Chapter 14
Understanding Biomedical Engineering for Quantum Computing

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ABSTRACT

Engineers working in the biomedical field have a wide range of responsibilities, such as helping to introduce a new medical imaging technology or to create assiduous devices to assist someone with a disability. Many people consider what exactly constitutes biomedical engineering reasonably clear. Still, there are many differences of opinion regarding this field that can be traced to differences concerning the definition of the field. This chapter aims to provide an understanding of the ground of biomedical engineering and its relevance in quantum computing. The authors are discussing various areas of biomedical engineering where research is constantly happening. With the combination of quantum computing, biology, engineering, and computer science, researchers always strive to be the best.

1. INTRODUCTION

Health professionals today face many issues that are extremely important to engineers because they relate to the initial design of devices and components. Engineering practice is based on three key activities: system analysis, design, and practical implementation. These are all integral parts of engineering. There are many medically critical technological challenges in the design which can vary from large-scale complex facilities to small ones. Large-scale facilities are likes automated clinical laboratories and multistage screening facilities (i.e., testing facilities that allow for a wide range of tests) and hospital information

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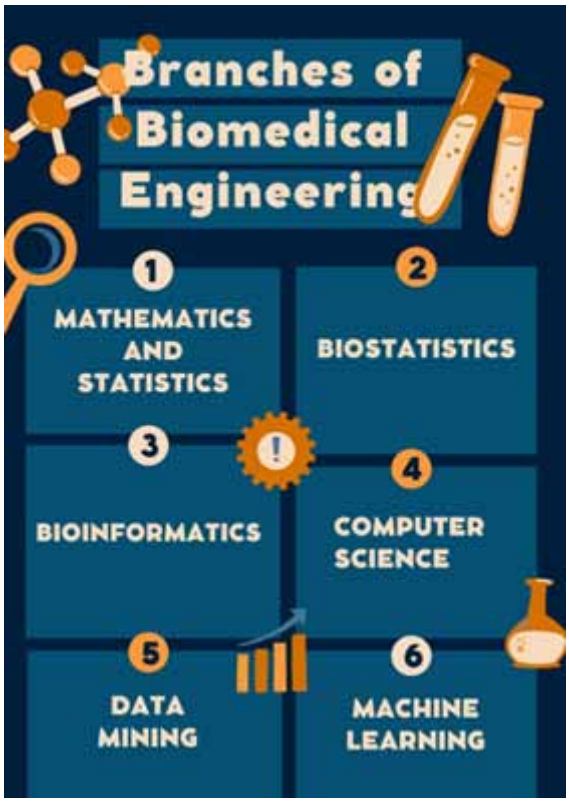
Figure 1. Branches of biomedical engineering



systems. Example of small facilities includes recording electrodes and sensors that are used to monitor physiological processes. It also includes remote monitoring and telemetry complexities. Engineers working in the biomedical field have a wide range of responsibilities, such as helping to Introduce a new medical imaging technology or to create assiduous devices to assist someone with a disability. Many people consider what exactly constitutes biomedical engineering reasonably clear. Still, there are many differences of opinion regarding this field that can be traced to differences concerning the definition of the field. An activity closely related to any technology addressing fundamental research questions, bioengineering is usually used to modify animal or plant cells or parts of cells to develop new plants, animals, or microbes. Food companies, for example, have used this to improve the strains of yeast used for fermentations in the food industry. A bioengineer may enhance agriculture by adding organisms to plants capable of reducing frost damage to improve a crop's yield. The Bioengineers of the future are going to be able to have a dramatic impact on the quality of life of the human race in the coming years. Figure 1 shows different branches of biomedical engineering.

2. BIO-MEDICAL SENSORS

As part of clinical medicine and biological research, diagnostic bio instrumentation is widely used to measure several physiological factors. There are a variety of sensors and transducers that can be used to