**Development of a data fusion model for detection of electronic components and generating of a life-cycle inventory PCB model**

BY

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# Introduction

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## Object recognition from 2D Images

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## Recycling potential of electronic waste

Asd

# Recognition of electronic components

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## Data fusion model

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## Image preprocessing

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### Image rotation correction

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### Scaling determination based on scaling symbol

Wa

To bypass the restricton of invariant features for object recognition, thescaling of the prnted circuit board images were determined using a scaling symbol is shown in.



Figure : Scale symbol

asd

## Electronic component detection

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### Electronic component detection based on color based background detection

Sdf

### Electronic component detection based on 3D range image

Sd

### Electronic component detection based on normalized correlation

Sasd

## Feature extraction algorithms for electronic components

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### Fourier analyses for feature extraction

Asd

### Histogram based feature extraction

Sad

### Segment based feature extraction

Asd

### PCA based feature extraction in Laplacian of Gaussian filtered gray scaled image

Asfd

## Feature selection and feature fusion techniques for classification

Asd

# Classification

Asdf

## Random forest classifier

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## Support vector machine classifier

Asdf

# Decision fusion for component recognition

Asf

# Optical character recognition of electronic component marking

Dsf

## Introduction

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## Character segmentation

Dsf

## Optical character recognition with Tesseract and Cognex Vision Pro software

Asdf

## Electronic part label verification based on Octopart database

Dsf

# Experimental results

Asfd

## Dataset creation

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### Image acquisition

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## Classification results

Ef

## Optical character recognition results

Asd

# Life-cycle inventory analyses of printed circuit boards

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## Introduction

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## Printed circuit board region classification based on electronic part recognition results

Sad

## GaBi-Software and LCI data availability of electronic components

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## ILCD format for LCA-data exchange

# Conclusion and prospects

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