

INTELLIGENT SYSTEMS

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REVIVIS Ptuj

- Revivis Ptuj (Centre for Higher Education) was founded by local community with a view to support tertiary education. This is performed by
- different universities guest study courses,
 - setting up High school of Ptuj with complementary study courses.

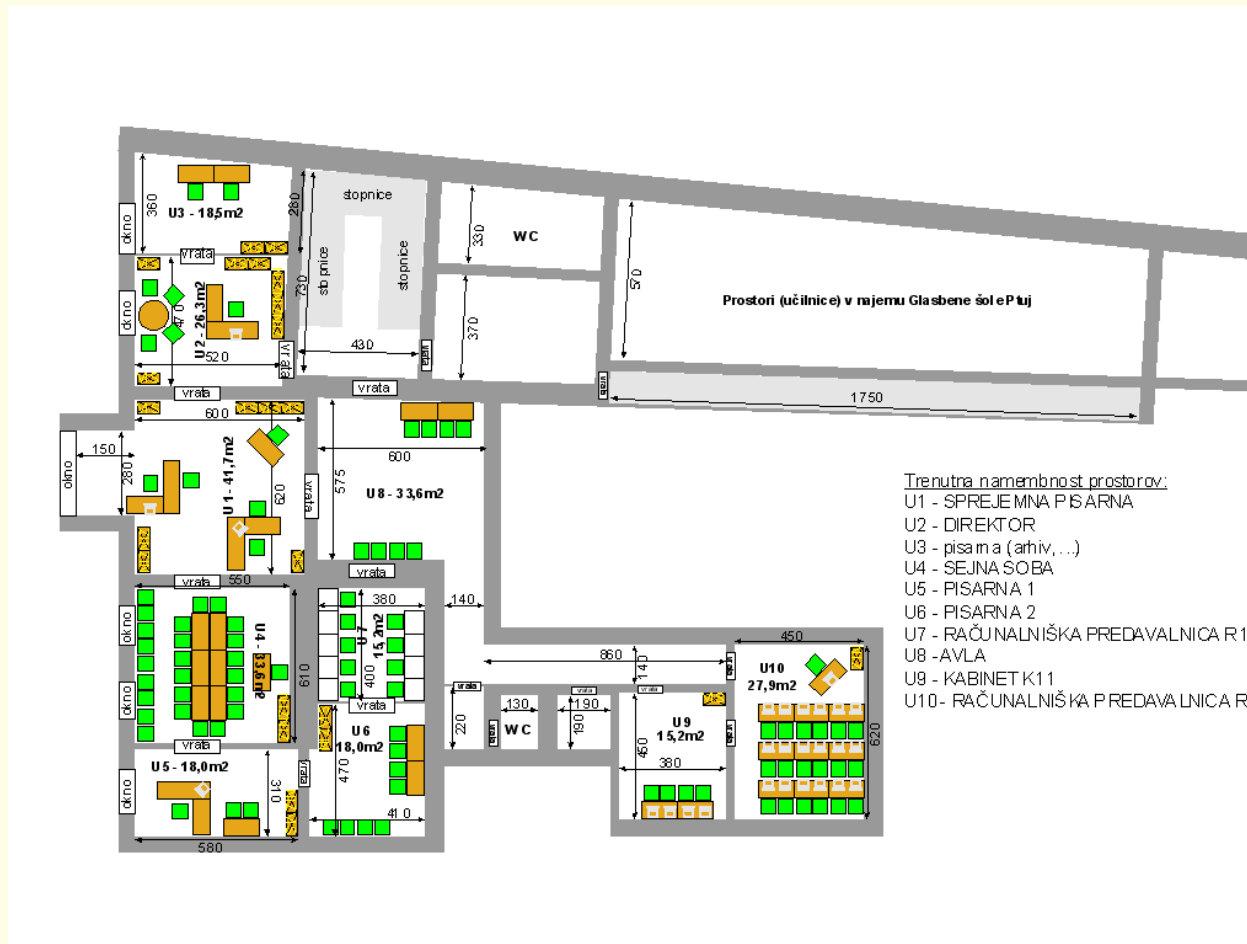
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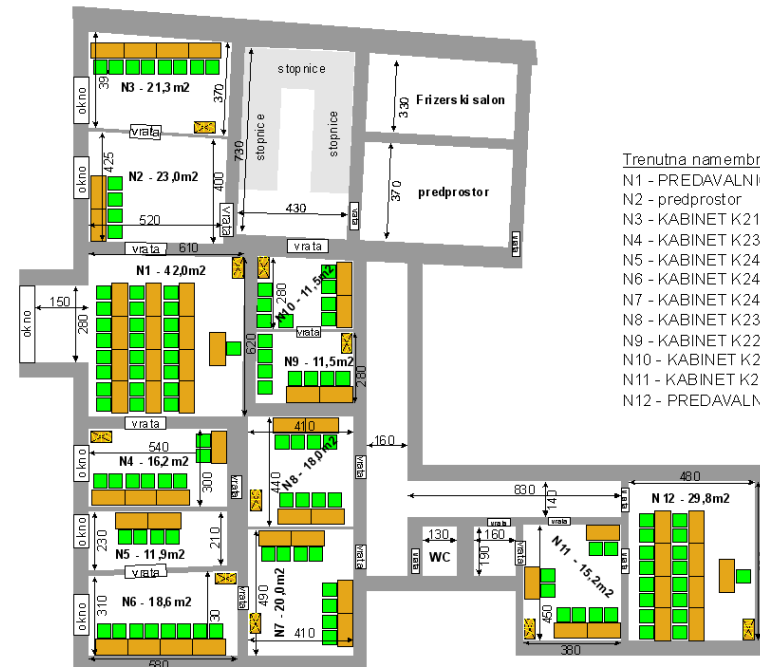
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Trenutna namembnost prostorov:

- N1 - PREDVALNICA P1
- N2 - predprostor
- N3 - KABINET K21
- N4 - KABINET K23a
- N5 - KABINET K24
- N6 - KABINET K24
- N7 - KABINET K24
- N8 - KABINET K23b
- N9 - KABINET K22
- N10 - KABINET K22
- N11 - KABINET K25
- N12 - PREDVALNICA P2

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Recent academic accreditation of the guest study courses,

- University of Primorska, Tourism, 1st and 2nd study cycle ,
- University of Maribor, Organization and management, 1st and 2nd cycle .

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Future domicile study courses of the High school of Ptuj (still under accreditation process):

- Technologies and food chain management, 1st study cycle,
- Tourism, joint degree, 1st study cycle,
- Heritage maintenance, 1st study cycle.

Summary

- We will present technical intelligent systems.
- We will define what intelligent systems are and associate the reader on holistic view of giftedness by human being. The paper is based on the intelligent systems use for process control. Presented are the most
- important definitions and different kinds of the technical intelligent systems: knowledge based systems, fuzzy systems and neural networks, for control of the complex systems.

Outline

- - Introduction
 - Some definitions
 - Qualitative modelling
- - Fuzzy systems
 - Neural networks
 - Conclusion

Introduction

- Technical intelligent systems are actually incorporated in almost every industrial process control.
- Advanced complex control systems have to deal with uncertainty resulting from weak models caused by the lack of knowledge, or high level modelling aiming at the avoidance of computation complexity.

Introduction

- More can be acquired by abstractions than with designing and the use of more powerful computers.
- Modern scientists and engineers often solve control problems by using the intelligent systems.
- Intelligent control is a discipline in the field of process control .

Some definitions

- • The definitions of *intelligent control* can be derived from:
 - the intelligence of the developed controller,
 - the way in which biological systems perform a certain task,
- - the design of the controllers which perform the tasks that are usually performed by biological systems.

Some definitions

- • We can speak of biological, psychological, and also engineering intelligence definitions. We shall concentrate on the definition of the intelligence of engineering systems in connection with biological systems.
- • The minimal requirement of intelligence is to perceive the environment, to make decisions and to generate control actions (cybernetics).

Some definitions

- In engineering systems the tasks and the criteria for success are defined externally - by the designer, programmer or operator.
- Intelligent systems can emulate the functions of living beings and also human mental abilities.

Some definitions

- Intelligent systems can be described by understanding *intelligence* as the property of the system which becomes active when the procedures of attention focusing, combinatorial searching and generalisation over the input information are used to generate the output. Thus intelligence is inclined to reduce the complexity to master the controlled system with greater ease.

Qualitative modelling

- • Modelling is a procedure in which a part of the real environment is represented by a model that includes all the essential properties of the modelled object.
- • Mathematical or qualitative model?

Qualitative modelling

- The purpose of qualitative inference is to create and use simplified presentations of the world leaving out the irrelevant details, but retaining the resolution and the interpretation of the important properties of behaviour. The objective is a general and consistent system.

Fuzzy systems

- • *Fuzzy sets* were introduced by Zadeh in 1965 to represent and manipulate data and information that possess nonstatical uncertainty.
- • Important property of the fuzzy systems is the implementation of a learning.

Neural networks

- • *Computational neural networks* were first discussed by McCullough and Pitts in 1943 as a means of imitating the power of biologic systems for data processing.
- • A neural network model is composed of a number of inputs, a number of outputs, and a number of artificial neurones (paralell computation).

Neural networks

- Many learning algorithms have been developed based on optimisation techniques to train neural networks.
- Neural networks are universal approximators.

Conclusion

- • Modern intelligent control systems approach brings control systems scientists possibility to model complex processes.
- • Sometimes we can solve process control task easier and in more natural way with use of the intelligent system control.

Conclusion

- • The advantage of using the intelligent systems is the efficiency of these systems in specific applications where only qualitative information is available.
- • Inherence of the parallel structure in the neural networks is very powerful property of the intelligent systems.

Conclusion

- The efficiency of the intelligent systems increases with the increasing complexity of the control level.

Thanks for Your Kind Attention