<u>ME 461 Mechatronics Components and Instrumentation</u>
<u>Fall 2021 Syllabus</u>

Catalog Description: Basic applied concepts in mechatronic components and instruments. Laboratory experiments on: identification and classification of mechatronic components, sensors and transducers, machine vision, actuating systems, information and cognitive systems, mechatronic instrumentation, evaluation of mechatronic systems.

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Course Topics to be covered
Course Introduction (1 week)
Programming Overview: PC and Microcontroller (~7 weeks)
    1-2 week: Terminal – Bash
    2-3 weeks: Python
    2-3 weeks: Arduino
Computer interfacing (1 week)
Introduction to computer vision (1-2 week)
Introduction to search methods (1-2 week)
Team project group presentations (1 week)

In general labs will be on:
    Electric circuit components and interfacing
    Actuators
    Sensors
    Interfacing

Grading Policy:

Assignments / Labs / Quizzes	50 pts
Cross member evaluation	10 pts
Project / Final presentation	40 pts
Consent of Instructor based on contribution	*up to* 10 pts

Assignments and Quizzes will be through ODTU Class or directly in class.
Some quizzes will be online and at a late hour, therefore, you are expected to have computer access pretty much for everything related to this course. If there is a late night quiz, it will be announced at least 1 week ahead of time with a broad definition of the content. Pop-quizzes on the other hand, are un-announced.

Assignments are generally announced and explained in class. Mostly assignments will be given a week of time to finish.

Recommended Textbooks:
1. **David G. Alciatore, Michael B. Histand, "Introduction to mechatronics and measurement systems",** McGraw-Hill, 2011. Library call no: <u>TJ163.12 .H57 2011</u>**.**
2. **Devdas Shetty, Richard A. Kolk,** "**Mechatronics system design",** Cengage Learning., 2011. Library call no: <u>TJ163.12 .S52 2011</u>.
3. **W. Bolton,** "**Mechatronics : electronic control systems in mechanical engineering",** Pearson, 2012. Library call no: <u>TJ163.12 .B65 2012</u>
4. **Robert H. Bishop, "Mechatronics : an introduction",** Taylor & Francis, 2006. Library call no: <u>TJ163.12 .M4315 2006</u>

Recommended Reading:
1. Auslander D.M. "What is Mechatronics?", *IEEE/ASME Transactions on Mechatronics*, Vol. 1, No. 1, pg. 5-9, March 1996.
2. Kyura N., and Oho H., "Mechatronics – An Industrial Perspective", *IEEE/ASME Transactions on Mechatronics*, Vol. 1, No. 1, pg. 10-15, March 1996.
3. Borgen M.G., Washington G.N., and Kinzel G.L., "Design and Evolution of a Piezoelectrically Actuated Miniature Swimming Machine", *IEEE/ASME Transactions on Mechatronics*, Vol. 8, No. 1, pg. 66-76, March 2003.
4. Ishihara H., Arai F., and Fukuda T., "Micro Mechatronics and Micro Actuators", *IEEE/ASME Transactions on Mechatronics*, Vol. 1, No. 1, pg. 68-79, March 1996.
5. Moulton T., and Ananthasuresh G.K., "Micromechanical Devices with Embedded Electro-Thermal-Compliant Acutation", Sensors and Actuators A, 90, pg. 38-48, 2001.
6. Luo R.C., "Sensor Technologies and Microsensor Issues for Mechatronics Systems", *IEEE/ASME Transactions on Mechatronics*, Vol. 1, No. 1, pg. 39-49, March 1996.
7. Van de Straete H.J., Degezelle P., De Schutter J., and Belmans R.J.M., "Servo Motor Selection Criterion for Mechatronic Application", *IEEE/ASME Transactions on Mechatronics*, Vol. 3, No. 1, pg. 43-50, March 1996.

Rules of the Game:

Course will be managed via ODTU Class: odtuclass.metu.edu.tr
Project and all of the hands-on Arduino assignments will be completed and presented as a group. And, as a group you will be expected to purchase your electronic equipment. Typical cost per person should be at or around a regular textbook.
By taking this class you accept the codes of ethics detailed in the following links:
https://me.metu.edu.tr/academic-code-ethics-students
http://www.metu.edu.tr/code-ethics-core-values

This is your last year before graduation. In your professional engineering life you will be expected to solve problems that you have not dealt with during your undergraduate education. An undergraduate education cannot be expected to provide you everything that can be necessary in the rest of your life. You can take this class as a practice for what is coming up after graduation.

You will be expected to seek knowledge once the initiatives are given, no spoon feeding.

During class, you will be expected to participate in discussions.

There will be one project. The project will involve the design, some manufacturing and interfacing of several components. Details of the project will be presented throughout the semester.

Naming Convention:
If a naming convention is explained along with an assignment, I expect you to honor it.

E-mail policy: All assignments should be submitted via METU CLASS. In case METU CLASS submission is not made available, you can only then email me assignments to bugra.koku@gmail.com unless announced otherwise. Your e-mail subject should definitely include ME461 and more as defined in naming convention.

Free rider policy: If I or your TA feel that your contribution to your group's success is questionable, then you will be subjected to a comprehensive oral exam relating the project as well as all of the course material. Depending on your performance, your final grade will be determined by solely based on this oral exam.