN: 1937-4186
- [2].Nisha D. Wanjari ; Shailaja. C. Patil,”Wearable Devices”,2016 IEEE International Conference on Advances in Electronics, Communication and Computer Technology (ICAECCT) ISBN: 978-1-5090-3662-2
- [3].Suranga Seneviratne ; Yining Hu ; Tham Nguyen ; Guohao Lan ; Sara Khalifa,”A Survey of Wearable Devices and Challenges”, IEEE Communications Surveys & Tutorials (Volume: 19 , Issue: 4 , Fourth quarter 2017),ISSN: 1553-877X
- [4].Binkley, P. F. (2003). “Predicting the Potential of Wearable Technology “,IEEE engineering in medicine and biology (May/June), 23–27
- [5].Bonato, P. (2010). Advances in wearable technology and conference of IEEE Engineering in Medicine and Biology 31 - September 4. (Vol. 2010, pp.2021–4) Buenos Aires, Argentina.
- [6].Kortuem, G., Segall, Z., & Bauer, M. (1998). Contextaware, adaptive wearable computers as remote interfacesto 'intelligent' environments. In 2012 16th Internanal Symposium on Wearable Computers (p. 58). IEEE Computer Society.
- [7]. Muensterer, O. J., Lacher, M., Zoeller, C.Bronstein Google Glass in pedrotic surgery:exploratory study, International Journal of Surgery, 12(4),281–9. doi:10.1016
- [8].Popat, K. A., & Sharma, P. (2013). Wearable Computer Applications A Future Perspective. International Journal of Engineering and Innovative Technology, 3(1), 213–217.