**TU-Berlin**

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

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# Introduction

## Object recognition from 2D Images

## Recycling potential of electronic waste

# Recognition of electronic components

## Data fusion model

## Image preprocessing

### Image rotation correction

### Scaling determination based on scaling symbol

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 Illustration.

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Illustration 1: Scaling symbol

The scaling symbol recognition process is shown in Figure

## Electronic component detection

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

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

### Electronic component detection based on normalized correlation

## Feature extraction algorithms for electronic components

### Fourier analyses for feature extraction

### Histogram based feature extraction

### Segment based feature extraction

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

## Feature selection and feature fusion techniques for classification

# Classification

## Random forest classifier

## Support vector machine classifier

# Decision fusion for component recognition

# Optical character recognition of electronic component marking

## Introduction

## Character segmentation

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

## Electronic part label verification based on Octopart database

# Experimental results

## Dataset creation

### Image acquisition

## Classification results

## Optical character recognition results

# Life-cycle inventory analyses of printed circuit boards

## Introduction

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

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

## ILCD format for LCA-data exchange

# Conclusion and prospects