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Biosystems Engineering and its Applications

Abstract

Biosystems Engineering is a new scientific discipline that applies biological principles to develop new engineering solutions for agriculture, food, forestry, aquaculture, energy, environment, medicine, industry, and many other fields. This discipline integrates the life sciences with engineering and the physical sciences. Biosystems Engineering involves investigation of the means that microorganisms (bacteria, fungi and algae) behave and adapt to their environment. Biosystems Engineering implements this knowledge to develop new techniques and technologies and converts them into bioproducts that meet the global demands. Biosystems Engineering is a multidisciplinary discipline encompassing many specialty areas in engineering (biomedical engineering, chemical engineering, mechanical engineering, electrical engineering, and electronics), physical sciences (chemistry, physics, materials science, and nanotechnology) and biotechnology (microbiology, biochemistry, and genetics engineering). Integrated research programs in this area span many of these disciplines and analyze the way that biological systems form and function.

This literature review discusses the integration of engineering, biology, physics, mechanics, and electronics etc. which formulate the emerging discipline of Biosystems Engineering. This paper elucidates the role of Biosystems Engineer in designing, manufacturing and operating bioreactors as well as managing, controlling and maintaining various biosystems. Eventually, the methods of producing high value-added bioproducts such as biofuels, pharmaceuticals, nutraceuticals and others such as power and heat from biomass and renewable biological resources are discussed.

Keywords: Biosystems Engineering, Bioengineering, Bioresource Engineering, Biophysics, Biomechanics, Bioelectronics, Bioprocess Engineering, Bioindustrial Engineering.