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Nr. crt.	Titlu lucrare	Scurtă descriere	Cerințe	Nivel (licență/ master)
1, 2	AI planning for guaranteed-performance and real-time nonlinear control	The students will work on a AI optimistic planning methods for optimal control in various types of problems: discrete or continuous inputs, minimax robust control, etc. Near-optimality guarantees and convergence rates are desired. A second student will focus on applying planning methods in real-time.	Strong analytical and mathematical skills, algorithmics, and Matlab programming.	Licență sau Master
3	Nonlinear identification and control of a DC-motor based inverted pendulum setup	An Arduino-controlled, Dynamixel DC motor is encapsulated in a USB-connected box and usable for system identification experiments (transient analysis, step and impulse response identification, FIR and parametric models). We will focus on developing a nonlinear variant by way of adding an asymmetrical weight to the disk turned by the motor, and solving the required steps for control: modeling/identification, control design.	Embedded programming, Matlab.	Licență sau Master
4, 5	Underwater litter detection and SLAM	In the context of the SeaClear2.0 EU project, we are working on mapping underwater litter with autonomous underwater vehicles. The per-student topics will be: * Detecting litter in sonar and camera images. * Using the locations of litter or other uniquely identified objects to perform SLAM.	Python, ROS.	Licență sau Master
6, 7, 8, 9	A platform for underwater mapping tests	In the context of the SeaClear2.0 EU project, the students will focus on developing a real-life scale model of the litter mapping system using an already existing BlueRobotics BlueROV2, a pool, and an overhead-camera-based positioning system. Per-student components: * Pose estimation. * Control design. * Path planning and obstacle avoidance. * Integration of a gripper device.	Matlab, Python, ROS.	Licență sau Master
10	Multiagent control of a team of TurtleBot robots	We will develop and apply multiagent control methods to a team of 2 to 6 TurtleBot robots. The application may be modeling of a traffic intersection,	Matlab, ROS	Licență sau Master

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		and methods will exploit control and AI to optimize objective functions that include group-level objectives like throughput as well as local objectives like energy usage.		
11	Reinforcement learning for control	The student will work either on fundamental developments in reinforcement learning, on their real-time application to nonlinear control, or a combination of the two.	Strong analytical and mathematical skills, algorithmics, and Matlab programming.	Licență sau Master
12	Nonlinear state estimation with uncertainty	We will be developing state estimation methods for nonlinear uncertain systems where channels may drop measurements stochastically. One student will focus on handling uncertainty and another on the intermittent-measurement part.	Strong analytical and mathematical skills, esp. in linear algebra, algorithmics, and Matlab programming.	Licență sau Master
13	Path-aware optimization with locally smooth functions	We will be working on developing methods for robots to find the maxima of a function defined over their operating space. Different from previous work where we only assumed Lipschitz continuity, here we will impose stronger smoothness conditions on the function and aim to obtain faster convergence rates to the optima.	Strong analytical and mathematical skills, algorithmics, and Matlab programming.	Master
14	Drone-based plant species identification	In the context of funded project SkAIGreen in collaboration with Adept Transilvania, we are looking into methods for detecting plant species from drone images. The student will assist with labeling images, training neural networks, and real-life drone experiments.	Python.	Licență sau Master
15, 16	Architectural optimization of recurrent neural networks	We will be looking into improving the architecture of so-called state-space-model neural networks; as well as their application to dynamical system identification and control.	Python, deep neural nets.	Master