FALL 2023-24 - MECT410 & MENG410 CAPSTONE TEAM PROJECT GROUPS

Gr. N	Supervisor	Project Title	Pre-Requisites	Students
1	Assoc. Prof. Dr. Murat Özdenefe	**Heat Pipe Integrated Evacuated Tube Solar Air Heater:** This project is for designing and manufacturing a novel type of solar air heater which will employ heat pipe integrated evacuated tubes as absorber. The system will involve heat pipes to convey the absorbed radiation to a heat exchanger where the air will be heated. The evacuated tubes will help to minimize the thermal losses.	**MENG353, MENG345, MENG442**	
2	Assoc. Prof. Dr. Murat Özdenefe	**Smart Window Shade:** The objective of this project is: To design and manufacture an external shading element for windows that is movable and preferably modular. The objective of the system is to block the direct radiation incident on the window for mimimising the heat gains during cooling season and to allow it to fall on the window for maximizing the heat gains during heating season. The external shading element will continiously adjust itself accordingly relative to the sun during a day by means of motors. The system will also be designed to adjust itself seasonally.	**MECT361, MECT444, EENG410, MENG442. Two students must be from Mechatronics Program.**	
3	Assoc. Prof. Dr. Devrim Aydin	**A solar driven cooling/dehumidification unit for building applications:** Students are expected to develop a small scale moving-bed unit that could be driven with solar collectors and could be used for air cooling or dehumidification. System could use simultaneous evaporation/dissolution effect to provide enhanced cooling performance.	MENG246, MENG345, MENG303 At least one group member from mechatronics program.	
4	Assoc. Prof. Dr. Devrim Aydin	**Integrated evaporative/ vapour compression cooling system:** Students are expected to integrate a small scale vapour compression air conditioning system with an existing regenerative evaporative cooler. The combined system is proposed for performance improvement of air conditioning systems in buildings.	MENG246, MENG345, MENG303 At least one group member from mechatronics program.	
5	Assoc. Prof. Dr. Devrim Aydin	**Latent heat storage unit for improved solar water heating performance:** Students are expected to develop a latent heat storage unit and integrate it with an existing solar water heating system. Latent heat storage will be used for water preheating to maintain the hot water tank temperature over longer periods.	MENG246, MENG345, MENG303	
6	Prof. Dr. Uğur Atikol	**Solar Air Conditioner** – It is required to convert an old airconditioner into a solar PV-operated air conditioner that will run from a battery directly.The battery will store the energy from the solar panels and will be able to run the air conditioner for 3 to 4 hours until it is charged again. It is required to have a multi-disciplinary team with a partner from the EE department.	**MENG345, MECT361, MENG364, EENG350, MENG443**	
7	Prof. Dr. Uğur Atikol	**Wind Energy Storage System** – It is required to design an energy storage system for a wind turbine having the capacity for storing energy that can provide electricity to the internet, tv, a few bulbs and charging for the cell phone for at least 2 hours. The team should be a multi-disciplinary team formed by mechatronics and electrical engineers.	**MECT361, EENG350, MENG364, EENG342**	
8	Prof. Dr. Hasan Hacisevki	**Drag Measuring System:** A drag for measuring device will be designed and manufactured fo wind tunnel test equipment. The device will measure the drag force during wind tunnel test and display the result on a digital display.	**MENG201, MENG203, MENG375**	
9	Prof. Dr. Hasan Hacisevki	**Designing a two color 3D plotter:** A two color 3D printing system will be designed and manufactured for small plastic parts manufacturing purpose. The team should be a multi-disciplinary team formed by mechatronics and electrical engineers.	**MENG286, MENG303, MENG375, MECT444**	
10	Prof. Dr. Hasan Hacisevki	**3 D carving machine:** A 3 D three axis wood carving machine will be designed and maufactured. The plane dimensions will be 30 cm by 30 cm and height 25 cm. The system will be controlled through a open source software and must allow to upload drawings from Solidwork software. The team should be a multi-disciplinary team formed by mechatronics and electrical engineers.	**MENG286, MENG303, MENG375, MECT444**	
11	Assist. Prof. Dr. Babak Safaei	**Development and implementation of solid-state batteries** Solid-state batteries replace the liquid or gel electrolytes found in traditional lithium-ion batteries with a solid electrolyte, which is safer, more stable, and potentially offers higher energy density. Solid-state batteries have the potential to offer faster charging times, longer lifetimes, and increased safety, making them attractive for use in electric vehicles, consumer electronics, and grid-scale energy storage.	MENG303, MENG331, MENG364, MENG375,MECT375, MECT361, MECT444 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, ANSYS, Abaqus	
12	Assist. Prof. Dr. Babak Safaei	**Energy Harvesting Storage Systems** Energy harvesting storage systems combine energy harvesting techniques with energy storage to provide a reliable source of power for devices. These systems are being explored for use in applications such as remote monitoring and sensing, smart agriculture, and smart cities	MENG303, MENG331, MENG364, MENG375,MECT375, MECT361, MECT444 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, ANSYS, Abaqus	
13	Assist. Prof. Dr. Babak Safaei	**Multi-functional sandwich structures** The development of multi-functional sandwich structures that can perform multiple functions, such as providing structural support, thermal insulation, and acoustic absorption, is another current hot topic in the field. Research is being conducted to develop new core materials and face sheet materials that can provide multiple functions and to optimize the design of sandwich structures for multi-functionality.	MENG303, MENG331, MENG364, MENG375,MECT375, MECT361, MECT444 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, ANSYS, Abaqus	
14	Assist. Prof. Dr. Omid Shekoofa	**Renewing a PLC-based industrial automation demonstration and test platform:** The aim of this project is to renew a PLC-based industrial automation lab-scale system by replacing the old PLC module of the system with a new micro-PLC module and equip it with robotic arm to pick up different objects from a recirculating conveyor based on their size, color, etc...	MECT444, MENG 332, EENG 410, at least two members from the mechatronics program and one from mechanical engineering program	
15	Assist. Prof. Dr. Omid Shekoofa	**Robotic arm for space debris removal by CubeSats:** CubeSats are a very popular class of nanosatellites, which are manufactured based on one or several unites of cube (1U) structure of 10cm*10cm*10cm dimension. They can provide a low-cost solution in space projects by providing comparable services to micro- or mini-satellites. One new area of CubeSat applications is using them for space debris removal. In this project a miniature robotic arm is designed and built to be installed on a 1U CubeSat unite for demonstration the capability of this class of satellites for space debris mitigation.	MECT361, MENG 332, EENG 410, at least two members from the mechatronics program and one from mechanical engineering program	
16	Assist. Prof. Dr. Omid Shekoofa	**2-axis solar tracker for solar panels:** The aim of this project is to develop a dual-axis solar tracking systems for optimizing solar panel performance. This solar tracking system must be capable of automatically adjusting solar panels in both horizontal and vertical axes to follow the sun's movement throughout the day. Through advanced control algorithms and precise mechanical design, this project seeks to enhance energy generation from solar panels by maximizing their exposure to sunlight. Students will combine their skills in engineering, electronics, and programming to create a sustainable and eco-friendly solution for harnessing solar energy more effectively.	MECT361, MENG 332, EENG 410, at least two members from the mechatronics program and one from mechanical engineering program	
17	Assist. Prof. Dr. Omid Shekoofa	**Robotic solar panel cleaner -2:** This project is the second iteration of design and manufactuering a solar panel cleaner robot. This iteration aims to enhance the robot's cleaning capabilities, energy efficiency, and overall performance while reducing the size and overall weight of the system. Students involved in this project will integrate cutting-edge robotics, artificial intelligence, and sensing technologies to create a cost-effective and eco-friendly solution for ensuring the optimal operation of solar panels.	MECT361, MENG 332, EENG 410, at least two members from the mechatronics program and one from mechanical engineering program	
18	Assist. Prof. Dr. Omid Shekoofa	**Design and Fabrication of a Low-Cost Monochromator:** Monochromator is a sophisticated optical instrument essential in various scientific and industrial application, such as EQE measurement of solar cells and laser diodes. project will challenge students to integrate mechanical, electrical, and software engineering skills to create a device capable of isolating and precisely selecting a single wavelength of light. Throughout the project, students will gain valuable insights about mechatronics, optics, and automation, making them well-prepared for careers in advanced instrumentation and control systems development.	MECT444, MECT361, MENG 332, EENG 410, at least two members from the mechatronics program and one from mechanical engineering program	
19	Assist. Prof. Dr. Omid Shekoofa	**Smart Composting Garbage Bin:** This project involves the design and development of an intelligent garbage bin that facilitates efficient composting of organic waste. Students will employ sensors and automation to monitor and regulate composting conditions within the bin, optimizing decomposition rates and minimizing odor and pests. The project's aim is to promote eco-friendly scalable waste disposal methods, reduce landfill waste, and produce nutrient-rich compost for agricultural use.	MECT444, MENG 332, EENG 410, at least two members from the mechatronics program and one from mechanical engineering program	
20	Sn. Lec. Dr. Cafer Kızılörs	**Redesign the throatless shear machine**	**MENG303, MENG364, MENG375/MECT375**	
21	Sn. Lec. Dr. Cafer Kızılörs	**Refurbishment of the Mini CNC Milling Machine**	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, PLC, ROS	
22	Sn. Lec. Dr. Cafer Kızılörs	**Refurbishment of the Mini CNC Turning Machine**	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, PLC, ROS	
23	Sn. Lec. Dr. Cafer Kızılörs	**Famagusta Shipyard Project**	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, PLC, ROS	SİMANUR KATAL - 19000033 DOĞUKAN BİRDAL - 19000099 MEHMET ALİ ŞAHİN - 20000046 BLESSING MECK - 20700188 MOHAMMED ABDELGADIR - 20700305
24	Prof. Dr. Qasim Zeeshan	**Refurbishment of Ocean Wave Energy Generator**	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, ROS	
25	Prof. Dr. Qasim Zeeshan	**Snake Robot - 2.0:** This project focuses on the redesign, development and testing of the snake robot 1.0 which was inspired from real snakes. It consists of compact links (brackets) which allows to maintain smooth movements. The most effective movement pattern such as; crawling and slithering must be implemented. Servo motors, wireless cam, Arduino Nano and remote control are some of the components that must be used to develop this prototype. To make the snake robot function like a real snake, it is constructed using many brackets. To cut down the cost, these brackets must be designed and 3D printed. Each bracket can have a servo motor that enables the robot to have various degrees of freedom for different gaits. Modular design must give the robot flexibility to reach different territories and ability to move around in complex environments. The work will cover several key areas of mechanical and mechatronics engineering.	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, ROS	
26	Prof. Dr. Qasim Zeeshan	**Human-powered Electric hybrid vehicles (aka Power-assisted Vehicle)** A human–electric hybrid vehicle is a hybrid vehicle, or more specifically a hybrid human-powered vehicle, whose drivetrain consists of a human being and an electric motor/generator (and one or more electricity-storage device(s) such as a battery(ies) or ultracapacitor(s)). Some vehicles are able to operate off both human power and be plugged in to operate on battery power. The main aim of the project is to develop a hybrid electric human-powered vehicle.	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG350, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, PLC	
27	Prof. Dr. Qasim Zeeshan	**Refurbishment of a Mini Circular Automated Storage and Retrieval System (ASRS) -** Automated Storage and Retrieval Systems (AS/RS) are used as warehouses, specifically designed for material handling in advanced manufacturing systems and are broadly utilized in distribution centers as subsystem for production area. The aim of the project is to refurbish the mini Circular AS/RS Configuration. The configuration is based on a single aisle; single S/R (Storage/Retrieval) machine. Randomly storage assignment policy is applied for the system.	MENG303, MENG331, MENG364, MENG375, MECT361, MECT444, EENG320, EENG410, EENG428 SPECIAL REQUIREMENT: At least 2 team members should be from the Mechatronics Program. Software: Solidworks, MATLAB, Simulink, ANSYS, ARDUINO, PLC	