



The **Centre for Applied Creative Technologies (CfACTs)** led by Prof Jian Chang Bournemouth University, is recruiting Post-Doctoral Researchers Fellows (1st cohort starting April 2021) to work on Creative Technology R&D with Industry Partners. Please see:

<https://cordis.europa.eu/project/id/900025>

CfACTs is founded on the expertise of **National Research Centre for Computer Animation (NRCCA), Bournemouth University** <https://www.bournemouth.ac.uk/research/centres-institutes/national-research-centre-computer-animation> . NRCCA academics will provide supervisory support to the CfACTs Fellows during a two year placement with Industry Partners. Selected expertise and recent publications of the NRCCA team are provided below:

Publications by Research Topic:

1. AI Assisted 3D Reconstruction and Character Modelling

Xiang, N., Wang, R., Jiang, T., Wang, L., Li, Y., Yang, X. and Zhang, J., 2020. Sketch-based modelling with a differentiable renderer. *Computer Animation and Virtual Worlds*, 31(4-5), p.e1939.

Xiaohui Tan, Zhengyuan Lv, Kang Wang and Xiaosong Yang. 2020, Dynamic human body size measurement based on feature points prediction and mapping, accepted by Springer Communications in Computer and Information Sciences.

Nie, Y., Han, X., Guo, S., Zheng, Y., Chang, J. and Zhang, J.J., Total3DUnderstanding: Joint Layout, Object Pose and Mesh Reconstruction for Indoor Scenes from a Single Image Supplementary Material.

Nie, Y., Guo, S., Chang, J., Han, X., Huang, J., Hu, S.M. and Zhang, J.J., 2020. Shallow2Deep: Indoor scene modeling by single image understanding. *Pattern Recognition*, 103, p.107271.

Nan Xiang, Li Wang, Tao Jiang, Yanran Li, Xiaosong Yang, and Jianjun Zhang. 2019. Single-image Mesh Reconstruction and Pose Estimation via Generative Normal Map. In Proceedings of the 32nd International Conference on Computer Animation and Social Agents (CASA '19). ACM, New York, NY, USA, 79-84. DOI: <https://doi.org/10.1145/3328756.3328766>

Nie, Y., Chang, J., Chaudhry, E., Guo, S., Smart, A. and Zhang, J.J., 2018. Semantic modeling of indoor scenes with support inference from a single photograph. *Computer Animation and Virtual Worlds*, 29(3-4), p.e1825.

Kazmi, I. K., You, L., Yang, X., Jin, X., & Zhang, J. J. (2015). Efficient sketch-based creation of detailed character models through data-driven mesh deformations. *Computer Animation and Virtual Worlds*, 26(3-4), 469-481. doi:10.1002/cav.1656

2. AI Assisted Human Motion Capture, Recognition, Prediction and Retrieval

- Li, Y., Qiu, L., Wang, L., Liu, F., Wang, Z., Lulian Poiana, S., Yang, X. and Zhang, J., 2020. Densely connected GCN model for motion prediction. *Computer Animation and Virtual Worlds*, 31(4-5), p.e1958.
- Zhangmeng Chen, Junjun Pan, Xiaosong Yang and Hong Qin. 2020, Hybrid Features for Skeleton based Action Recognition based on Network Fusion, *Computer Animation and Virtual World*, v31, 4-5, DOI: 10.1002/cav.1952
- Li, Y., Wang, Z., Yang, X., Wang, M., Poiana, S.I., Chaudhry, E. and Zhang, J., 2019. Efficient convolutional hierarchical autoencoder for human motion prediction. *Visual Computer*, 35 (6-8), 1143-1156.
- Hu, W., Wang, Z., Liu, S., Yang, X., Yu, G. and Zhang, J. , 2017, Motion Capture Data Completion via Truncated Nuclear Norm Regularization, in *IEEE Signal Processing Letters*, vol. PP, no. 99, pp. 1-1. doi: 10.1109/LSP.2017.2687044
- Wang, Z., Feng, Y., Qi, T., Yang, X. and Zhang, J.J., 2016. Adaptive multi-view feature selection for human motion retrieval. *Signal Processing*, 120, 691-701.
- Feng, Y., Ji, M., Xiao, J., Yang, X., Zhang, J., Zhuang, Y., Li, X. (2015). Mining Spatial-Temporal Patterns and Structural Sparsity for Human Motion Data Denoising, *Cybernetics*, *IEEE Transactions on*. DOI: 10.1109/TCYB.2014.2381659
- Xiao, J., Feng, Y., Ji, M., Yang, X., Zhang, J., Zhuang, Y., 2014, Sparse Motion Bases Selection for Human Motion Denoising, *Signal Processing*, accepted, DOI: 10.1016/j.sigpro.2014.08.017.
- Feng, Y., Xiao, J., Zhuang, Y., Yang, X., Zhang, J., Song, R.. 2014, Exploiting temporal stability and low-rank structure for motion capture data refinement. *Information Science*, 277: 777-793. DOI: 10.1016/j.ins.2014.03.013.
- Qi, T., Xiao, J., Zhuang, Y., Zhang, H., Yang, X., Zhang, J. and Feng, Y., 2014. Real-time motion data annotation via action string. *Computer Animation and Virtual Worlds*, 25(3-4), pp.291-300.
- Tang, Z., Xiao, J., Feng, Y., Yang, X. and Zhang, J., 2014. Human motion retrieval based on freehand sketch. *Computer Animation and Virtual Worlds*, 25(3-4), pp.271-279.
- Qi, T., Feng, Y., Xiao, J., Zhuang, Y., Yang, X. and Zhang, J., 2013. A semantic feature for human motion retrieval. *Computer animation and virtual worlds*, 24(3-4), pp.399-407.
- Liu, F.D., Southern R., Guo S.H., Yang X.S., Zhang, J.J., Motion Adaptation With Motor Invariant Theory, 2012, *IEEE Transactions on Systems, Man and Cybernetics: Part B. Cybernetics*, Volume: PP, Issue: 99, Page(s): 1-15, November 2012, doi:10.1109/TSMCB.2012.2224920,

3. AI Assisted Facial Expression Recognition, Detection and Synthesis

- Yang, H., Liu, L., Min, W., Yang, X., Xiong, X., 2020, Driver Yawning Detection Based on Subtle Facial Action Recognition, *IEEE Transactions on Multimedia*, accepted.
- Liu, S., Wang, Z., Yang, X., Zhang, J., 2017, Realtime Dynamic 3D Facial Reconstruction for Monocular Video In-The-Wild, *The IEEE International Conference on Computer Vision (ICCV)*, 2017, pp. 777-785
- Zhang, Y., Liu, S., Yang, X., Zhang, J. and Shi, D., 2017. Supervised coordinate descent method with a 3D bilinear model for face alignment and tracking. *Computer Animation and Virtual Worlds*, 28 (3-4).
- Liu S, Zhang Y, Yang X, Shi D, Zhang JJ. 2017, Robust facial landmark detection and tracking across poses and expressions for in-the-wild monocular video. *Computational Visual Media*, March 2017, Volume 3, Issue 1, pp 33–47, DOI: 10.1007/s41095-016-0068-y

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Liu, S., Yang, X., Wang, Z., Xiao, Z. and Zhang, J., 2016. Real-time facial expression transfer with single video camera. *Computer Animation and Virtual Worlds*, 27 (3-4), 301-310.

Yu, H.C., Zhang, J.J., Yang, X.S., 2011, Tensor-based feature representation with application to multimodal face recognition, *International Journal of Pattern Recognition and Artificial Intelligence (IJPRAI)*, Volume: 25, Issue: 8(2011) pp. 1197-1217

4. AI Assisted Graphical Content Generation, Analysis and Retrieval

Wang, M., Wang, L., Jiang, T., Xiang, N., Yang, X. and Zhang, J., 2020, Bas-relief Modelling from Enriched Detail and Geometry with Deep Normal Transfer, *Neurocomputing*, accepted.

Xia, Y., Wang, S., Li, Y., You, L., Yang, X. and Zhang, J.J., 2019, Fine-Grained Color Sketch-Based Image Retrieval, CGI2019, *Lecture Notes in Computer Science*, 11542 LNCS, 424-430

Jiang, T., Yang, X., Zhang, J., Tian, F., Liu, S., Xiang, N. and Qian, K., 2019. Huber- L1 -based non-isometric surface registration. *Visual Computer*, 35 (6-8), 935-948.

Li Wang, Nan Xiang, Xiaosong Yang, and Jianjun Zhang. 2018. Fast photographic style transfer based on convolutional neural networks. In *Proceedings of Computer Graphics International 2018 (CGI 2018)*. ACM, New York, NY, USA, 67-76. DOI: <https://doi.org/10.1145/3208159.3208165>

Wang, L., Wang, Z., Yang, X., Hu, S., Zhang, J., 2018, Photographic Style Transfer, *The Visual Computer*, <https://doi.org/10.1007/s00371-018-1609-4>

Yang, Y., Zhao, H., You, L., Tu, R., Wu, X. and Jin, X., 2017. Semantic portrait color transfer with internet images. *Multimedia Tools and Applications*, 76(1), pp.523-541.

5. Partial Differential Equation (PDE) Based Surface

You, L., Yang, X., Pan, J., Lee, T.Y., Bian, S., Qian, K., Habib, Z., Sargano, A.B., Kazmi, I. and Zhang, J.J., 2020. Fast character modeling with sketch-based PDE surfaces. *Multimedia Tools and Applications*, 79 (31-32), 23161-23187.

Maguire, G., Bian, S., Zheng, A., Gao, L., Kokke, W., Macey, J., You, L. and Zhang, J., 2019. Fully Automatic Facial Deformation Transfer. *Symmetry*, 12(1), p.27.

Chaudhry, E., Chang, J., Ugail, H., Malyshev, A., Carriazo, A., Iglesias, A., Habib, Z., Sargano, A.B., Haron, H., Noreika, A. and You, L., 2019, August. Modelling and Simulation of Lily flowers using PDE Surfaces. In *2019 13th International Conference on Software, Knowledge, Information Management and Applications (SKIMA)* (pp. 1-8). IEEE.

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Zhu, X., Song, L., You, L., Zhu, M., Wang, X. and Jin, X., 2017. Brush2Model: Convolution surface-based brushes for 3D modelling in head-mounted display-based virtual environments. *Computer Animation and Virtual Worlds*, 28(3-4), p.e1764.

6. Surgery Simulation - VR and AR

Aguilera-Canon M.C., Wainwright T., Yang X., Nait-Charif H. 2019, Mixed Reality-Based Simulator for Training on Imageless Navigation Skills in Total Hip Replacement Procedures. In: El Rhalibi A., Pan Z., Jin H., Ding D., Navarro-Newball A., Wang Y. (eds) E-Learning and Games. Edutainment 2018. Lecture Notes in Computer Science, vol 11462. Springer, Cham

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7. Novel HCI

Deng, S., Chang, J., Hu, S.M. and Zhang, J.J., 2017, June. Gaze modulated disambiguation technique for gesture control in 3d virtual objects selection. In *2017 3rd IEEE International Conference on Cybernetics (CYBCONF)* (pp. 1-8). IEEE.

Deng, S., Chang, J., Kirkby, J.A. and Zhang, J.J., 2016. Gaze–mouse coordinated movements and dependency with coordination demands in tracing. *Behaviour & Information Technology*, 35(8), pp.665-679.

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8. Physically Based Animation and Simulation: Complex fluid dynamics, deformable objects modelling

Bian, S., Deng, Z., Chaudhry, E., You, L., Yang, X., Guo, L., Ugail, H., Jin, X., Xiao, Z. and Zhang, J.J., 2019. Efficient and realistic character animation through analytical physics-based skin deformation. *Graphical Models*, 104.

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Yang, X.S., Chang, J., Southern, R., and Zhang, J. J., 2012, Automatic Cage Construction for Retargeted Muscle Fitting, *The Visual Computer*, DOI: 10.1007/s00371-012-0739-3

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