

IOT IN CANCER TREATMENT

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Abstract In recent years, internet of Things (IoT) has planted a thrust of recent technological advancement, and it's used nearly defined also as health, agriculture etc. Interconnectivity of smart sensors, objects, devices, data, and applications is basically known as IOT

1. INTRODUCTION

Internet of Things (IoT) technology presents promising technological, economic, and social edges to the evolution of information communications and networking facilities due to the advanced property of devices, systems, and services on the way aspect machine-to-machine (M2M) communications. Through IoT, devices/objects, networks, associated applications are being connected to facilitate an exchange of information and data thereby leading to the enablement and activation of a variety of services. In essence, it helps to talk and integrate several network technologies (protocols, topologies, wired/wireless property, architectures, frequency bands, etc.) and communication solutions exploitation the connected devices.

1.1 Motivation and connected work

Unequivocally, there has been an unexampled growth within the world burden of cancer incidence, that has been found to be doubled between 1975 and 2000 .it's equally argued that the amount are doubled once more by 2020, and concerning tripled by 2030. However, there has been a rise in analysis and development across the globe to scale back the menace of the malady so as to make sure a population freed from cancer whereas up the standard of life. Though, this can be not while not a value. it's unbelievable to grasp that an enormous investment has been incurred on analysis and development for cancer treatment, that involves a lot of bucks being spent annually.

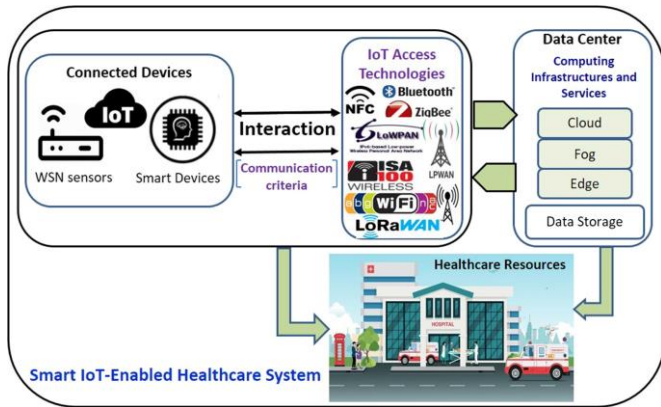
1.2 Nature of cancer and its impacts

In implementing IoT for cancer care services, it's well thought out that it's essential to supply some background on cancer, its classifications, groupings, and impacts. Generally, cancer originates from a tumour, and there square measure many kinds of tumors, which might be classified supported size/shape, variety of tumour, growth pattern, and site of the tumour. Tumors square measure thanks to sign of inflammation, genetics, diets, environmental toxins, non-genetic changes iatrogenic by environmental factors, etc. Hence, tumors square measure classified into 3 classes, namely: benign, premalignant, and malignant. A {benign

tumour|benigntumour|nonmalignanttumor|nonmalignanttumour|nonmalignantneoplasm|tumor|tumour|neoplasm} is viewed as a tumor that poses no health threat (i.e., causes no invasion to close tissue and doesn't unfold to alternative elements of the body the premalignant isn't however cancerous however are seen to be developing the properties of cancer. This premalignant tumour needs shut monitoring. Lastly, the malignant tumors square measure the cancerous ones. Within the case of malignant, the tumors divide and unfold chop-chop to new remote sites with the power to invade alternative organs thereby inflicting metastasis.

A benign tumour is viewed as a tumor that poses no health threat (i.e., causes no invasion to close tissue and doesn't unfold to alternative elements of the body). In most cases, benign tumors square measure merely neglected, reduced in size, or removed entirely by surgery. The premalignant isn't however cancerous however are seen to be developing the properties of cancer. This premalignant tumour needs shut monitoring. Lastly, the malignant tumors square measure the cancerous ones.

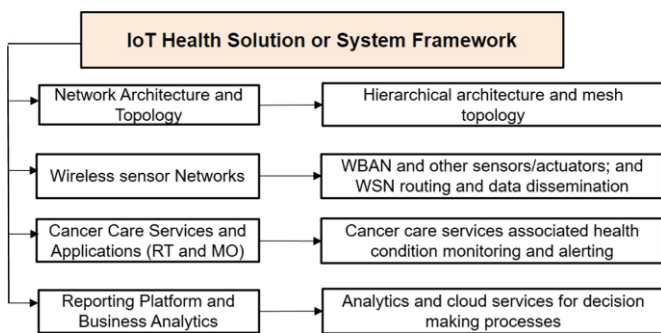
Within the case of malignant, the tumors divide and unfold chop-chop to new remote sites with the power to invade alternative organs thereby inflicting metastasis. sadly, the malignant tumors are answerable for a lot of deaths worldwide. in line with, cancer has emerged as a significant public unhealthiness thanks to the many range of deaths being practiced. With the unexampled nature of cancer, varied treatment choices square measure being employed, together with surgery, therapy, therapy, and actinotherapy. Surgery is employed to work or take away cancer to forestall any spreading. The therapy could be a variety of general treatment victimization drug regimens in hormone-related tumors. The use of immunotherapy (another variety of general treatment) is intended to strengthen and restore the immune systems of the body that square measure being caused by cancer and alternative foreign substances. The actinotherapy involves the employment of radiation to treat cancer tumors. In spite of of these treatment choices, this analysis proposes the adoption and implementation of IoT/WSN technology to reinforce the present choices. Noting that the general treatment will cause allergic, side-effects, pains, complications, fever, symptoms, and alternative problems, and then this suffices another excuse why the employment of assorted sensors, actuators, and good connected devices square measure being recommended to be enforced for cancer patients to assist increase the standard of life.



2. IOT BASED HEALTHCARE SYSTEM FRAMEWORK AND LAYERED ARCHITECTURE

2.1 IoT based healthcare system framework

In fig.2 an IOT based healthcare system framework is depicted for the proposed network showing the interdependencies of various components impacted by the network design methodology. Some features and approaches is captured by the framework to present the design solution. It also tells the way of integration, interface, network and transmitting the network resources which are produced by the connected devices from one node to another within the system.



3. NETWORK DESIGN SOLUTIONS FOR SERVICES

3.1 Cancer Care Services

It is important for us to know that cancer care services consist of two sub-services connected with the diagnosis and treatment of cancer, that is to say, chemotherapy and radiotherapy. Chemotherapy being associated with medical oncology (MO) and radiotherapy being associated to radiation oncology (RO).

Smart devices and wireless sensors are generally responsible for improving the quality of cancer care services and patient care by the help of medical oncology and radiation oncology procedures. Smart devices can be very useful because connecting and linking WSNs and smart devices can help

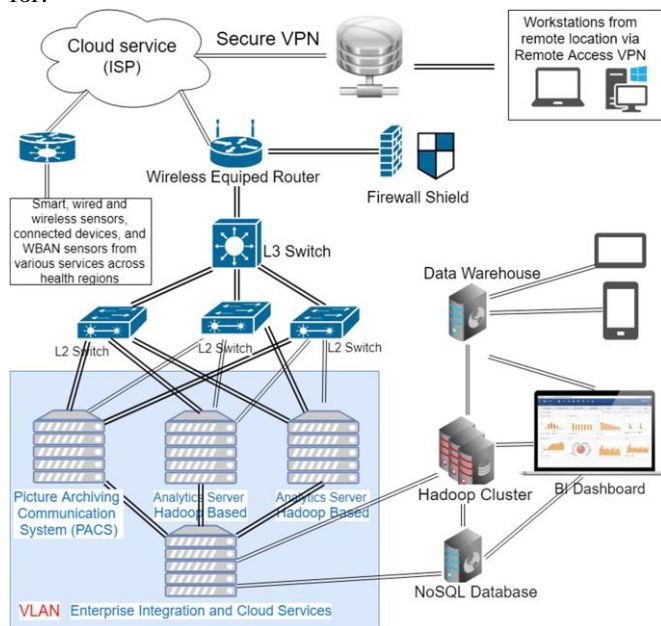
health practitioners/nurses to keep an eye on the patients to check any changes, complications, problems, signs of cancer therefore enhancing the treatment for cancer. Doctors can detect cancer symptoms and influence the treatment at a lower stage only therefore improving the quality of life

3.2 Business Analytics and Cloud Services

The availability and accessibility of patient data which is being streamed from various sources on a real-time and continuous basis is ensured by the incorporation of business analytics and cloud services to cancer care services. Data can be managed and shared across the healthcare network systems by deploying into the cloud. Clearly, information of patients as streams of data is generated. Data is in the form of multimedia, textual and visual formats. Data are transmitted through the cloud services to remote servers (data center). Due to which, the volume, velocity, and variety of health data and information of patients have continually increased significantly. Many reporting capabilities for immediate dashboards which can facilitate treatment decisions are also offered by this architecture as it will be making us able for discovering patterns from all the data from various services so that the quality of care and risk, disease and epidemic pattern, etc. could be analyzed by it. Stream of data will be converted to actionable insights and evidence based healthcare decisions about the health condition of patients, and Helps the clinical experts and research groups to keep up to date with the latest trends and breakthroughs in clinical oncology practices. This architecture uses Picture Archiving Communication System, that is comprised of secure computer systems for storage, retrieval, and display of diagnostic images such as X-rays, Magnetic Resonance Imaging , etc. In the PACS the diagnostics images are being retrieved and accessed through the business analytics and cloud services thus making it an important component.

Hadoop deployment in business analytics and cloud Services From IOT based solution, usage of many tools for data management in storing the array of data is coming into practice. One such tool is the Hadoop framework used as a data repository and processing engine due to its effective ability and being well organized importantly with the increasing volume of data. Due to its effectiveness and efficiency, we have considered Hadoop framework or tool in implementing business analytics of the IOT cancer care solution. For predictive analytics through its own machine learning and data mining capabilities, Hadoop cluster is used. Due to Hadoop cluster, we could avoid the crucial single point(s) of failure that could bring down the entire Hadoop cluster, by making provision for the data so that it can be normally triple replicated for ensuring availability in the event of failures and disasters . Other benefits of Hadoop include its low response time and real-time alert capability. In summary, Hadoop is considered for the following features and characteristics, as follows: data value; schema; workload; data sources; availability; security; and scalability. For the business analytics and cloud services for conducting disease, genomics, etc.; tracking and monitoring the patient disease; analyzing patient sentiment; etc. The No SQL

databases and Hadoop cluster components can be suggested for.



Business analytics and cloud services network architecture

4. CONCLUSION AND FUTURE WORK

For enhancing treatment, diagnosis and monitoring of cancer patients we have proposed IOT based medical system with remark about cancer care services and business analytics/cloud services. By using WSNs and smart connected devices, the healthcare solution has been established. By searching into business analytics/cloud services it is ensured the availability of patient data stream for jumping into actionable insights and evidence based healthcare decisions.

Concluding up, we can say that there are numerous services in healthcare setting which are being delivered but we have only mentioned here the cancer care and business analytics/cloud services. Hence we will cover more services in future research papers in the same research domain.

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