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NEURAL NETWORK WITH VARIABLE TYPE CONNECTION WEIGHTS FOR AUTONOMOUS OBSTACLE AVOIDANCE ON A PROTOTYPE OF SIX-WHEEL TYPE INTELLIGENT WHEELCHAIR

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Abstract. *In this paper, an assist method for human's operation of electric-powered wheelchairs is studied. The purpose of this research is to make powered wheelchair intelligent and to realize a mobility aid for people, who find it difficult or impossible to drive a conventional wheelchair. On a prototype of our group, a neural network produces an obstacle avoidance function. In this research, by the approach that connection weights of the neural network change according to the condition of obstacles in the vicinity of the wheelchair and the running state of the wheelchair, we improve the obstacle avoidance function. First, neural networks evolve by using digital computer simulator. Secondly, experiments, using a prototype with six wheels implemented neural networks whose connection weights are determined by numerical studies, demonstrate that the neural network with variable connection weights exhibits the excellent level of ability of obstacle avoidance.*

Keywords: Neural network, Intelligent wheelchair, Obstacle avoidance, Variable connection weight, Operation assist

1. **Introduction.** The number of elderly people and disabled gradually increases, hence, people needing a wheelchair of various kinds increase in Japan. While there exist various wheelchairs, electric powered wheelchairs are one of the important vehicles for disabled and elderly people. However, the operation of the wheelchair has some difficulties in configurations such as obstacle avoidance and operation in narrow corridors. Therefore, a certain degree of ability to operate is needed as well as a certain degree of judgment ability. There have been various researches on intelligent wheelchairs and operation support systems [1-6]. Autonomous or semi-autonomous intelligent wheelchairs have been developed [7-10] and various human interface have been proposed [11-15]. As a recent