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**MATRIC NO.: 15/ENG05/019**

**COURSE: MCT 506 (COMPUTER SOFTWARE ENGINEERING 2)**

**DEPT.: MECHATRONICS ENGINEERING**

**ASSIGNMENT**

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

**Answer:**

Mechatronics is simply an engineering discipline that focuses on the design, development and maintenance of items that have both electronic and mechanical properties. The main focus of mechatronic engineering is to enhance the synergy that binds the electrical control systems and the machines they control. As a design field, it employs systems thinking and interdisciplinary approach to solving problems within a system. For instance, in today’s automobiles, an average car has 30 to 50 systems control units that take care of all mechanical functions. Control units like anti-lock brakes and pneumatic tire pressure monitoring systems employ the principles of mechatronic engineering to help the car run smoothly.

Software has been a crucial part 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.

Software development engineers, methods, and tools can be integrated into product development teams. Examples include industries and product types such as medical devices, radar subsystems, transportation equipment, production monitoring, aerospace, and communications. Approaches used by some of these companies can aid software development in new product introduction projects.

1. Explain the following and how they relate
   1. Computer Science,
   2. Computer Engineering and
   3. Software Engineering

**Answer:**

Computer science is the study of computers and computing, including their theoretical and algorithmic foundations, hardware and software, and their uses for processing information. The discipline of computer science includes the study of algorithms and data structures, computer and network design, modelling data and information processes, and artificial intelligence. Computer science draws some of its foundations from mathematics and engineering and therefore incorporates techniques from areas such as queuing theory, probability and statistics, and electronic circuit design. Computer science also makes heavy use of hypothesis testing and experimentation during the conceptualization, design, measurement, and refinement of new algorithms, information structures, and computer architectures.

The major subfields of computer science include the traditional study of computer architecture, programming languages, and software development. However, they also include computational science (the use of algorithmic techniques for modelling scientific data), graphics and visualization, human-computer interaction, databases and information systems, networks, and the social and professional issues that are unique to the practice of computer science. As may be evident, some of these subfields overlap in their activities with other modern fields, such as bioinformatics and computational chemistry. These overlaps are the consequence of a tendency among computer scientists to recognize and act upon their field’s many interdisciplinary connections.

Computer engineering is the branch of engineering that integrates electronic engineering with computer sciences. Computer engineers design and develop computer systems and other technological devices. Computer engineers work with hardware and software, ensuring that the two are seamlessly integrated and functioning properly. Computer engineers focus on innovation, making computing systems safer, faster and more powerful. At the career level, there are two main avenues: hardware and software engineering. Hardware engineers focus their skills on computer systems and components, designing microprocessors, circuit boards, routers and other embedded devices. On the software side, these engineers create, test and debug programs and applications that run on computers, mobile devices and more.

Computer engineering exists at the intersection of technology and innovation. A dynamic professional field, computer engineering offers varied career paths in both hardware engineering (e.g. microprocessors) and software development—each which drive computing advances in industries ranging from aerospace to healthcare. The following guide provides a high-level overview of computer engineering, including a look at different degree and career paths, related skills and technologies, earning potential and employment outlook.

Software engineering is the process of analysing user needs and designing, constructing, and testing end user applications that will satisfy these needs through the use of software programming languages. It is the application of engineering principles to software development. In contrast to simple programming, software engineering is used for larger and more complex software systems, which are used as critical systems for businesses and organizations. A software engineer takes the software needs of end users into account and consequently develops or designs new applications. Furthermore, software engineering may involve the process of analysing existing software and modifying it to meet current application needs.

Software engineering is a detailed study of engineering to the design, development and maintenance of software. Software engineering was introduced to address the issues of low-quality software projects. Problems arise when a software generally exceeds timelines, budgets, and reduced levels of quality. It ensures that the application is built consistently, correctly, on time and on budget and within requirements. The demand of software engineering also emerged to cater to the immense rate of change in user requirements and environment on which application is supposed to be working.

The three disciplines are closely related to each other, both computer and software engineering were built of the observations, data and techniques which came from research and experiments done in computer science. Computer engineering uses knowledge of electrical engineering to develop efficient computer architecture that can be used to satisfy consumer needs. Software Engineers use engineering doctrine for the development of software programs up to a certified standard and enable integration of latest technologies with the real world. Breakthroughs in computer and software engineering give computer scientists data to research for further progress in the Information and Communication Technology.