The Multidisciplinary Design Project (MDP) is a group-based design project undertaken by a mixed group of students comprising of undergraduates from the CE, CS, BCG and BCE programmes. The project is practical-oriented and multi-disciplinary in nature, requiring system level integration of subsystems developed by different team members. The course aims to introduce you to the process, issues and constraints related to team-based design and development of real-world multi-disciplinary engineering problems. MDP is also an opportunity for you to acquire practical knowledge of various engineering methodologies and tools while addressing an interesting system-level problem that requires the integration of various multidisciplinary sub-systems. These sub-systems may involve the development of working solutions in areas such as embedded microcontroller systems, web-based server technology, wireless and mobile computing, data structures & algorithms, sensor interfacing & control, graphical user interface design, etc. In short, the project is designed to allow you to make use of the concepts and knowledge you have acquired in your respective CE and CS programmes. The course emphasizes on how to deliver a complex system-level solution by working effectively in small sub-teams on various sub-systems with a goal towards seamlessly integration at the later stage of the development cycle.

By the end of this course, you (as a student) would be able to:

1. Interpret how a multi-disciplinary team can function effectively and manage the methodical design and practical development of a complex multidisciplinary system.
2. Identify the practical aspects of technique, skills and tools required to implement and test an engineering solution based on a specified functionality.
3. Relate how basic engineering concepts acquired in earlier-year courses can be structured and applied to solve practical problems with clearly defined deliverables.
4. Observe how experimentation and quantitative performance evaluation can be used to assess the limitation and quality of a solution.
5. Summarize the need for iterative improvement of engineering solutions through innovation and incorporation of more advanced knowledge acquired through self-directed means.
6. Interpret how the development of engineering solutions can be effectively communicated through proper documentation and multimedia presentations.
7. Demonstrate the responsibility and accountability to other team members when delivering an integrated multi-disciplinary engineering solution within time constraints.
Course Content

<table>
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<th>Topics</th>
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<td>The course project will be updated from year to year to remain interesting and relevant. Details of the current year’s project will be made known to students at initial MDP briefing. One example of such a project is described here: Teams must build a complete mobile robotic system that is capable of autonomously exploring, mapping and traversing an obstacle-filled environment. A combination of desktop, single-board and tablet computers are to be employed to implement a heterogeneous system that is able to deliver a list of specified functionalities, which may include manual &amp; automatic navigation of robot, acquisition &amp; display of environment, remote interactive control of robot, simulation of maze solving algorithm, etc. The components of this complex system will be designed and developed based on a subset of the following knowledge areas:</td>
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<tr>
<td>1. Microprocessors, Signals and Interfaces</td>
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<td>2. Sensors and Communication</td>
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<td>3. Software engineering</td>
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<td>4. Data structures and Algorithms</td>
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<td>5. Open-source frameworks</td>
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<td>6. Human-computer interaction</td>
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<td>7. System analysis and design</td>
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Assessment (includes both continuous and summative assessment)

a) Leader board performance ranking  
b) Project deliverable checklist  
c) Documentation of group project wiki  
d) Video submission – project highlight and presentation  
e) Project strategy and division of responsibilities  
f) Early-stage Peer Review*  
g) Final-stage Peer Review*  

*Students who get a PE2 score less than 50% can have their final score greatly reduced compared to the rest of their team mates. This is to prevent free loaders in a team. Overall attendance >= 80% required to Pass. Those who DO NOT fulfil the criteria will not be graded and will be required to RETAKE MDP

Note: School reserves the right that content and assessment criteria may be adjusted during a given semester possibly because of circumstantial reasons. Any such changes will be discussed with the students enrolled in a given semester.

Reading and References

a. Reading material will vary from project to project. Each project will be accompanied with appropriate online reading material, tutorials and “getting started” resources for each sub-system.  
b. Customized material developed specifically for each project.  
c. Lecture notes from related courses taking in the past.  
d. Relevant website resources and tools appropriate for different parts of the project.