ȘL Natsakis Tassos

Nr.crt.	Titlu lucrare	Scurta descriere	Cerinte	Nivel (licenta/master)
1	Robotic fire-fighting robot	The goal of this thesis is to design and implement a fire-fighting robot that is able to detect where is the focus of a fire and direct a water jet towards its base. To achieve this, the robot should be able to control the azimuth and altitude of the water cannon, together with the water pressure.	Robotics, Arduino Linux, ROS	Licența
2	Robotic prosthetic hand	The goal of this project is to design and construct a robotic prosthetic hand, aiming at helping amputees perform basic every day tasks. The robotic arm should be lightweight and offer a level of dexterity so that the patient can grasp objects of different sizes and shapes. Appropriate modelling and control of the robotic hand should be developed.	Robotics, 3D design, hardware	Licența
3	Robotic glove for finger rehabilitation	A stroke is a medical condition that affects the quality of life of millions of people world wide. A usual symptom of a stroke is the inability to control the motion of ones fingers, resulting in problems achieving every day tasks.	3D design, Hardware, Electronics, Control	Licența

		The goal of this thesis is to design and implement a device that will perform a passive motion of the fingers of a patient. The device should be easily attached to the patients hand and should control the extention and flexion of each finger separately.		
4	Pick and place application using depth camera data	Picking and placing is one of the most used functions for a robotic arm. This has been the primary use for decades and most modern industrial robots are able to perform such a task with extreme accuracy. Picking and placing in an industrial environment is solved when the location of the objects to pick is known on beforehand, however when using collaborative robots with humans, small deviations on the position of the object to be picked are unavoidable. The goal of the project is to constantly monitor a human operator and detect where did he/she drop the object to be placed. The robot should be then	Robotics, C++, Linux, ROS	Licența

		instructed to pick the object and place it to its desired location.		
5	Human avoidance during robot operations	Using a robot in the vicinity of a human is a common application, especially with the advent of collaborative robotics. Even though collaborative robots have inherent safety features, these mainly concerns force limits which are activated only after there is contact between the robot and a human. This project aims to improve this situation, by using a depth camera to detect the human and make sure the robot avoids him/her. This will make the robot even safer to operate close to humans.	Robotics, C++, Linux, ROS	Licența
6	Location aware robotic telescope	The goal of this thesis is to motorize and automate an existing telescope with equatorial mount, so that it is able to perform object tracking over long periods of time. Ideally the telescope should be location aware, so that any corrections due to latitude and longitude will be taken into consideration. Telescope and motors and controllers are available and will be provided.	Motor control, Basic astronomy, Arduino, Sensors	Licența

7	Integration of an industrial robot with ROS	ROS (Robotic Operating System) is a rapidly developing framework for robot sensing, planning and control. It can be a great tool for learning and experimenting about robotics as well. We currently have an industrial robotic arm (FANUC M-6iB/HS) that is available for teaching purposes. However, with no intuitive control interface it is difficult to use it in a teaching environment. The goal of this project is to integrate ROS with the robotic arm in our laboratory. Experimental packages exist already, however they are not fully integrated and effort is required in bringing them to a level that would allow to be used for educational purposes (i.e. implement controllers for joint position/velocity control).	C++, ROS, Linux	Licența
8	Quantitative analysis of the performance of a depth camera	Depth cameras are constantly being used in real-life application, one important use case being the detection of motions of human beings. The claims of the manufacturer for their accuracy are not always well documented, and comparison to ground truth data	ROS, Data analysis, Signal processing	Licența

		is necessary. The goal of this thesis is to make a quantitative analysis of the accuracy of skeleton tracking of an Orbbec Astra Pro camera, compared to data acquired by an OptiTrack system.		
9	Online and real-time intention prediction of upper limb motion	With the advent of collaborative robots, the opportunity to use robotic arms in the vicinity of humans has emerged. Human-robot collaboration is a rapidly developing field for industrial applications, but can also have significant impact on healthcare related applications, such as rehabilitation. However, in order to implement human-robot collaboration, there has to be real-time and objective communication to the robot about the intentions of the human. The goal of this project is to implement in ROS an already existing algorithm for the prediction of the intention of motion. The training of the algorithm is happening currently	Matlab, Signal processing, ROS	Licența

		offline, but it would be very beneficial to perform this online and in real-time.		
10	Sensitivity analysis of modelling parameters on inverse dynamics controller robustness	Most modern control methodologies of robotic arms require access to the torque commands of the motors. However, industrial robots usually provide only position or velocity commants, and do not provide appropriate hardware interfaces for controlling the joint torques, mainly for safety issues. One way to overcome this limitation is by calculating equivalent joint velocity commands for the required joint torques. This is possibly by taking into consideration the dynamic model of the robot arm and a numerical integration of it. This works in theory when perfect knowledge of the robot model is available, but it is not certain to what extend is this sensitive to the inertial parameters of the robot arm. The goal of this thesis is to perform a sensitivity analysis on the inertial parameters of the robot model, and, if possible, to apply this methodology on an	Control theory, Robot modelling, ROS, C++	Master

		actual robotic arm available at our laboratory		