Curriculum Vitae of
Junjun Pan

National Centre for Computer Animation
Media School, Bournemouth University
http://nccastaff.bournemouth.ac.uk/pjunjun
Email: pjunjun@bournemouth.ac.uk
Poole, BH12 5BB
(+44) 01202 961878 (office)
(+44) 07858485247 (home)

Current Position

Research Fellow (Aug, 2010 - Present), National Centre for Computer Animation, Media School, Bournemouth University

Current Project in Research

VR-based simulation system in laparoscopic rectum surgery. (This project is cooperated with Bournemouth & Poole Hospital)

Education

PhD Computer Science   Sep 2006 – Apr 2010

• National Centre for Computer Animation, Media School, Bournemouth University, UK
• "Sketch-based Skeleton-driven 2D Animation and Motion Capture" (PhD thesis)

MSc Computer Science   Sep 2003 – May 2006

• School of Computer Science, Northwestern Polytechnical University, China
• "3D Craniofacial Measurement and Visualization in Orthodontics" (MSc thesis)

BSc Computer Science   Sep 1999 – Jul 2003

• School of Computer Science, Northwestern Polytechnical University, China
• "3D Reconstruction of Coronary Artery from DSA by Binocular Stereo" (BSc thesis)

Research Interests

• Sketch-based modeling and animation
• Computer assisted cartoon animation

- Mesh skeletonization and geometric modeling
- Medical visualization and virtual reality based surgery simulation
- Haptic rendering and application
- Computer vision
- Image analysis and processing

Selected Publications

Journals:

- Pan, J., Chang, J., Yang, X., Qureshi, T., Howell, R., Hickish, T., and Zhang, J. A Medical VR Simulator in Laparoscopic Rectum Surgery. *CyberTherapy & Rehabilitation.* 4: 19-20, 2011.
- Pan, J., Chang, J., Yang, X., Qureshi, T., Howell, R., Hickish, T., and Zhang, J. Graphic and haptic simulation system for virtual laparoscopic rectum surgery. *International Journal of Medical Robotics and Computer Assisted Surgery*, 7: 304-317, Jun. 2011.
- Pan, J., Zhang, J., Sketch-based skeleton-driven 2D animation and motion capture. *Transactions on Edutainment (VI)*, Springer, 164-181, 2011.
- Chang, J., Yang, X., Pan, J., Li, W., and Zhang, J. J., 2010. A fast hybrid computation model for rectum deformation. *The Visual Computer* 27: 97- 107, Nov. 2010.
- Pan, J., Yang, X., Xie, X., Willis, P., and Zhang, J. Automatic rigging for animation characters with 3D silhouette. *Computer Animation and Virtual Worlds*, 20(2-3): 121-131, Jun. 2009.
- Pan, J., Zhang, Y., Zhao, R., and Cui, C. A Fast Reconstruction Algorithm of Coronary Artery Based on Geometry Feature. *Computer Applications and Software* (Chinese). 23(4): 54-63, Apr. 2006.
- Pan, J., Zhang, Y., Luo, G., and Zhang, J. Intelligent Detection System of Sleep Apnea Syndrome Based on BP-Network. *Computer Applications and Software* (Chinese). 23(3): 26-35, Mar. 2006.
- Pan, J., Zhang, Y., Zhou, H., Hou, Y., Long, L., and Yao, L. A Points Matching Algorithm Based on Position Similarity. *Transaction of Image Processing and Graphics* (Chinese). 10(1): 81-87, Jan. 2005.

International Conferences:

- Chang, J., Yang, X.S., Pan, J.J., Li, W. Zhang, J. J., 2010. Beads-on-String Model for Virtual Rectum Surgery Simulation. In: 3D Anatomic Human Summer School 2010, 23-24 May 2010, Chania, Crete, Greece.
- Wang, M., Chang, J., Pan, J. and Zhang, J. J., 2010. Image-based bas-relief generation with gradient operation. *In: The Eleventh IASTED International Conference on Computer Graphics and Imaging, 17-19 February 2010, Innsbruck, Austria*.
- Pan, J., Zhang, Y., Zhou, H., and Feng, D. 3D Visualization System of the Cranium Based on X-ray Images. In *9th International Conference on*

Information Visualization (IV2005), London. pp. 71-76, 2005.
- Pan, J., Zhang, Y., Zhou, H., Hou, Y., Long, L., and Yao, L. The Research of the Match of Corresponding Points in Multi-view and the Realization by Evolutionary Programming. In *7th International Conference on Signal Processing (ICSP04)*. pp. 2202-2205, 2004.

Book Chapters:
- Pan, J., Zhang, J., Zhang, Y., and Zhou, H. X-ray-Based Craniofacial Visualization and Surgery Simulation. In book: *Recent Advances in the 3D Physiological Human* (Chapter 13). Eds.: Magnenat-Thalmann, N., Zhang, J., Feng, D. Springer-Verlag, New York. ISBN: 1848825641, August 2009, pp.208-224.
- Chang, J., Pan, J. and Zhang, J. J., 2010. Modelling Rod-like Flexible Biological Tissues for Medical Training. *In: Modelling the physiological human : second 3D physiological human workshop, 3DPH 2009, Zermatt, Switzerland, November 29 - December 2, 2010, proceedings.* Berlin: Springer.

Paper submitted:
- Pan, J., Vascular Imaging Based on Hall Effect. *IEEE Transaction on Medical Imaging,* Dec, 2011.

Grants and Awards

- Overseas Research Students Bursary in Bournemouth University (three years), 2006.
- Distinguished BSc in Shaan xi Province (top 1%), 2003.
- China "IBM" Scholarship (80 students in China), 2002.
- "Computer World" Scholarship (100 students in China annually), 2002.

Computer Skills

- Proficiency in C/C++ and OpenGL. 10 years programming experience in computer graphics and image processing.
- Proficiency in Haptic Device (Phantom) development. 2 years programming experience in related projects.
- Familiar with Visual Basic, Qt, Matlab and Maya.
- Familiar with media production through Apple Shake and Adobe Premiere Pro.
- Experience with Python, C#, ITK, VTK and 3-d Max.

Research Experience

Feb, 2010 – Present, Research Fellow, NCCA, Media School, Bournemouth University

- VR-based simulation system in laparoscopic rectum surgery. (This project is cooperated with Bournemouth & Poole Hospital. Three papers have been published in the journals: *Int J Med Robotics Comput Assist Surg*, *The Visual Computer* and *CyberTherapy & Rehabilitation*)

Sep, 2006 – Apr, 2010, PhD candidate, NCCA, Media School, Bournemouth University

- Sketch-based cartoon and 2D motion capture. (PhD thesis, a related paper is published in the journal: *Transactions on Edutainment*)
- Fast Character Modeling with Sketch-Based PDE Surfaces. (Working with two research fellows in NCCA)
- Automatic rigging and skinning for character animation. (The related paper had been published in the journal: CAVW)

Jan, 2005 – Feb, 2006, Head of 3D Group, Northwestern Polytechnical University

Number of group members: 15.
Designing and developing a traffic monitoring system by video network, I was in charge of the reconstruction of 3D scene by multi-cameras and traffic animation.

Oct, 2003 – Jan, 2006, Head of Research Group, Northwestern Polytechnical University and Stomatology Hospital in Xi an Jiaotong University

Number of group members: 10.
Designing and developing a 3D visualization system in craniofacial surgery, which aims to the application in diagnosing, planning, surgery simulation and used as an evaluation tool for orthodontics. This system is based on the X-rays and 3-D laser scanner. We cooperated with the Stomatology Hospital of Xi an Jiaotong University to implement it as a clinical product.

Oct, 2002 – Feb, 2004, Research member, Northwestern Polytechnical University and Medical School in Xi an Jiaotong University

Number of group members: 5.
Developed 3D visualization system for cardiovascular surgery. It can reconstruct the coronary artery in DSA through the correlated vision. This system can also be used a medical training tool and assist in diagnosing of coronary heart disease.

Feb, 2003–Summer 2003, Research member, Union Medical College Hospital, Tongji Medical College of Huazhong University of Science & Technology

Developed the detecting system of Sleep Apnea Syndrome based on Artificial Neural Network. It can diagnose whether the patient have the Sleep Apnea Syndrome and classify the disease by BP-Network. This system played an important role in the period of SARS prevalence. I joined this project in my part time and was in charge of the ANN design and

development.

Teaching Experience and Training

Sep, 2011- June, 2012,   Bournemouth University

  • Postgraduate Certificate Education Practice (Teaching Training)

Sep, 2004- Dec, 2004,   School of Computer Science, Northwestern Polytechnical University

  • Lecturing *C programming* for undergraduates.
  • Supervised *Computer Organization and System Architecture (Level H)*

Significant Projects Introduction

VR-based simulation system in laparoscopic rectum surgery   8/2010-present

Compared with traditional open surgery, minimally invasive surgery (MIS) is less in surgical trauma, less post-operative pain and a shorter convalescence for patients. In the last ten years, in particular, laparoscopic colorectal surgery has witnessed a shift from open surgery to the laparoscopic approach. This project is developing a virtual simulation system for the rectum cancer surgery. It can be used to train the laparoscopic surgeons. The hardware of system is composed of a computer, a display screen and two haptic devices (Phantom Omni). The haptic device provides 6-DOF navigating parameters (pitch, yaw, insertion) and force feedback when there is a collision detected. Run-time operations include soft tissue deformation, collision detection, cutting, rendering and the communication with the haptic devices. Some novel techniques are applied in this system. The technical detail can be found in my published paper. Throughout the whole system development process, three consultant surgeons from the Bournemouth and Poole Hospitals (NHS, UK) have been closely involved. They both advise our researchers about the medical content and help evaluate the results.

Sketch-based cartoon and 2D motion capture (PhD thesis)   03/2007-07/2009

In current 2D animation (cartoon) production, the generation of key-frames and in-between frames are the two most important and labour intensive steps. Although some commercially available software tools, e.g. Animo and Toon Boom, have been helpful in generating in-between frames, they often lack 'personality'. In practice, many in-betweens are still created manually. So far little exists in the market to help key-framers to produce their work more efficiently. Inspired by 3D animation techniques, we have developed a prototype system with a very simple user interface to improve the degree of automation for the production of 2D animation without sacrificing the quality. Our technique is characterized by two special features - sketch-based; and skeleton-driven. This has two parts: Part 1: cartoon sequence generation and Part 2: motion capture and reuse. We anticipate that this technique will be not only of interest to professional cartoon studios, but also to novice 2D artists for creating 2D moving graphics.

Fast character modeling with sketch-based PDE surfaces   12/2006-12/2007

Virtual characters are commonly used in computer games and computer animated films. Model building of virtual characters is usually a labor expensive task. How to simplify the modeling of a complex virtual character and create the model quickly is of practical significance. Current popular modeling systems are effective in creating various geometric models. However, they are not always best fitted with the practice exercised by artists. In this project, we presented a new modeling framework which divides the task into two subtasks: global modeling and local modeling. The global models are created from projected profiles by hand-drawn sketches. The local modeling uses generalized elliptic curve based surfaces and partial differential equation (PDE) surfaces to generate the detail of models. Working with two research fellows in NCCA, I was in charge of global modeling by sketch profiles in this project.

Automatic rigging and skinning for animated character   02/2008-09/2008
Animating an articulated 3D character requires the specification of its interior skeleton structure which defines how its motion deforms the skin surface. Currently this task is conducted by manual work, which normally needs special expertise for animators to finish a good result for character animation. We present an automatic rigging method making use of a new geometry entity called the 3D silhouette. By avoiding complicated computation such as voxelization and pruning, this approach is simple and efficient, much faster than existing methods. This is very useful for quick animation production, with applications including games design and prototype graphical systems. A related paper is published in journal: *Computer Animation and Virtual Worlds.*

3D visualization, measurement and simulation in craniofacial surgery   10/2003-01/2006
Supported by the Technology Innovation Fund in Shaan xi Province, this research project is cooperated with the Stomatology Hospital of Xi an Jiaotong University. 3D measurement and visualization of the cranium is an important research area in modern orthodontics and craniofacial plastic surgery. In this project, we coped with three tasks: 3-d reconstruction of the skull by X-rays, 3-d measurement of the face by 3-d laser scanner and craniofacial surgery simulation based on finite element. Using three X-ray pictures, we reconstruct the 3D skull by correlated vision, which is a low radiation, low cost alternative to CT-based system. We also designed a supervised learning method to estimate the soft tissue stiffness parameters in surgery simulation. In the end, we completed a software tool package and published related papers in journal and international conferences.

3D reconstruction of coronary artery from DSA by binocular stereo   11/2002-05/2003
This research project is cooperated with Medical School in Xi an Jiaotong University. It is developing 3D visualization system for cardiovascular surgery. It can reconstruct the coronary artery in DSA through the correlated vision. This system can also be used a medical training tool and assist in diagnosing of coronary heart disease. An algorithm based on geometry feature of coronary artery is presented according to the particularity of 3-d reconstruction of coronary artery in Angiograms.