

# Shanhu Yang

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## RESEARCH INTERESTS

PHM of Engineered Systems, Signal Processing, Embedded Systems, CAD, Machine Vision

## EDUCATION

**University of Cincinnati**, Cincinnati, OH, USA Sep, 2010-present

- Ph.D. in Mechanical Engineering.

**Shanghai Jiao Tong University**, Shanghai, China Sep, 2007-Mar, 2010

- Master of Science in Mechatronics;
- SJTU 2009 College Scholarship.

**Shanghai Jiao Tong University**, Shanghai, China Sep, 2003-Jun, 2007

- Bachelor of Science in Mechanical Design and Manufacturing;
- Highest Honor in Military Training (2003); 3<sup>rd</sup> prize in College Basketball Championship (2004).

## RESEARCH EXPERIENCES

**A Remote Monitoring System for Tower Cranes** (China “863” Program\*) Dec, 2007-Aug, 2008

- Works:
- 1) Instituted a new industrial standard in crane safety monitoring using TEDS (transducer electronic data sheet); Established protocols of data collection (from sensors and CAN bus);
  - 2) Proposed data compression algorithm using prediction coding, diminishing data amount by 30.07%;
  - 3) Designed the database structure for malfunction prognosis of cranes using Fault Tree Analysis; designed WEB service for clients (GIS, ASP.net, AJAX, XML);
  - 4) Developed a data-driven virtual system imitating tower crane’s motion in real time, including 3D modeling (CATIA, UG) and formulating transformation matrixes in DirectX.

- Results:
- 1) Executed on-site debugging and installation on over 7 tower cranes; co-worked with corporations to solve problems during field application afterward;
  - 2) Mastered DSP programming using BIOS, computer aided design and database management; Knew well about industrial field bus applications.

**A Remote Video Surveillance System for Tower Cranes** (China “863” Program) Nov, 2008-Jun, 2009

- Works:
- 1) Designed a novel algorithm combing pattern recognition and PPHT to detect hook’s position;
  - 2) Programmed for the surveillance system (C/C++), including the algorithm, image acquisition from I2C bus, compression to JPEG format and transmission through GPRS network;
  - 3) Customized and configured the embedded Linux system based on ARM; designed peripheral circuits using Protel.

- Results:
- 1) Implemented the video system in two construction sites, increased construction efficiency by 5%;
  - 2) Mastered the basic methods of image process and feature recognition in machine vision using OpenCV and Matlab.

## INTERNSHIP EXPERIENCE

**Shanghai Turbine Company, Ltd.**, Shanghai, China Jun, 2006-Jul, 2006

- Co-worked with technicians with the issue “sort moving blades by weight” to minimize blade-disk’s eccentric mass; successfully presented the approach using an optimized exhaustive method.

## PAPERS

- Shanhu Yang, Yanming Li and Chengliang Liu, “A Video Surveillance System for Tower Cranes Using Automatic Tracking of Hook Movements,” Computer Engineering. (submitted)
- Yanming Li, Chengliang Liu, and Shanhu Yang, “Data-driven Remote Virtual Monitoring System for Tower Crane,” Automation of Construction. (submitted)

## PATENT

- “A Real-time Monitoring System for Tower Cranes based on Modularization and Fieldbus,” SIPO’s Publication No: CN101362575.

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\* also known as the National High-tech Research and Development Program in China