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15/ENG05/010

MECHATRONICS ENGINEERING

SOFTWARE ENGINEERING ASSIGNMENT

1. Discuss in details not more than one page the relationship between Software Engineering and Mechatronics Engineering.

2. Explain the following, how they relate.

a) Computer science, computer engineering and software engineering. Not more than two pages

THE RELATIONSHIP BETWEEN SOFTWARE ENGINEERING AND MECHATRONICS ENGINEERING

Mechatronic engineering is a multidisciplinary branch of engineering that focuses on the engineering of both electrical and mechanical systems, also includes a combination of robotics, electronics, computer, telecommunications, systems, control, and product engineering.

Software engineering is the systematic application of engineering approaches to the development of software. Software engineering is a sub-field of computing science.

The relationship between software engineering and mechatronics engineering is the fact that it is a branch in mechatronics. An important branch of mechatronic engineering is the control engineering. Software has been an important component of control systems for many years. Control system software continues to grow in importance. For example, a faster processor in a control unit may allow a product to perform better and reduce costs by using simpler, lower cost mechanical parts, but only if the sensor and actuator control software are good enough. Software intensive, networked electronics are becoming increasingly central to the performance of products of all kinds, from industrial to consumer. More engineering teams are facing questions about the best way to handle software development as a key part of product development projects. [This includes mechatronics-based design, those integrating mechanical and electronics, including

embedded software.] The multidisciplinary interpretation of mechatronics has software playing a crucial role across the entire spectrum, from embedded control to the graphical user interface. Software engineering is not limited to programming hardware and interface controls and signal processing algorithms but starts with the definition of the system architecture. In close collaboration with the mechatronic systems engineers, software engineers also work with ‘languages’ such as Mat lab/Simulink, for model-based system design and control, and LabVIEW, for data acquisition and signal processing.

COMPUTER SCIENCE, COMPUTER ENGINEERING AND SOFTWARE ENGINEERING

1. COMPUTER SCIENCE

Computer science is the study of processes that interact with data that can be represented as data in the form of programs. It enables the use of algorithms to manipulate, store, and communicate digital information. A computer scientist studies the theory of computation and the design of software systems.

2. COMPUTER ENGINEERING

Computer engineering (CE) is a branch of engineering that integrates several fields of computer science and electronic engineering required to develop computer hardware and software. Computer engineers usually have training in electronic engineering (or electrical engineering), software design, and hardware-software integration instead of only software engineering or electronic engineering. Computer engineers are involved in many hardware and software aspects of computing, from the design of individual microcontrollers, microprocessors, personal computers, and supercomputers, to circuit design. This field of engineering not only focuses on how computer systems themselves work but also how they integrate into the larger picture

3. SOFTWARE ENGINEERING

Software engineering is the systematic application of engineering approaches to the development of software. Software engineering is a sub-field of computing science.

Computer science and software engineering are both concerned with computer software and virtually everything related. For example, those with degrees in either computer science or

software engineering may specialize in programming language development, systems software, software architecture, or application development. The focus of these two fields of study overlaps in that both require the student to develop an intimate knowledge of computers, and especially computer software and its various applications. The difference between the two paths is to examine two specific words within the given nomenclature; namely, 'engineer' and 'science' (or 'scientist'). Engineers, by nature, are tasked with developing solutions to problems or creating processes that are more efficient by using tools already in existence. By extension, software engineers often find themselves creating new software by utilizing existing languages or established practices already in use. Contrary to this, scientists often hone their expertise on research and developing (and pushing) the boundaries of their given field. As such, computer scientists may assist in the creation of new algorithms or language types that will eventually be put in use to create software.

Many agree that a degree in computer science best prepares a student for abstract problem solving and research on the development of computer technology, while a software engineering degree provides a student with knowledge regarding the software development process and how to apply this as an engineer. A degree in computer engineering, on the other hand, develops skills to assist in the design of software and hardware, or systems that integrate the two. Degrees in computer science and computer engineering share a number of similarities, both obvious and subtle. Both are largely concerned with the use and application of computers as a tool to help develop modern technology. Indeed, both of these degrees require extensive study of computer programming, computer operation, and computational processes