

The Emerging Methods of Control and Monitoring of the Biological Systems

Technical University of Koszalin is located in Northwest part of Poland near the Baltic Sea. We have five hundred person of research staff and eighteen thousands students learning in four departments. Location in agriculture and tourist area of Poland with mostly small and medium industry is a reason of our strong research activity in the area of farming and food processing. The Technical University of Koszalin with co-operation of local industry act as place of development and transfer of new technologies.

The [Division of Control Systems](#) as a part of the Mechanical Faculty conducts research activities connected with the novel techniques and methods in control and monitoring of the processes in the food and chemical industry namely regarded the mathematical modelling, identification, dynamic optimisation, simulation, signal and image processing.

The domain of the call:

The Division of Control Engineering is looking for contacts and co-operations with research institutes and industrial partners to develop collaboration and research on:

- application of control algorithms in food processing and chemical industry,
- optimal (energy efficient) control strategies,
- methods of microclimate control,
- control for Heating, Ventilating, and Air-Conditioning Systems (HVAC),
- methods of modelling and identification of non-stationary, non-linear distributed parameter processes,
- methods of the material quality monitoring based on digital image processing (computer vision) methods,
- methods of the water content measurement inside of a material in the dryer during the drying process,
- methods of controlling dryers for grain, wood, paper, pulp etc. based on model-based optimal strategies,
- model-based intelligent sensors,
- measurement of physical properties of foods,
- non-invasive measurement methods.

Technical University of Koszalin will provide expertise and technical know-how to projects concerning these above mentioned topics.

Especially we offer:

The energy-efficient microclimate control algorithms. That algorithm comprises models of material respiration, water transportation, changes of material quality, heat and mass exchange between crops and ambient air.

The indirect method of grain moisture content estimation on the basis of thermodynamic parameters of air such as temperature, humidity and other.

Know-how and co-operation in creating a monitoring systems based on digital image processing techniques. The system interprets the detected signals from the image sensors and utilises texture properties of monitoring material's digital image to extract relevant information.

Keywords:

Food safety; Food processing; Heat treatment; Control; Microclimate control; HVAC; Optimal control; Drying; Baking; Storage; Transport; Freezing; Chilling; Chemical and biochemical processes; Agriculture; Biotechnology; Identification methods for non-linear parameter distributed processes; Modelling of food, chemical and biochemical processes; Heat and mass transport; Water content; Food quality evaluation; Product quality control; Non-invasive measurement; Image processing; Sensor and data fusion; Texture and colour analysis; Machine vision; Signal processing; Automatic measuring systems; Intelligent sensors; Environmental monitoring; Pollution control.

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