# Information and manipulate data. today, information technology is

Business, Decision Making

Informationtechnology (IT) is the application of computers and telecommunicationsequipment to store, retrieve, transmit, and manipulate data. Today, informationtechnology is used in a wide range of industries, including medical scienceknown as Health Information Technology (HIT). The term is a broad concept that encompasses a collectionof technologies used to store, retrieve, share, and analyze health careinformation for communication and decision making purposes. Progressively, more healthcare providers are using HIT to improve patient care. Its application involves both computer hardware and software and other communications featuresthat can be networked to build systems for moving and optimizing healthinformation.

In this paper we are going to discuss the role ofInformation Technology in the medical world with a specific focus ontechnologies, such as computer-assisted prosthetics, implantable devices, neural-electronicimplants, and the importance of electronic health records as part of health IT. This paper will alsodiscuss the various roles that HIPAA plays in the medical world and itsimplications. Computer Assisted Prosthetics During the last decades, several information andcommunication technology tools, such as computer-aided design (CAD) andcomputer-aided engineering systems, have been introduced to support the productdevelopment process by reducing the need for physical prototypes, as well asreducing costs and times.

1 Mostof the components are standards (e. g., foot and knee) and can be selected froma manufacturer’s catalogue, while others, such as the socket, have to becreated on the basis of the patient’s anatomy. The socket is a

criticalcomponent and designed and manufactured almost completely in a manual way, greatly relying on the experience and skills of prosthetics technicians. 2However, there are problems in the process of preparing and fabricating theprosthesis manually, such as loss of information, distorted shape, andmeasurement errors. The inherent issues embedded within these types of manualprocesses can be overcome with the help of computer-aided design (CAD) andcomputer-aided manufacturing (CAM). The computer-aided system allows for betterprosthesis designs and production efficiency, and enables the reproducibilityof models that have been created and stored on the computer. There are someCAD/CAM prosthetic systems (e.

g., Bioshape, Rodin4D Neo and Canfit) availableon the market. Through reverse engineering techniques (usually laser scanning), the external shape of the stump from which the socket and the positive chalk arederived can be acquired, and basic models stored in libraries can also bemodified. 3 The process of generating the final prosthesis consists ofthree stages: digitization of the contralateral and residual limbs; computer-aideddesign (e. g. below-knee prosthesis); and computer-aided manufacturing of thefinished prosthesis. 4 Thedigitization of the contralateral and residual limbs is accomplished by amechanical digitizer controlled by a computer to read topographical informationfrom cast models of the patient’s limbs.

This process is controlled by asoftware program that converts the data from the contralateral limb to a mirror3-D image of the limb. 5 Themethod for obtaining this data is done through the use of a laser scanningcamera system, such as the Insigniascanning wand developed by Polhemus. The camera system acquires a three-dimensional shape of the patient’s limb, which is then stored on a computer through CAD software and then later used tocreate the customized diagnostic prosthetic socket. A laser light, similar tothe ones used to read barcodes, is emitted from a handheld device. This lightscans the entire limb and captures an identical digital image replicating theshape and size of the patient’s’ limb. The second stage of generating the final prosthetic is thecomputer-aided design of the prosthesis. Computer-aided design of the finishedprosthesis can be broken down into four phases of development: creation, alignment, shaping, and finishing.

This process is accomplished by utilizing apre-existing programmable solid modelling package to generate the design of theprosthesis. 6 Thedigitized stump and limb are created automatically using the data obtained inthe first stage, and then a replica of the socket model is developed by scalingthe stump model. The system contains algorithms that allow the prosthetist torotate the limb, socket or stump models to any alignment configuration thatprovides a comfortable fit for the patient.

In regards to the shaping substage, more algorithms embedded within the system generate a smooth transition betweenthe areas of the limb and socket models that overlap, thus providing an evenouter covering for cosmesis. 7 Thefinal phase of design is the finishing phase. Options included in thisalgorithm allow the prosthetist to cut the stump into the socket model, thusproviding inner contours for the patient’s stump. 8Once the final look of the prosthetic is completed, a data file is createdcontaining the data needed for the next phase—the actual manufacturing of theprosthetic. The CAM software is used to generate the machine code and thenecessary data is sent to the machine for the fabrication of the finishedprosthesis. Overall, the use of CAD/CAM has many advantages since most of thedesign algorithms have been automated and require only simple input from theprosthetist to be performed accurately. CAD/CAM also allows the designs to bemore exact, thereby creating less dependency on the technique or skill level ofthe prosthetic practitioner.

CAD systems exist today for all of the majorcomputer platforms, including Windows, Linux, Unix and Mac OS X. The userinterface generally centers on a computer mouse, but a pen and digitizinggraphic tablet can also be used. View manipulation can be accomplished with a spacemouse(or spaceball). 9 The systems however, are not currently integrated with simulation tools, such as finite elementanalysis (FEA) or multi-body systems, to validate the prosthesis design. 10Yet, technologies have advanced so that the use of virtual reality systems isalso being developed to optimize medical treatments.

Research is beingconducted on a new computer-based design framework wherein a digital model ofthe patient is used in designing and testing the prosthetic in a completelyvirtual environment. According to the authors of this framework, the virtualmodel of the patient will be the backbone of the whole system, based on abiomechanical general-purpose model customized with the patient'scharacteristics or anthropometric measures. Various works proposing the use ofFEA to simulate the behavior of prosthetic components and for analyzingsocket–residual limb interaction are available. The software platformcomprehends two main environments: the prosthesis modelling laboratory and thevirtual testing laboratory. The first permits the three-dimensional model ofthe prosthesis to be configured and generated, while the second allows theprosthetics to virtually set up the artificial leg and simulate the patient’spostures and movements, validating its functionality and configuration.

111 Colombo, Giorgio, GiancarloFacoetti, and Caterina Rizzi. “ A Digital Patient for Computer-Aided ProsthesisDesign.” Interface Focus 3. 2 (2013): 20120082. PMC. Web.

29 Nov. 2017. 2 Colombo, Giorgio, GiancarloFacoetti, and Caterina Rizzi. “ A Digital Patient for Computer-Aided ProsthesisDesign.” Interface Focus 3. 2 (2013): 20120082. PMC.

Web. 29 Nov. 20173 Colombo, Giorgio, GiancarloFacoetti, and Caterina Rizzi. “ A Digital Patient for Computer-Aided ProsthesisDesign.” Interface Focus 3.

2 (2013): 20120082. PMC. Web. 29 Nov. 20174 E. Riechmann, M.

Pappas, T. Findley, S. Jain and J. Hodgins, “ Computer-aided design and computer-aidedmanufacturing of below-knee prosthetics,” Proceedings of the 1991 IEEE Seventeenth Annual NortheastBioengineering Conference, Hartford, CT, 1991, pp. 154-155. doi: 10.

1109/NEBC. 1991. 1546255 E. Riechmann, M.

Pappas, T. Findley, S. Jain and J.

Hodgins, “ Computer-aided design and computer-aidedmanufacturing of below-knee prosthetics,” Proceedings of the 1991 IEEE Seventeenth Annual NortheastBioengineering Conference, Hartford, CT, 1991, pp. 154-155. doi: 10. 1109/NEBC. 1991. 1546256 E. Riechmann, M. Pappas, T.

Findley, S. Jain and J. Hodgins, “ Computer-aided design and computer-aidedmanufacturing of below-knee prosthetics,” Proceedings of the 1991 IEEE Seventeenth Annual NortheastBioengineering Conference, Hartford, CT, 1991, pp. 154-155.

doi: 10. 1109/NEBC. 1991. 1546257  E. Riechmann, M. Pappas, T. Findley, S.

Jain and J. Hodgins, “ Computer-aideddesign and computer-aided manufacturing of below-knee prosthetics,” Proceedings of the 1991 IEEE SeventeenthAnnual Northeast Bioengineering Conference, Hartford, CT, 1991, pp. 154-155. doi: 10. 1109/NEBC. 1991. 1546258 E.

Riechmann, M. Pappas, T. Findley, S. Jain and J. Hodgins, “ Computer-aided design and computer-aidedmanufacturing of below-knee prosthetics,” Proceedings of the 1991 IEEE Seventeenth Annual NortheastBioengineering Conference, Hartford, CT, 1991, pp.

154-155. doi: 10. 1109/NEBC. 1991. 1546259https://www. techopedia. com/definition/2063/computer-aided-design-cad10 Colombo, Giorgio, Giancarlo Facoetti, and Caterina Rizzi.

“ A Digital Patient for Computer-Aided Prosthesis Design.” Interface Focus 3. 2 (2013): 20120082. PMC.

Web. 4 Dec. 2017. 11 Colombo, Giorgio, GiancarloFacoetti, and Caterina Rizzi. “ A Digital Patient for Computer-Aided ProsthesisDesign.” Interface Focus 3.

2 (2013): 20120082. PMC. Web. 4 Dec. 2017.