

SELECTED PROBLEMS OF AUTOMATIC EVALUATION OF COMMANDS GIVEN BY THE OPERATOR USING ARTIFICIAL NEURAL NETWORKS

Maciej Majewski, Wojciech Kacalak*

The voice communication between technological devices and the operator becomes a stronger challenge as technology becomes more advanced and complex. New applications of artificial neural networks are capable of recognition and verification of effects and safety of commands given by the operator of the technological device. In this paper there is a review of the selected issues on estimation of results and safety of the operator's commands as well as supervision of the technological process. A view is offered of the complexity of effect analysis and safety assessment of commands given by the operator using neural networks. There is also an intelligent two-way voice communication system between the technological device and the operator presented, which consists of the intelligent mechanisms of operator identification, word and command recognition, command syntax and result analysis, command safety assessment, technological process supervision as well as operator reaction assessment. The first part of the paper introduces a new concept of modern supervising systems of the technological process using an intelligent layer of two-way voice communication between the technical device and the operator and discusses the general topics and issues. The second part is devoted to a discussion of more specific topics of the automatic command verification that have led to interesting new approaches and techniques.

Key words: voice communication, command evaluation, artificial intelligence, artificial neural networks, human machine interface

1. Intelligent two-way communication by voice

Humans communicate with other humans in many ways, but surely voice communication is the most widely used. Speech is a singularly efficient way for humans to express ideas and desires. Nowadays technological devices can already be provided with enough intelligence to understand and act appropriately on voice commands. The voice communication with technological devices becomes a stronger challenge as technology becomes more advanced and complex. The obvious advantages of two-way communication by voice include the following:

1. Speech is the natural mode of communication for humans [3, 4].
2. Voice control is particularly appealing when the human's hands or eyes are otherwise occupied.
3. The ubiquitous telephone can be an effective remote terminal for two-way voice communication with technological devices that can also speak, listen, and understand.

* M. Majewski, W. Kacalak, Technical University of Koszalin, Department of Mechanical Engineering, Raclawicka 15–17, Koszalin, Poland