EMBEDDED VOICE PROCESSOR FOR EMERGENCY CONTROL

Olesea Borozan

Technical University of Moldova, Chişinău, Republic of Moldova

olesea.borozan@ia.utm.md

New trends in development of the strategy Industry 4.0 are based on the nucleus of the cyber-physical system, this implying the integrated intelligent and communication systems aimed to increase the efficiency, performance and productivity [1]. The concept of Industry 4.0 foresees complex automation, with minimum engagement of human personnel, who can interfere only in case of emergencies (urgent situations, accidents or breakdowns). The majority of such emergencies may be detected through sounds, noises or voice expressions uttered by human beings. It is obvious that the process shall be either stopped, or switched to the maximum safety mode, in such situations.

It is suggested to use a specialized processor with cognitive features that will interfere in the technological process in emergencies and will either stop it, or will switch it to the maximum safety mode. The model of such a processor is defined by the following expression:

$$PV[T] = \{In[T], Kem[T], Kev[T], Out[T]\}$$

where $PV[T]$ is the configuration of the processor at a point of time T, $In[T]$ is the processor entry (sound, noise or voice signal), $Out[T]$ is the processor exit (signal of action), $Kem[T]$ is the knowledge model for deciding on taking actions (signal generation $Out[T]$), $Kev[T]$ is the knowledge model for knowledge evolution $Kem[T]$.

The evolution of knowledge models is based on the following expression:

$$PV[T+1] = \left\{ \begin{array}{c} Kem[T] \xrightarrow{Kev[T],Out[T]} Kem[T+1], \\ Kev[T] \xrightarrow{Kem[T],In[T]} Kev[T+1] \end{array} \right\}$$

where $PV[T+1]$ is the new state of knowledge model $Kem[T+1]$ and $Kev[T+1]$ obtained as a result of use of knowledge models $Kev[T]$, $Kem[T]$, of entry data $In[T]$ and of exit data $Out[T]$.

References:

1. V. Kumar, et al. *Ontologies for Industry 4.0. The Knowledge Engineering Review* Vol. 34, el17, 1-14, 2019. DOI: 10.1017/S0269888919000109.