Manoj Ramanathan, Ph.D.

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Summary

- **8 years Research Experience in Computer Vision, Video Analytics (2D and 3D), Deep learning Algorithms.**
- **4 years Research Experience in Human Computer Interaction, Human Agent Interaction, Natural Language Processing (NLP).**
- **Quick learner and curious researcher in the field of AI, Computer vision, human computer interaction and NLP and teaching experience in Engineering Mathematics.**
- **Experience as Editorial assistant for The Visual Computer Journal.**
- **Reviewer in peer-reviewed journals and conferences.**

Employment History

June 2021 – Present

- **Research Fellow.** Rehabilitative Robotics Institute Singapore (RRIS), Nanyang Technological University, Singapore.
  - Developing of 3D camera or vision system for a exo-skeleton developed to enable stroke patients in their movement.
  - Experience in working with deep learning algorithms for 3D computer vision for depth perception, semantic segmentation.

November 2019 – June 2021

- **Research Scientist (AI).** Dex-Lab AI, Singapore.
  - Design and develop generic software architecture for a humanoid robot and Virtual assistant to control their behavior and show human-like capabilities.
  - Lead an interdisciplinary team to produce software modules for high level social humanoid robots and virtual humans.
  - Develop AI and deep learning algorithms for computer vision, NLP, IoT, human-computer interaction tasks in humanoid robots and virtual humans that can be integrated to the platform based on need and application.
  - Responsible for deploying and implementing the robot and virtual human in cloud.
  - Responsible for coordinating and help firmware team with development of robot's facial and body animation (FAP and BAP mapping)

Employment History (continued)

September 2016 – November 2019

Research Fellow. Institute for Media Innovation, Nanyang Technological University, Singapore.

- Handle and maintain the overall Nadine and Virtual human platform covering perception, processing and interaction layers that include vision, NLP, affective system, memory etc.
- RGB-D and skeleton based action recognition using deep learning in Nadine social robot. Develop a reaction model to allow Nadine react to the recognized actions.
- Developing and incorporating non-verbal behavior and communication into Nadine social robot.
- Develop speechless communication such as reading for Nadine social robot.
- Experience in working with deep learning algorithms for computer vision, NLP tasks etc.

December 2014 – March 2016

Teaching Assistant. School of Electrical and Electronics Engineering, Nanyang Technological University, Singapore.

- Teaching Engineering Mathematics for Undergraduate students.
- Handling E-Tutor website and invigilation of quizzes.

August 2009 – August 2012

Software Engineer. Toshiba Embedded Software Pvt. Ltd., Bangalore, India.

- Working for Product validation (PV) on SoCs of several teams including Digital TV, Mobile Multimedia, Compilers, Graphics, DSTablet teams for testing.
- Automation scripting for various development teams.
- Handling the PV Wikipedia Website

Skills

Languages — Strong reading, writing and speaking competencies for English, Tamil, Hindi. German (Basic).

Coding — C, C++, OpenCV, Python, Perl, tcl/tk, shell scripting, x86 assembly language, Verilog, HTML, LaTeX.

Deep learning framework — Tensorflow, MatConvNet, NVIDIA DIGITS, Google Cloud Platform, Microsoft Azure Services.

Deep learning architecture — CNN, RNN, GAN.

Software Tools — MATLAB, MS Visual Studio, Unity, Blender 2.69, makehuman, MSOffice, Irfanview, putty, QAC, Adobe PhotoShop, AutoCAD, National Instruments LabVIEW, PSpice.

Platform — Windows and linux.

Education

August 2012 – August 2016 **Ph.D., School of Electrical and Electronics Engineering, Nanyang Technological University, Singapore** in Computer Vision.
Thesis title: *Pose Invariant Action Recognition for Automated Behavioral Analysis.*

- Mutually reinforcing motion and pose component for pose-invariant action recognition framework
- Pose-invariant kinematic motion features that is partially view-invariant
- Canonical stick pose hypothesis scheme to identify the pose of the person in a frame
- A body part detector that can work in non-upright human postures and used in the pose component of the framework
- New action recognition dataset focusing on non-upright human postures

More details at `https://repository.ntu.edu.sg/handle/10356/70099`

2005 – 2009 **B.Tech. Instrumentation and Control Engineering, National Institute of Technology, Tiruchirapalli, India**
First Class With Distinction.

2004 – 2005 **All India Secondary School Certificate Examination, National Public School, Chennai, India.**
463/500. Overall School Topper and also topped English, Physics and Biology.

Research Publications

Journal Articles

1. **Ramanathan**, **M.**, Yau, W.-Y., Teoh, E. K., & Thalmann, N. M. (2019, March). Mutually Reinforcing Motion-Pose Framework for Pose-Invariant Action Recognition. *Intl. Journal of Biometrics*, *11*(2), 113–147.
2. **Ramanathan**, **M.**, Kochanowicz, J., & Thalmann, N. M. (2019, February). Combining Pose-Invariant Kinematic Features and Object Context Features for RGB-D Action Recognition. *Intl. Journal of Machine Learning and Computing*, *9*(1), 44–50.
3. **Ramanathan**, **M.**, Yau, W.-Y., & Teoh, E. K. (2014b, October). Human action recognition with video data: Research and evaluation challenges. *IEEE Trans. on Human Machine Systems*, *44*(5), 650–663.

Conference Proceedings

1. Mishra, N., **Ramanathan**, **M.**, Satapathy, R., Cambria, E., & Thalmann, N. M. (2019, October). Can a Humanoid Robot be part of the Organizational Work Force? A User Study leveraging on Sentiment Analysis. In *28th IEEE Intl. Conf. on Robot and Human Interactive Communication (RO-MAN)*. IEEE.
2. **Ramanathan**, **M.**, Mishra, N., & Thalmann, N. M. (2019, June). Nadine Humanoid Social Robotics Platform. In M. Gavrilova, J. Zhang, N. M. Thalmann, E. Hitzer, & H. Ishikawa (Eds.), *Computer Graphics International (CGI)* (Vol. 11542, pp. 490–496). Advances in Computer Graphics, Part of LNCS book series. Springer, Cham.
3. **Ramanathan**, **M.**, Yau, W.-Y., Teoh, E. K., & Thalmann, N. M. (2017, December). Pose-Invariant Kinematic Features for Action Recognition. In *AsiaPacific Signal and Information Processing Association Annual Summit and Conference* (pp. 292–299). IEEE.
4. Thalmann, D., Thalmann, N. M., & **Ramanathan**, **M.** (2017). Real Humans with Virtual Humans and Social Robots Interactions (HCI). In *SIGGRAPH Asia 2017 Courses* (15:1–15:221). SA '17. Bangkok, Thailand: ACM. doi:`10.1145/3134472.3134513`
5. **Ramanathan**, **M.**, Yau, W.-Y., & Teoh, E. K. (2016a, November). Improving Human Body Part Detection using Deep Learning and Motion Consistency. In *Intl. Conf. on Control, Automation, Robotics and Vision* (pp. 1–5). IEEE.
6. **Ramanathan**, **M.**, Yau, W.-Y., & Teoh, E. K. (2016b, October). Human Posture Detection using H-ELM Body Part and Whole Person Detectors for Human-Robot Interaction. In *Intl. Conf. on Human-Agent Interaction* (pp. 239–242). IEEE.

7 **Ramanathan**, **M.**, Yau, W.-Y., & Teoh, E. K. (2014a, December). Human Body Part Detection Using Likelihood Score Computations. In *IEEE Symp. on Computational Intelligence in Biometrics and Identity Management* (pp. 160–166). •.

Books and Chapters

1 **Ramanathan**, **M.**, Satapathy, R., & Thalmann, N. M. (2021). Survey of Speechless Interaction Techniques in Social Robotics. In N. M. Thalmann, J. J. Zhang, **M. Ramanathan**, & D. Thalmann (Eds.), *Intelligent Scene Modelling and Human-Computer Interaction, Human Computer Interaction Series* (pp. 241–257). Springer, Cham. doi:10.1007/978-3-030-71002-6_14

Miscellaneous Experience

Certification Courses

May 2020 - July 2020 — **Cloud Architecture with Google Cloud**. Coursera Certification Course by Google Cloud.

November 2018 — **"Building Interactive 3D Characters and Social VR"**. Coursera Certification Course.

October 2017 — **Image Classification with DIGITS, Scene Description Generation** by NVIDIA Deep Learning Institute (DLI).

Positions Held

Reviewer in peer-reviewed journals and conferences.

November 2016 - November 2019 — **Editorial Assistant in The Visual Computer Journal**.

October 2017 — **Session Chair of Technical session of ICARCV 2016, ICCCV 2018**.

October 2013 - February 2014 — **Treasurer of Social and Recreation Group, NTU Graduate Students Club (GSC)**

Organizing Committee member of GradFest 2014, NTU

2008 — **Event Manager of Fox Hunt in Pragyan '08, the annual technical festival of NIT Trichy**