International Journal of Trend in Scientific Research and Development (IJTSRD)
International Open Access Journal | www.ijtsrd.com
ISSN No: 2456 - 6470 | Volume - 2 | Issue – 6 | Sep – Oct 2018

Biocomputing

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ABSTRACT
Biocomputing is an interdisciplinary research area which combines biology, computer science, and engineering. It is the process of building computers that use biological materials. It uses systems of biologically derived molecules, such as proteins and DNA, to perform computational calculations. This paper provides a brief introduction to biocomputing.

Keyword: *biocomputing, molecular computing, DNA computing*

INTRODUCTION
Biocomputing, known also as molecular computing or DNA computing, is a fascinating development at the interface of computer science and molecular biology. It is the application of information technology and computer science to biological problems.

Biocomputing is the use of computers which function like living organisms or contain biological components. Biocomputers use systems of biologically derived molecules such as DNA (or deoxyribonucleic acid) and proteins to perform computation. They are computers made of proteins, genes, and cells; they can perform mathematical operations. Proteins are the fundamental building blocks of life. Cells are made up of proteins. The cell is understood as a computational system; its program resides in DNA.

Biological computing can provide a huge parallelism for handling problems in the real world. DNA computers have the capability of high performance computing [1]. The biological computers are mostly used for medical applications. Scientists have been able to create genetic biocircuits that can perform all basic Boolean logic gates: AND, OR, NOT, NAND, NOR, XOR, and XNOR. The functional block diagram of the biocomputing system is shown in Figure 1 [2].

BENEFITS AND CHALLENGES
We use biocomputer for its multi-processor, cost effective, little waste, high artificial intelligence (AI), self-recovery, and massive memory. DNA Computers can perform massively parallel computation and are highly energy efficient systems [3]. Biocomputing can open up a whole different realm of computing.

Currently, a biocomputer requires hours to return an output. For this reason, biocomputers may never match their digital counterparts in terms of speed. However, significant advances in biology are likely to be made in the coming years and the advances will have impact on biocomputing. The possibility of CPU being replaced by biological molecules remains in the far future.

The challenge for biologists nowadays lies in the de-codification of the complex data they have to handle in order to achieve a better understanding of how our genes shape and how our genome evolved [4]. Scientists that are involved in the biocomputing must take care of legal, moral, and ethical regulations.

CONCLUSION
While we live in the age of computers, biocomputing is slowly gaining importance. The new field of biocomputing has emerged through the interdisciplinary efforts of engineers and scientists. As engineers and scientists do research on biocomputing, the new discoveries will revolutionize the medical field. Thus, the future for biocomputing is bright. It will lay the foundations for a new era of computing [5]. Additional information about biocomputing can be obtained in [6].

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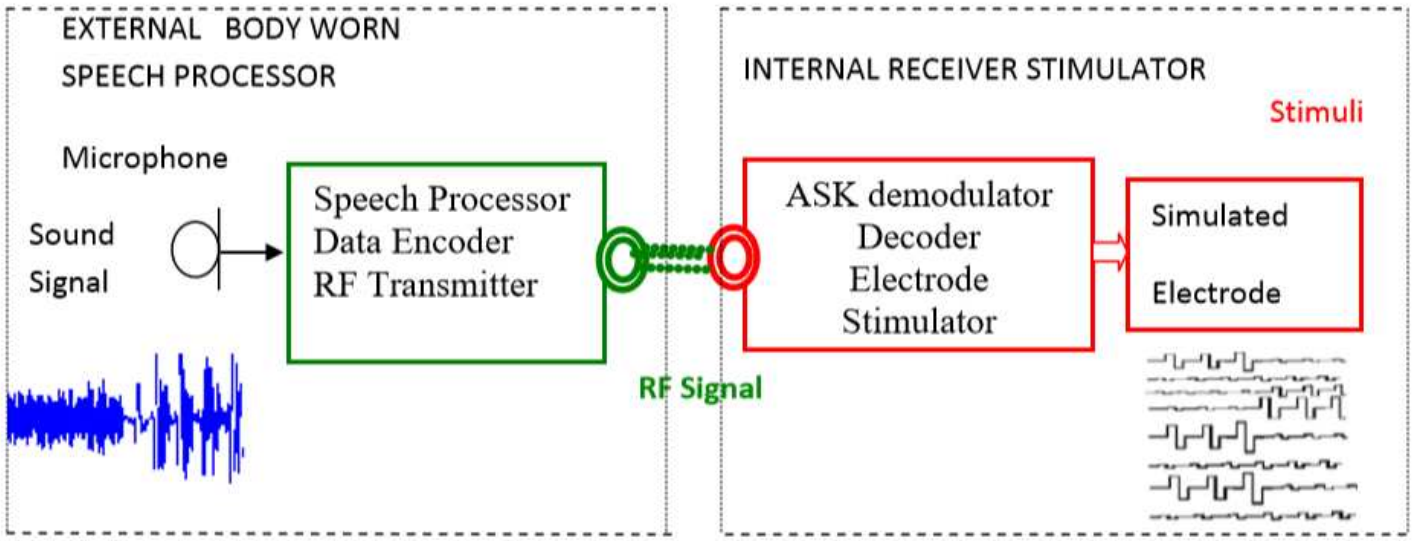

Figure1. Functional block diagram of bio-computing [2]