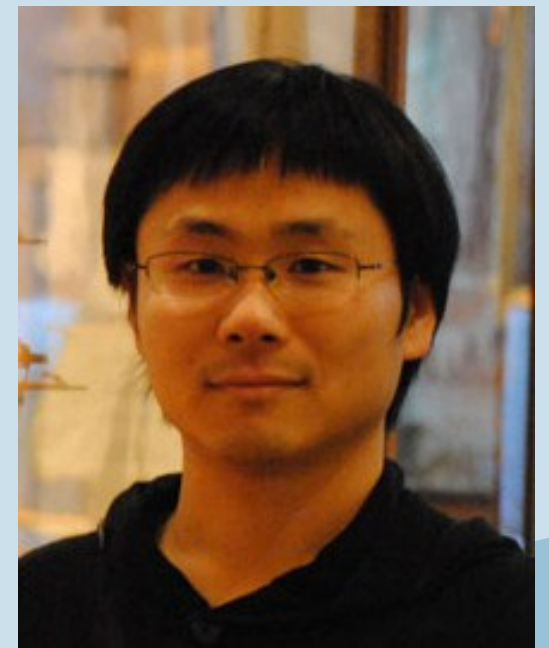


Quan Yu, PhD candidate

Quan Yu is currently working as a PhD candidate at Department of Production and Quality Engineering, NTNU. He is focusing on automated vision inspection systems for manufacturing quality control, integrating computational intelligence. Academic interests include Mechanical Design, Structure Light System, Image Analysis, Template Matching, Pattern Recognition, Applied Computational Intelligence and Data Mining.

Quan Yu holds a Master of Engineering from the School of Mechanical Engineering of Tianjin University from 2009.



Intelligent Quality Inspection based on Structure Light System combining Computational Intelligence

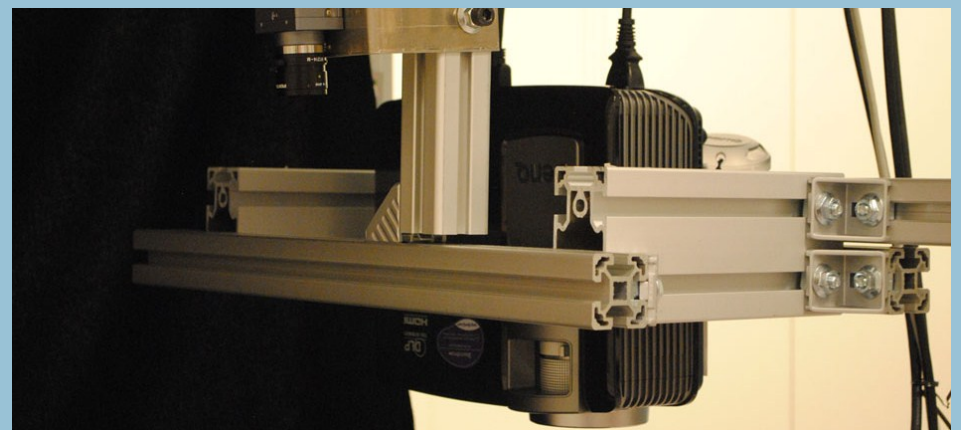
Product quality inspections are important to protect a company's brand and reputation by minimizing defective merchandise. Automated, smart quality inspection is developed to meet the need for accurate, fast and objective quality inspection. Automated Vision Inspection (AVI) is the automation of quality control of manufactured products, normally achieved using a camera system with a computer. In quality inspection, the AVI system is not only required to recognize the objects, but also to qualify them.

Structure Light System (SLS) is a typical 3D vision technique. SLS manages to acquire point clouds by projecting specific pattern onto the measured object and capturing the images. The point cloud of an object surface can be built up with the image analysis. Computational intelligence and data mining techniques are expected to build up the connection between the point cloud and the quality. During this process, Swarm Intelligence (Ant Colony Optimization, Partical Swarm Optimization and Bee Colony Optimization), Artificial Neural Network (ANN), Fuzzy Logic Systems (FLS), Genetic Algorithms (GAs) or Decision Tree could be possible solutions or combined to accomplish the inspection more effeciently.

The research consists of structure light system configuration, template matching, point cloud registration, feature definition and extraction, classification and intelligent quality inspection system. Computational intelligence is studied especially and applied to enhance the performance and improve the efficiency of the inspection. The object of the research is to find a new way for industry quality inspection with better robustness and applicability, especially for the specialized parts with complex geometrical features.

Facts

- Start
2009
- Supervisor
Kesheng Wang
- Co-supervisor
Lars Tore Gellein
- Thesis title
Automated Inspection in Manufacturing combining machine learning and machine vision techniques



Objectives for planned work

- 1) Acquiring point clouds of the inspected objects using Structure Light System
- 2) Extracting pre-defined features relevant to quality from the point clouds
- 3) Using computational intelligence and data mining techniques to construct an automated quality inspection system

