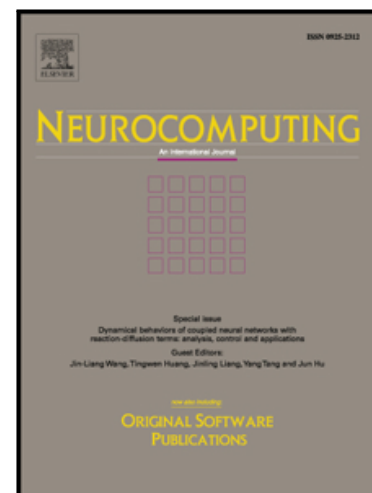


## Accepted Manuscript

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PII: S0925-2312(18)30921-4  
DOI: <https://doi.org/10.1016/j.neucom.2018.08.006>  
Reference: NEUCOM 19835



To appear in: *Neurocomputing*

Received date: 19 May 2018  
Revised date: 4 August 2018  
Accepted date: 5 August 2018

Please cite this article as: Weiyang Lin, Xinyang Ren, Jianjun Hu, Yuzhe He, Zhan Li, Mingsi Tong, Fast, Robust and Accurate Posture Detection Algorithm Based on Kalman filter and SSD for AGV, *Neurocomputing* (2018), doi: <https://doi.org/10.1016/j.neucom.2018.08.006>

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# Fast, Robust and Accurate Posture Detection Algorithm Based on Kalman filter and SSD for AGV

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## Abstract

The autonomous navigation technology of mobile robot based on visual sensor has been widely studied by researchers in recent years. Visual sensors, such as Charge-coupled Device (CCD), usually bring severe noise and unpredictable disturbances (including light differences, scene changes, etc.), thus it is necessary to find an adapted detection method to accommodate to the complex missions. Traditional detection model obtains feature characterization manually, which is laborious, time-consuming, mostly depending on researchers experience, and greatly increases the complexity of the recognition procedures. In this paper, we propose a target location strategy Kalman based SSD (K-SSD) utilizing convolution neural network (CNN) to improve the location accuracy and the speed of mobile robot during the automatic navigation. First, one frame of the entire scene is captured by a camera to construct an environment model. Then, a Single Shot MultiBox Detector (SSD) model is trained offline using original images as model input, which can output classes corresponding with their own positions. Finally, we use the Kalman Filter to filter the Gaussian noise to improve the accuracy of location. In the experiments, we use the HUSKY UGV platform to verify the proposed strategy. The results indicate that this algorithm is capable of realizing the fast, robust and accurate posture detection for Gaussian noise and abnormal noise.

**Keywords:** Deep learning, Kalman Filter, Autonomous navigation, CNN

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## 1. Introduction

Autonomous navigation using visual sensor has been drawing a great deal of attention these years, including academic researches and industrial applications. Reference [1] proposed a navigation method based on Kalman Filter and magnetic nail localization in Automatic Guided Vehicle (AGV). Kanezaki[2] solved the mobile robot navigation problem

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