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Future and Current Chemical Engineers in Advancing the Oil Palm Biomass Industry

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Description

Compound designers assume a significant and indispensable part in tending to all, while possibly not most, of the terrific difficulties humanity faces. Knowledge of chemical engineering has been essential to the development of current industrial sectors. The objective of this perspective paper is to provide an overview of the contributions that chemical engineering knowledge can make to the oil palm biomass industry, a green industry that transforms waste into products with added value such as chemicals, energy, and fuel. The three fundamental areas of chemical engineering—reaction engineering, multi-component/multi-phase separation, and process systems engineering are illustrated with a number of real-world examples. In addition, this work offers specific viewpoints on the industry's outlook for the future. In general, several illustrative examples have been used to discuss the illustrated potential areas in each of the three dimensions—micro-scale, meso-scale, and macro-scale. The purpose of this perspective paper is to present the most recent chemical engineering applications in the oil palm biomass industry. It serves as a brief reminder of the significance of the field of chemical engineering and provides current and future chemical engineers with insight into how to advance the oil palm biomass industry.

Interdisciplinary Curriculum for Intelligent Chemical Engineering

Intelligent chemical engineering urgently requires High Quality Personnel (HQP) with interdisciplinary chemical engineering, computer science, and automation knowledge and skills. How chemical engineering students can use automation and computer skills to solve difficult industrial problems is the focus of this study. At Taiyuan University of Technology's College of Chemical Engineering, a team of professors in automation, chemical engineering, and computer applications created an interdisciplinary curriculum for the Intelligent Chemical Engineering (ICE) program. This paper describes the implementation of the interdisciplinary curriculum in ICE experimental classes for three years and volunteer groups for two years. It had been demonstrated that project-based learning (PBL) was an efficient method for implementing the curriculum within limited teaching time. Students' ability to think across disciplines and solve difficult problems, as well as their ability to use professional software for digital plant design and smart plant management, had significantly improved, according to surveys of current and former students. The field of chemical engineering has a wide range of applications, but a few logically consistent guiding principles have kept it together. Thermodynamics, reaction kinetics, and transport phenomena are frequently regarded as the foundations of various chemical processes for power generation and the production of industrial goods like gasoline, plastics, and ammonia. These industrial processes typically generate a significant amount of greenhouse gas emissions and use fossil fuels as their raw materials. The development of alternative routes using renewable energy and sustainable feedstock calls for the expansion of the knowledge base so that eco-friendly chemical processes can be quantified, controlled, and optimized with high precision as processes based on fossil fuels are considered to be phased out. In order to speed up the paradigm shift from fossil fuels to renewable energy, this article provides some perspectives on possible engineering developments.

Overlapping of Computer Imagery onto Real-World Objects

Improvements in educational technology are synchronous with these rapid developments in information technology and data science, which are undergoing continuous enhancements and rapid progress. One of the various visualization technologies used as an instructional medium to deliver academic content through a virtual space in this context is augmented reality (AR). In general, augmented reality (AR) is defined as the technology in which virtual modeled objects are interactively and synchronously overplayed on real-time backgrounds or images. However, it was suggested that the term "augmented reality" should not be limited to just one technology; rather, it should encompass any technology that effectively and meaningfully combines real and virtual information. Emphasized that augmented reality encompasses more than just precise overlapping of computer imagery onto real-world objects.

Although it may be useful in other fields, there are no predetermined criteria that the virtual and real background layers must be related in any way for the technology to be considered augmented reality. According to Sirakaya and Akmak augmented reality technology is one of a kind because it adds virtual objects to the real world and creates an awe-inspiring environment that our senses cannot comprehend. According to Bekele et al., augmented reality can be utilized in numerous fields, including tourism, marketing, entertainment, medicine, and training.2018, Bifulco and others,2014), this technology has the potential to improve academia and education. A broader definition of augmented reality technology might be more helpful in educational contexts because it suggests that a variety of end-user technologies and devices, including desktop computers, mobile devices, and head-mounted displays. According to Squire and Klopfer (2007) augmented reality takes advantage of the advantages of the real world by providing useful and contextual information that may enhance students' perception of reality. According to Khan et al., augmented reality technology could effectively support students as a primary or supplementary tool to increase learning motivation and engagement in lessons.2019. In addition, in the midst of the global COVID-19 pandemic, using augmented reality technology to deliver academic content to students was considered the best option. Teachers and understudies the same know about the significance of schooling congruity to guarantee ideal finishing of understudies' courses particularly during this period and giving consistent inventory of individuals to enter the labor force. It is well known that artificial intelligence has the potential to have a significant impact on chemical engineering and is already doing so. However, there are numerous chemical engineering applications for which traditional machine learning methods may be inadequate. The challenging data characteristics that arise in chemical engineering applications are the subject of this review. We identify four characteristics of chemical engineering application data that make it challenging to apply traditional AI methods data with a high variance and a low volume; data with a high variance and a low volume; data that is noisy, corrupt, or missing; and data that is restricted by physics-based restrictions. We show how current chemical engineering research is expanding the fields of data science and machine learning to incorporate these challenges for each of these four data characteristics. We also discuss applications for each of these data characteristics. In conclusion, we identify a number of obstacles that require investigation in the future.