Lista zagadnień na egzamin dyplomowy

Kierunek studiów: **Automatyka i Robotyka** Stopień studiów: **drugi**

Specjalność: **Smart Aerospace and Autonomous Systems (Inteligentne systemy latające i systemy autonomiczne**

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| Nr | Zagadnienie |
| 1 | Basic tools used in design of nonlinear control algorithms. **[Nonlinear systems]** |
| 2 | Different linearization methods. **[Nonlinear systems]** |
| 3 | Examples of linearization techniques. **[Nonlinear systems]** |
| 4 | Characterization of autonomous systems. Control architecture paradigms in mobile robotics. **[Fundamentals of autonomous systems]** |
| 5 | Basic structures and properties of wheeled robots. **[Fundamentals of autonomous systems]** |
| 6 | Motion control of wheeled mobile robots. **[Fundamentals of autonomous systems]** |
| 7 | Adaptive control with a reference model (MRAC). **[Adaptive control]** |
| 8 | Adaptive control with plant-model identification (MIAC). **[Adaptive control]** |
| 9 | Adaptive control with active disturbance rejection (ADRC). **[Adaptive control]** |
| 10 | Learning algorithms for Artificial Neural Networks. **[Basics of smart systems]** |
| 11 | Radial basis function networks. **[Basics of smart systems]** |
| 12 | Fuzzy inference systems. **[Basics of smart systems]** |
| 13 | Multi-agent systems characteristics; MAS applications. **[Design of multi-agent systems]**  |
| 14 | Multi-agent techniques in mobile robotics. **[Design of multi-agent systems]**  |
| 15 | Communication in multi-agent systems. **[Design of multi-agent systems]**  |
| 16 | Optimal controllers. **[Control of under-actuated systems]** |
| 17 | Linearisation and partial feedback linearisation for acrobot and pole-cart. **[Control of under-actuated systems]** |
| 18 | Energy shaping control for pendulum and cart-pole. **[Control of under-actuated systems]** |
| 19 | Mathematical model of aircraft. **[Design of control systems]**  |
| 20 | Linear and nonlinear controllers for aerial vehicle. **[Design of control systems]** |
| 21 | Controller design for mobile robots with respect of dynamics models. **[Design of control systems]** |
| 22 | Vision system in control systems. Types of vision based control. Camera calibration. **[Vision based control]** |
| 23 | Basics of image processing and analysis. **[Vision based control]** |
| 24 | Civil applications of Remotely Piloted Aircraft (drones). Types of drones. **[Aerial robots]** |
| 25 | The Aerial Robot Loop (components, description). **[Aerial robots]** |
| 26 | Control techniques of drones (classical, optimal control, robust control, nonlinear control, intelligent control). **[Aerial robots]** |
| 27 | Characteristics of white Gaussian noise. **[Sensor integration]** |
| 28 | Assumptions and operations of Kalman Filter. **[Sensor integration]** |
| 29 | Linearization method in Extended Kalman Filter. **[Sensor integration]** |
| 30 | Combinatorial and sampling planning methods. **[Navigation and motion planning in robotics]** |
| 31 | Geometric and kinodynamic planning. Planning in view of the optimal control paradigm. **[Navigation and motion planning in robotics]** |
| 32 | Environment description methods for motion planning purposes. **[Navigation and motion planning in robotics]** |
| 33 | Differential flatness systems and their methods of control. **[Nonlinear control systems]** |
| 34 | Examples of differential flatness systems. **[Nonlinear control systems]** |
| 35 | Systems described on Lie groups and their control and related examples. **[Nonlinear control systems]** |
| 36 | Methods of describing position and orientation in three-dimensional space. **[Control of flying robots]** |
| 37 | Limitations on the use of inverse dynamics methods in the control of flying robots. **[Control of flying robots]** |
| 38 | Methods of obtaining state variables inaccessible directly from sensors. **[Control of flying robots]** |
| 39 | Basic properties and characteristics of electronic systems of flying vehicles. **[Electronic systems of flying vehicles]** |
| 40 | Fundamentals of metrology and basic knowledge of general navigation and flight planning. **[Flight planning]** |