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The Impact of Using Computer Techniques and Its Applications in Medicine Fields

Ola Basil*

**Department of Dentistry, Al-Hadi University College, Iraq*

*Corresponding Email: *Ola.basil@huc.edu.iq*

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Abstract: Due to the development in information and computer technology, these technologies have been applied in various medical fields, which is reflected in the future medical development in the areas of treatment and management of confidential information for patients. Personal health is one of the most crucial parts of everyone's life, practically all computer techniques and applications that have showed technological and scientific potential are quickly used in medicine. For this reason, it is necessary to take care of computer technologies and develop it. Moreover, studying its effect on the speed and accuracy of work in various medical fields.

Keyword: Telesurgery, 5G Internet, Communication, CAD/CAM

1. INTRODUCTION

There are many computer technologies in the field of medicine that help improve and develop curative and preventive medicine.The techniques used to facilitate the work of the medical staff, which will be discussed in this paper. The motivation of this paper is presenting many different up to date computer applications that used in medicine field that might be good to this subject[1].

Computer technologies in complementary medicine
The medical image divided in to two types (structure image and functional image). The structure image is used to obtain anatomical structures image of the different human organs to enable the medical personnel diagnoses the organ diseases without any anatomical examination. The Images generated by MRI and CT consider as a structures image. However, there are earlier injury for the human organs. Although the structure of organ is still normal, when some of the physiological function begin to be change abnormally such as metabolism activates. So the structure image will be useless at this case. Wherefore, the functional image that based on PET and SPECT is necessary

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to use to detect the abnormal changes in biochemical activity of the harm organs. There is a list of useful application as follows: 1) Restore and simulate the defective or blurred images. 2) Compress large medical images for the purpose of facilitating the process of storing and transferring them over networks. 3) Decompose the complex medical images that facilitate physicians to perform more detailed analysis, research and discover blurred corners. 4) Mathematical equation analysis in medical images. 4) Distorted medical image processing [2].

Medical record system

It is a digital medical record that is used to replace handwritten paper medical records and is saved, controlled, transferred, and duplicated using electronic equipment (computers, health cards, etc.). All of the information from a paper medical record is contained in it. A medical record is used to document a patient's illness and current state of health. It also serves as a channel of communication between the patient and hospital staff and serves as the main foundation for doctors' treatment plans. Outstanding advantages of an electronic medical record include: 1) easy information browsing; 2) strong storage capability; and 3) realizing the sharing of medical record information. The usage of the electronic medical record system also significantly raises the standardization and value of the hospital medical records, making them more useful for research and utilization. Electronic medical records can speed up the flow of patient data, making it possible to access patient data at any time and from any location—a feature that paper medical records are unable to offer. Utilizing an electronic medical record system results in paperless medical records, lower hospital costs, lower running expenses, and more economic efficiency [2].

Computer Assisted Decision making (CMD)

It is an interactive computer system that aims to help the doctors make clinical decisions and make judgments to complete their natural ability using a computer with a vast memory and a high ability to process data. This is the general model of the medical decision-making assistant system, as shown in the figure below. Computers can store and retrieve huge amounts of data, do complex analyses in a short amount of time, but their main limitations are that they lack the ability to make decisions and are not as sensitive as the human brain. Data entry is a significant barrier to medical professionals using computers. [3]

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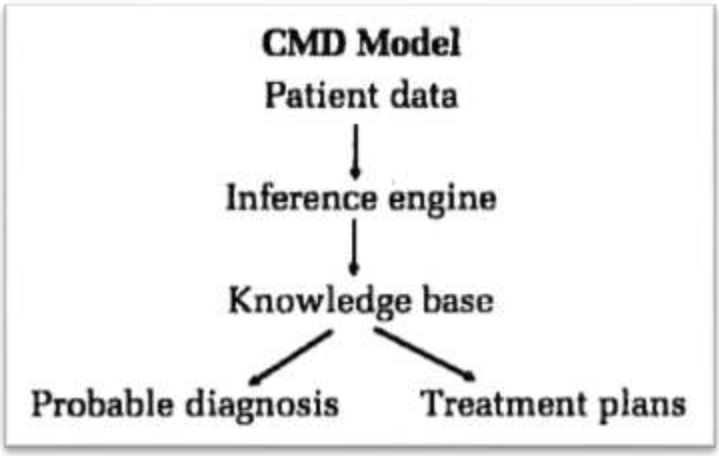


Fig. 1: CMD model for medical decision-making assistant system.

The most difficult computer applications currently available are those for diagnosis and therapy, which form the core of the clinical process. Many programs, including ONCOCIN for determining the best course of treatment for lymphomas or MYCIN for selecting antibiotic therapy, are only available in controlled settings while they are being developed. Still other programs, like CADUCEUS, a mainframe program that "diagnoses" a wide range of clinical problems, are still in the developmental stage [4].

Robotic Telesugery

The robotic Telesurgery (TS) or remote surgery means that the surgeon and the patient are separated geographically. The development of the TS system depends on the master and slave system, where the master console is a human system interface consist of haptic device, monitor, and headphone. And the slave robotic is equipped with the 3D-vedio camera, microphone and number of tactile sensors and force sensors. The both master console and slave robotic (teleoperator) is connected with the high speed communication network in order to transport a command and sensory data at the real-time. So the 5G internet is used to make communication faster and reliable. The close loop TS system is consist of forward-link and feedback-link. The forward-link transports the manipulation command of the surgeons at the real-time to control the movement of robotic arms at the teleoperator, as well as surgeon voice stream to communicate with physicians remotely. Feedback-link transports the physiological data of the patient such as blood pressure, heart rate, and 3D video stream, as well as the voice stream of nurses and anesthetists at the patient's side feedback to the surgeon side. Telesurgery significantly benefit from artificial intelligence, in particular convolutional neural networks and deep learning. Apart from providing a variety of value-added services, such as abnormality diagnosis and positioning and dissection strategy, various AI-based techniques can be designed and developed to enhance safety, accuracy, security, and contribute to the stability of haptic control. They can also be used to lessen network congestion, which will decrease latency and improve reliability. [5].

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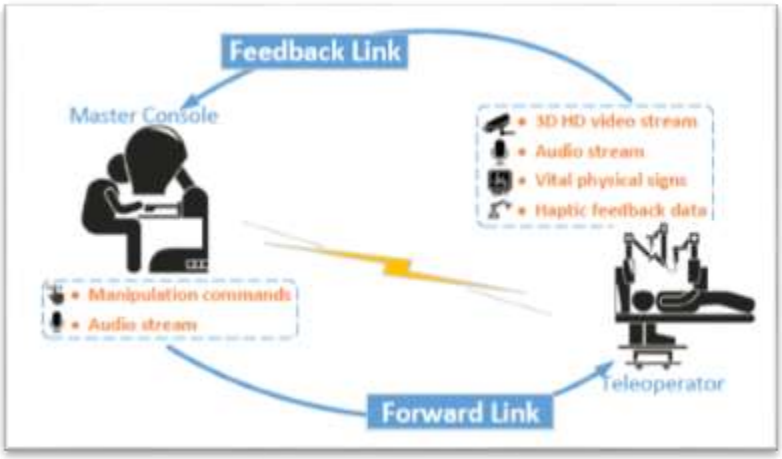


Fig. 2: The loop of master console and slave robotic (teleoperator).

Computer-aided-design/Computer-aided-manufacture in dentistry

The CAD/CAM system was previously only utilized "chair-side" in the office or at the laboratory. Recently, though, it has become possible to combine the ideas. Consequently, both expert technicians and dental professionals have profited. Consequently, CAD/CAM systems are now used in more dental specialties than just restorative ones, including oral surgery, implantology, orthodontics, periodontology, and maxillofacial surgery. These indicate that this technology is playing a major role and continuing to advance, going from a crudely constructed machine to a more advanced one recently. The three main components of CAD/CAM systems are as follows: The first step is a data collecting device, which gathers data from the preparation area as well as from structures that are close by and in opposition. Afterwards, they are transformed into virtual impressions using intraoral scanners (in-office CAD/CAM, CAD, or image capturing systems) or indirectly using a stone model created by taking a traditional impression. The program used to construct virtual restorations on a fictitious working cast and then determine the milling parameters Third, a machine that uses computers to mill solid blocks of material to create the restoration additive manufacturing or a repair substance.

The software applications have weaknesses as well. The practitioner must invest time and money in training, and the equipment and software have a high initial cost. Dentists who don't do enough restorations will challenge to get a return on their investment. [6].

The CAD is based on Virtual Reality (VR) technology, where use of VR simulation systems in dentistry is not easy, despite the fact that they are used in other areas of medical training, such as laparoscopic surgery. The reasons for the complexity of dental instruments in terms of shape, and speed, in addition to the diversity of oral tissues, which including bone, multiple-layer teeth, and gingiva. In dental virtual reality systems, the operator utilizes a stylus to simulate tooth reduction. With the aid of the stylus and specially designed goggles, which appears as the required tool, such

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as a high or low speed hand piece, on the 3D projecting stereoscopic monitor. It gives the user a realistic tactile experience, just as working on actual structures with real instruments, and allow them to feel the force necessary for each practice (force feedback)[7] .

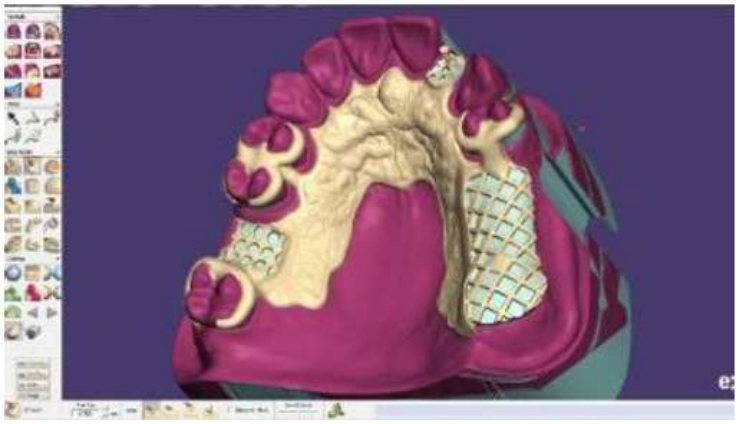


Fig. 3: CAD system.

Table 1: difference of traditional and CAD/CAM technology

Characteristics	**Traditional**	**CAD/CAM**
Duration of work	Take a long time	Make the design & fabrication faster than traditional way such as the milling of full contour crown takes six minutes[8].
Data collection	Conventional impressions by casting the wax-ups	digital impression used Scanner head intraoral to collect data
Challenges	There is no guarantee of the accuracy of the restoration and the natural appearance.	Ensure the restoration strength, especially for posterior teeth, and ensure the natural appearance of the restoration, with more accuracy.
Cost	The cost is less cost than CAD/CAM technology	The high cost of equipment and software, where the practitioner needs to spend money and time on training

2. CONCLUSION

In order to help researchers understand the details of their work and the best techniques used in them to obtain the best results, many computer systems and applications used in the field of

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medicine have been discussed in this article in terms of how they work and its impact on the development of various medical fields. Examples include (CMD) system, which used virtual reality technique, and robotic telesurgery, which used 5G internet and artificial intelligence technique, such as deep learning, while most applications are in the medical environment.

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