

Chinpei Tang, Ph.D.

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Electro-Mechanical Engineer – Robotics, System Integration and Autonomous Systems

A skilled electro-mechanical engineer with a broad background in robotics, system integration and autonomous systems who thrives in challenging, multidimensional and team-oriented work environments. Strong knowledge in full electro-mechanical design lifecycle (design, implementation, integration & validation). Strong programming and real-time instrumentation. Excellent problem solver capable of implementing innovative engineering solutions. Effective communicator with outstanding written, oral and visual presentation skills.

TECHNICAL COMPETENCIES

- **Software & Programming:** MATLAB, Simulink, LabVIEW, C/C++
- **Real-Time Operating System (RTOS):** xPC Target, MathWorks Real-Time Workshop, QuaRC, OpenEmbedded, LabVIEW
- **Computer Aided Design:** Solid Works, Pro/ENGINEER, AutoCAD
- **Application Software:** MSC.Visual Nastran, MATLAB SimMechanics, Maple DynaFlexPro, Pro/MECHANICA
- **Control Hardware:** PC/104, gumstix Verdex, NI FieldPoint
- **Operating Systems:** Windows, Linux (Fedora, Ubuntu), Unix
- **Documentation:** Word, Excel, PowerPoint, LaTeX

EMPLOYMENT EXPERIENCE

Art and Technology Institute, Frisco TX

Robotics Instructor

Sep 2011 – present

Introducing fundamentals of robotic concepts through various small fun hands-on Lego Mindstorms and Lego WeDo projects to elementary, middle and high school students.

- Taught robotics workshops in SciTech at Frisco Discovery Center and Liberty Middle School, benefited over 300 students.
- Conducted Merit Badge Robotics Course for Boy Scout of America.

Laboratory for Autonomous Robotics and Systems (LARS), UT Dallas, Richardson TX

State-of-the-art university affiliated robotics lab directed by world renowned robotics professor Dean Mark W. Spong.

Post-Doctoral Research Associate

Dec 2008 – Aug 2011

Core system developer of programmable flexible wireless networked multi robot platform that can be tele-operated and precisely tracked using visual motion tracker (indoor GPS). Wrote interface software to streamline the operating process for accelerated control evaluation.

Tele-operation and Collision Avoidance Control of Multiple Ground Robots under Uncertainties

- Developed novel tele-operation and collision avoidance controllers accounting for realistic uncertainties in measurements and time delay.
- Interfaced sensing and actuating components on multiple ground robots to be collectively controlled over an ad-hoc wifi network.

Dynamic Sliding PID Control of Quadrotor helicopter in Quaternion

- Experimented sophisticated hovering and trajectory tracking control of a custom-built quadrotor helicopter.
- Applied Kalman filter to reduce the sensor noise of the positional and velocity signals from the on-board sensor and global vision tracker.

Air Force Research Laboratory, Air Vehicles Directorate, WPAFB OH

Grant selected for the competitive Air Force Research Laboratory Research Program to perform micro-aerial-vehicle research.

Summer Researcher

Jul 2010 – Sep 2010

Modeling Interactions between Flexible Flapping Wing Spars, Mechanisms, and Drive Motors

- Derived rigorous high fidelity dynamic models using advanced analytical dynamics for a flapping-wing driving mechanism subsystem under extremely high speed flapping motion.
- Accounted for challenging closed-loop constraints of the driving mechanism and structural flexibility of the attached carbon fiber.
- Performed MATLAB simulations of the developed model under various operating scenarios, i.e. different flapping speed.
- Worked closely with aerospace engineers and lab technician to critically evaluate the simulation results with the measurement from high speed camera and in-house developed encoder system.
- Predicted the position and velocity behavior with 6% error, a key feature for subsequent model-based feedback control design.

Automation, Robotics and Mechatronics (ARM) Lab, SUNY at Buffalo, Buffalo NY

Graduate Research Assistant

Jan 2002 – Nov 2008

Core contributor of mechanical design, modeling simulation, control software analysis and rigorous validation of novel system of cooperative object transport by multiple robotic wheeled mobile robots.

Cooperative Payload Transport by Mobile Robot Collectives

- Provided mechanical design analysis to show system level improvement in disturbance rejection and manipulation capability for cooperative mobile manipulators requiring challenging physical interactions.
- Developed novel nonlinear control laws to take into account realistic multi-wheels and closed-loop constraints for case study of two cooperative mobile manipulators in both simulation and experiments.

- Developed suitable invariant yet quantitative measures of formation quality and a systematic optimization-based selection of formation-layout to enhance overall payload transport energetic performance.
- Streamlined the process to accelerate the mechanical and control design lifecycle for the class of cooperative systems.

Novel Control and Mechatronics Implementation of Nonholonomic Mobile Manipulators

- Extended and derived novel dynamic redundancy resolution and differential flatness controller on nonholonomic mobile manipulators.
- Actively involved in developing a fully functional mobile manipulator prototype hardware integrating encoders, dc motors and industrial real-time embedded computer under xPC Target.
- Performed staged hardware-in-the-loop (HIL) simulation experimentation of the mobile manipulator electro-mechanical hardware.

SUNY at Buffalo, Mechanical & Aerospace Engineering, Buffalo NY

Part-Time Faculty

May 2006 – Jul 2006, Jan 2008 – May 2008

Taught 64 students senior/ graduate level "CAD Applications" course, 23 students in junior level "Product Design in a CAD Environment" course.

- Taught engineering design using Pro/ENGINEER with Pro/MECHANICA and AutoCAD, and FEM structural/failure analysis.
- Proactively established forum to promote instructor-student and student-student online interactions to reduce the teaching load yet encouraging students to learn from each other.
- Supervised 19 practical final projects requiring detailed mechanical engineering analysis.

Winfield Industries, Inc. (Now Fenner Precision), Buffalo NY

Quality Assurance Engineer (Intern)

Jan 2007 – Mar 2007

Sole developer of an automated LabVIEW/ FieldPoint temperature data collection system for testing of polyurethane/ silicone engineered components to support the quality assurance process.

- Independently overhauled software to upgrade a malfunction system to a fully functional system in < 2 months.

LEADERSHIP EXPERIENCE

Chinese Institute of Engineers, DFW Chapter, Richardson TX

Dallas-Fort-Worth Metroplex's most active Asian professional organization promoting science, engineering and technology.

VP of Youth Programs

Jan 2012 – present

Leading the organization of the already popular CIE Youth Programs for 2012. Proposed events included: Youth Engineering Fair in Arlington TX, MathComp/MathFun in Plano TX, and Young Achiever Award.

VP of Public Relations

Jan 2011 – Dec 2011

Led public relations operation of the organization to promote programs and sponsorship. Published > 30 Chinese and English new release articles submitted to local newspaper publishers and websites for pre-event announcement and post-event reporting. Benefited > 3000 professional and students.

Chair of 2011 CIE Youth Engineering Fair

Jun 4, 2011

Led a team of > 5 sub-committee leads, > 50 enthusiastic adult volunteers and organized the successful metroplex-wide CIE Youth Engineering Fair benefited > 100 students from Grade 1 to 12. Increased participation by > 50% from the previous year.

AWARDS, GRANT AND AFFILIATION

- Certificate of Graduation, DFW AACC Leadership Training, 2011
- Air Force Research Laboratory Research Program Grant, 2010
- ScienceDirect TOP25 Hottest Articles for journal paper "Formation Optimization for a Fleet of Wheeled Mobile Robots – A Geometric Approach", October – December 2008.
- Best Presenter Award and Student Travel Grant, ASME Dynamics System and Control Conference, Ann Arbor, MI, 2008
- NYS/GSEU Professional Development Award, 2003
- Member of IEEE, ASME, CIE/USA, Sigma Xi, Tau Beta Pi, Golden Key Honor Society

EDUCATIONAL PREPARATION

- **Ph.D.**, Mechanical Engineering, *SUNY at Buffalo* *Feb 2009*
Dissertation: Design and Control Framework for Cooperative Mobile Robot Collectives
- **Advanced Graduate Certification**, Computational Science, *SUNY at Buffalo* *Jun 2006*
- **M.S.**, Mechanical Engineering, *SUNY at Buffalo*, *Jun 2004*
Thesis: Manipulability-Based Analysis of Payload Transport by Robot Collectives
- **B.S.**, Mechanical Engineering (Mathematics Minor), *SUNY at Buffalo*, *Feb 2002*
Project: Design of a Storage Container Loading/Unloading Device for a Truck

MISCELLANEOUS

- Published 10 journal articles, 15 conference articles, and made 15 international conference presentations
- Permanent resident of USA
- Fluent in Chinese Mandarin, Cantonese, English and Malay