Medical
Engineering

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Medical engineering

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Research summary

The current research aims to identify the importance of medical engineering and its history, and that this type of engineering applies technologies and seeks to solve problems in medicine, as well as knowing and clarifying the branches of this field, highlighting each branch with a brief overview of it, and clarifying the difference between medical engineering and biomedical engineering, and the researcher seeks to place the most important information about this topic.

Key words

Medical engineering- Biomedical engineering.

Content list

Chapter one

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Second: Research problem

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Introduction

Medical engineering is one of the science majors that is starting to spread widely around the world and the US Bureau of Labor Statistics says that medical engineering will remain the second best job in the United States until at least the end of 2020 due to the importance the profession plays in the impact of , and medical engineering is one of the latest engineering sciences emerging with the development of modern medicine After doctors complete all the tasks of diagnosis and treatment and even manufacture medicines alone medical engineers become indispensable partners for doctors in diagnosis and treatment Due to the urgent need to develop medical devices and equipment to serve patients health and speed of recovery, experts in fields other than medicine are required to intervene in the design of these equipments such as electrical, mechanical and computer engineers etc These engineers must also understand the medical sciences of human anatomy and physiology and understand how each of these systems work And they use their knowledge and engineering specialization to develop these devices so there must be an engineer who partially knows all these disciplines on the one hand and on the other hand he can deal with doctors knowing that he is not a substitute for any of them.

Research problem

By showing the researcher the studies that emphasize the importance and necessity of knowing medical engineering so that it can contribute significantly to solving many medical problems and due to the lack of studies on this subject, from here stems the research problem, which called the researcher to read on the subject of medical engineering and write the most prominent and important information about it.

Research aims

The research aims to:
Recognize the importance of medical engineering
Explain the branches of medical engineering
Detect the difference between medical engineering and biomedical engineering

Chapter two

First: Medical engineering concept

Second: History of medical engineering

Third: The importance of medical engineering

Fourth: Medical Engineering Branchs

Fifth: Difference between medical engineering and biomedical engineering

Sixth: Medical devices that medical engineering professionals can design

Seventh: Duties of a medical engineer

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Medical engineering concept

- Medical engineering is the application of engineering principles and techniques to solve problems in biology and medicine This is evident across the healthcare spectrum from diagnosis and analysis to treatment and rehabilitation through the proliferation of implantable medical devices such as pacemakers and artificial joints, to biotechnology More futuristic such as engineering stem cells and 3D printing of vital organs.
- Also known as medical device engineering it combines engineering sciences (electronic electrical mechanical, and computer skills) with physiology and biomedical sciences, as this science aims to solve problems in medicine using the latest and most advanced engineering techniques and based on this science engineers design and manufacture the equipment and devices that doctors need and help them perform their tasks accurately and correctly as quickly as possible.

History of medical engineering

The origins of medical engineering go back to ancient civilizations that is since the days of the philosopher Alcmene, the philosopher Plato and the Greek physician Galen, who studied the world around them including the human body, through systematic scientific methods. Especially before the age of Maimonides Leonardo da Vinci was also known as the greatest engineer in history because he applied the principles of physics, experimentation, and analysis in the study of physiology Helmholtz built his main interest in physics and mathematics, and continued his medical career in 1838 AD, and made amazing contributions to physiology and psychology because he relied on the same method to discover ophthalmoscopy, as engineers, inventors and scientists know the scientific method used in physics and mathematics Scientific research and engineering applied to medical engineering, and the exchange of technologies, knowledge, practical aspects, and applied theory .

The importance of medical engineering

Because of the rapid development of technology also because of the increase in diseases, due to many technical problems
Facing the medical world has greatly increased the demand for biomedical engineers to tackle and solve medical problems as a result of this specialization, many new devices have been invented to assist physicians in their tasks ,Also after the doctor performs the tasks of diagnosing the patient dispensing the prescription and determining the appropriate treatment medical engineering helps him to define and reduce his tasks and make his work more convenient so that he can focus
Ultimately it is the treatment and developmental needs of the field that make the design of medical devices a top priority which in turn requires the intervention of electrical mechanical and computer engineers among others.

Medical Engineering Branchs

1- **Pharmaceutical chemicals:** It is a chemical discipline that deals with the creation discovery, development and manufacture of therapeutic drugs It also includes efforts to improve the manufacturing process of existing pharmaceutical formulations. Medicinal chemistry is also known as medicinal chemistry.
2- **Biomedicine:** Biomedical engineering is concerned with the study of the human body, but from an engineering point of view, the main task of biomedical engineering is to fully understand the anatomy of the human body or organism to realize prosthetics, organs, or medical equipment.
3- **Genetic medicine:** This is a field dedicated to artificially modifying DNA or parts of it to change its properties Many recent advances in medicine, agriculture, and pharmaceuticals are based on genetics and engineering. The major also covers a wide range of topics such as Classical medical genetics, evolutionary and population genetics, animal husbandry, genetic manipulation of plant and animal genomes.
4- **Medical tissue:** It is a branch of science that involves the development of biopharmaceuticals that can replace diseased or diseased tissues in humans. The term tissue engineering was first

had gained wide acceptance and popularity due to the use of engineering to repair damaged human tissues, and it was thought to be capable of revolutionizing several medical specialties in scientific disciplines.

Difference between medical engineering and biomedical engineering

First: From the perspective of the field of work of the medical device engineer, after modern technology provided him with advanced devices and equipment in various health fields, there is a constant demand for the maintenance and development of these devices, which creates job opportunities for him Medical device engineers in the health sector have a variety of institutions, working with nurses and doctors including: Physiotherapy centers Manufacturers of medical devices and equipment. Medical research center Companies that sell and maintain medical. equipment.

Central nursing unit

As for the field of work of biomedical engineers

The need for massive technological advances in all fields coupled with the increase in medical problems and the need for quick and effective solutions has created job opportunities for biomedical engineers everywhere that involve the provision of healthcare Examples:

Hospitals

and medical companies specializing in the manufacture sale and maintenance of medical devices and equipment.

Medical laboratory

Research centers and laboratories There are many international universities and companies that invest millions of dollars in scientific research and development of medical technologies for devices, devices and artificial organs.

Using the best, most expensive and most advanced technology in both fields.

Medical devices that medical engineering professionals can design:

1- Therapeutic medical devices: They are the devices designed to help patients in their treatment and recovery, as they have become one of the best and most advanced treatments available, and they also help patients recover or not recover from aggravated conditions. Heart pacemaker.

2- Diagnostic medical devices: It is one of the most important devices manufactured by medical engineering, which plays a major role in helping doctors to correctly diagnose diseases and locate defects. Or endoscopy of the digestive system.

3- Prosthetic devices: are devices that patients use to help them live a semi-normal life and overcome obstacles that may be caused by disease. Prosthetics are still a good example on these prosthetic devices. Thus, we find that the science of medical engineering is concerned with the design and manufacture of the latest and most advanced medical equipment and devices and works on developing and maintaining them forever.

Duties of a medical engineer

a medical engineer can work in both general medicine and medical technology so his
or her responsibilities include:

- Design test and implement new medical procedures, such as surgical computer.
- Software and technologies and tissue engineering.
- Design development testing and modification of medical products and devices.
- Medical device repair.
- Writing reports and documents. Participation in medical research.

Job opportunities for medical engineers

Biomedical engineers have a large workload and high salaries as biomedical engineers salaries are much higher than salaries in other fields and there are many fields in which biomedical engineers can work including:

- Work in the hospital
-Work in a medical company specialized in the manufacture and maintenance of medical devices.
a research center is to a research center in a university.

Pros and cons of medical engineering

Positives:

1. Good income
2. Stable work
3. Allowing progress and excellence in work.
4. Achieving a prominent position in society

5. The high demand for specialization, especially in developed countries whose prosperity depends on specialization dry.
6. Engineering has good career prospects with the opportunity to join some other engineering discipline such as electrical engineering or Electrician.

disadvantage:
1. Business hours can be long.
2. This is a rather difficult and complex study
The 5 best Arab universities to study biomedical engineering.
3. Examinations require long-term memorization and study.
4. Standing for a long time, for which the engineer needs to be physically fit.

Chapter three

First: Conclusion

Second: References

Conclusion

It is generally believed that medical engineering is limited to medical devices and their maintenance, but there are other areas of medical engineering such as hospital management, prosthetics, and artificial organs. In the study of the human body and the diseases it faces in order to provide better methods for physical health and help in treating these diseases, and the medical engineering profession was established to facilitate all aspects of life and contribute to saving and preserving human life. Without medical and biological engineering, we would not be in specializations such as prosthetics, assistive devices, and equipment Radiology, physiotherapy, and communications.

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