

## APPLICATION OF A NEURAL NETWORKS TO THE SLIDING OBSERVER OF THE MOBILE WHEELED-ROBOT VELOCITY

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*In the following research the analysis of the estimation of escape velocities of the mobile 2-wheeled robot is based on a measurement of angles of wheels' rotation. For the estimation of escape velocities of the wheels and the frame, the slide observer was introduced. The observer was equipped with a recurrent neural net, which exemplify a new depiction of the solution to the problem of estimating a state of mobile wheeled-robots. In the solution proposed, weights of the nets are estimated on-line, without an initial preparation. The accurate knowledge about non-linear character of an object or linear character of the system is not required due to unknown parameters. Theoretic deliberations, presented in the following research, were exemplified by simulate tests made in Matlab.*

Key words: wheeled mobile robots, neural networks, sliding observer

### 1. Introduction

Angles of wheels' self-rotation and angles of steered wheels turn in mobile wheeled-robots can be measured with relative precision. However, measurement of the escape velocities is usually influenced by measurement static, which leads to lower precision of keep up steering of the systems. In order to decrease the measurement interference, process of measured signal filtration is used, as a typical solution. This process usually causes phase displacement a change of the measured signal amplitude, which lowers precision of steering robots' motions in consequence. The following research suggests the slide observer, in which recurrent neural net is introduced, as an alternative solution to the problem of estimating escape velocities of a mobile 2-wheeled robot. The fusion of the mobile wheeled-robot state observer is a complex problem for these objects are not linear, nonholonomic but multi-dimensional systems. Problems of estimation of non-linear systems were analysed in the researches [6, 7, 9, 12]. Possibilities of wide application of neural nets, result from their characteristics and features, make them particularly interesting to be used for identifying and control non-linear systems [5, 8, 10, 11]. Attempts to use neural nets in adaptive state-observers are also included in [6, 12]. In the following research, to solve the problem of estimation of the angular velocities of the mobile 2-wheeled robot, the adaptation observer equipped with the recurrent neural net was used, which exemplify a new depiction of the solution to the problem of estimating a state of mobile wheeled-robots. The results obtained after introduced observer simulation follows that inaccuracy in estimation of mobile 2-wheeled-robot state is little and estimated weights of the neural net are limited. This

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