Jake Gardner

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CAREER OBJECTIVE

I am a self-driven, idea-thriving engineer/entrepreneur seeking a challenging and creative position in robotics/automation/mechatronics. A hybrid, hands-on role between controls, mechanical, and electrical design would be ideal. Aspects of fabrication, prototyping and R&D also strongly desired. Looking for a company that is interested in in advanced control systems design, and more importantly aligns with my design philosophy and is receptive to outside-the-box ideas; I enjoy team-leading and project management, customer interfacing and appreciate mentoring and being mentored; strong interest in bringing in new business and developing new products for a variety of markets, including advanced sport training equipment and interactive marketing/advertising. Interested in a progressive company culture; very open to travelling and international relocation.

EDUCATION

Master's: M.S.M.E. - Mechatronics, Universität Duisburg-Essen (UDE), Duisburg, Germany *GPA 3.80 (1.2 German Scale)* Aug 2010 - Oct 2012
Thesis work in Biomechanics/Robotics. Curriculum focus in Robotics, Control System Design, Multibody dynamics, Machine Vision, Simulation/ Modeling Mechanical Systems; Program taught in German language; DAAD scholarship recipient, DSH-2 Proficiency (German language examination for university entrance)

Bachelor's: B.S. Mechanical Engineering, The Ohio State University (OSU), Columbus, Ohio *GPA 3.73* Sep 2005 - Jun 2010
Graduated with Honors, Magna Cum Laude. Degree focus in Control Theory, Systems Dynamics and Product Design; Participant of Capstone Senior Design project, leadership experience as University Ambassador (tour guide), Summer Orientation Leader, Beat Michigan Week Event Planning Sub-Chair

QUALIFICATIONS AND SKILLS

- Mechatronic design including robust control systems, electrical, mechanical, HMI user interfaces, safety, prototyping, ideation
- PLC programming: Rockwell Automation/Allen-Bradley Studio5000/RSLogix500, AutomationDirect Platforms, CoDeSys
- UI and HMI development: FactoryTalk View ME/SE, AutomationDirect, C#/.NET, MATLAB
- Vision programming: Keyence CV/XG/IV, OpenCV/Python/Scikit-learn object tracking and OCR, Vicon IR Reflective Motion Capture
- Industrial Robotic programming: Fanuc including iRPickTool and ROBOGUIDE, Nachi and FD OnDesk simulation, some exposure to ABB
- Motion control experience with pneumatics, servos, steppers, hydraulics, robotics; attended Kollmorgen and Rockwell Automation servo motor tuning courses
- Sensor experience with induct/cap prox, ultrasonic, encoders, photoelectric, laser distance, GPS/IMU, Lidar
- Software Dev: C#/.NET, Python, Arduino/C++, MATLAB/Simulink, SQL, HTML5/CSS/JavaScript, git source control
- Mechanical design: SolidWorks, multibody dynamics, actuation selection and sizing (electromechanical, pneumatic, hydraulic), simulation/modeling/animation
- Electrical design: schematic development in AutoCAD Electrical, panel layout in SolidWorks, NEC code and NFPA 79, cable harness design and routing
- Safety system design: safety risk assessment and risk mitigation design utilizing industrial-rated safety components
- Customer Relations: technical support, fostering of customer relationships, on-site operator training, new business development/recruit prospective customers
- Project management: team leader, budget and time estimation, coordination of purchasing with lead times and deadlines, automated BOM and purchasing documentation management via Excel, consulting with colleagues whenever possible/sensical to achieve highest quality outcomes (achieving strong group consensus), strong documentation skills including time/budget management and user guide development, testing reports and design evolution tracking
- Project Documentation: functional design specifications, Factory/Site Acceptance Test plans, User Guides, interface design specifications, proposals
- Fabrication/Assembly: electrical panel wiring/building, mechanical assembly, milling and other basic fabrication skills
- Other: sketching, Microsoft Office, baking/grilling, event planning

EMPLOYMENT EXPERIENCE

Independent Controls Engineer and Software Developer, Kurious Design, Denver, CO Dec 2019 - Present

- Controls programming project for new machine build for industrial automation; programmed and developed control system for CO2 laser cutting machine; integrated GuardLogix PLC, J1000 Laser, Scanlab powerSCAN II galvo scanhead, industrial PC w/ 3rd Party Software over TCP/IP, wrote Recipe List Updater App in C#/.NET and WinForms, developed HMI/UI using PowerPoint graphics embedded in FactoryTalk View Studio IDE (Jan 2021 - May 2021)
- Perform software development for Denver company which builds controls systems for CNC tube bending machines. Software dev is performed in C#/VB/.NET and uses WinForms (Jan 2021 - Present)
- Designed and developed MarinoArm target-throwing robotic arm, including mechanical, electrical and control system design and fabrication. Controls software uses WPF/C#/.NET as UI and process controller, while python scripts calculate command signals and c++/arduino carries out command signals and provides tracking signal of error back to C#. Mechanical design consists of Misumi parts and 3D printed parts, and utilizes low-friction pneumatic cylinders as the antagonistic muscle pairs for the 2-DOF robot arm. (Dec 2019 - Present)
- Development of project management software for BOM development using WPF/C#/.NET and SQL server. (Apr 2020 - Dec 2020)
- WebDev using HTML5, CSS and JavaScript for personal website. (Jul 2021 - Present)

Robotic Systems Engineer, Stratom Inc, Boulder, CO May 2020 - Sep 2020

- Design of robotic system architectures and integrating subsystems; Electrical system and mechanical design for robotics and autonomous vehicles
- Developing and implementing wiring schematics and cable layouts; Selection of implementation of control systems and autonomous sensing platforms
- Project experience with self-driving on-demand part delivery robot and cargo hauling vehicles entailing diesel-hydraulic propulsion and lidar-based feedback. Project execution time of less than 4 months, where autonomy stack and hardware being designed and developed simultaneously from scratch.

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- Writing requirements, developing test plans, and completing verification/validation procedures
- An understanding of MIL-SPEC including safety, electronic, power, mechanical, and environmental standards
- Exposure to ROS 2, Linux, A-Star global planner, MPC path tracking, Sensor fusion of GPS/IMU, odometry and Lidar

Automation Design Engineer, Concept Systems Inc, Albany, OR (Worked remotely from Denver, CO) Oct 2017 - Jan 2020

- System integration entailing programming of control systems integrating A-B PLCs, HMI, motor drives; Fanuc programming of three-robot cell
- Mechanical design of custom tooling in SolidWorks; electrical design and component selection, BOM management, safety analysis and design
- Project documentation: Function Design Specification, Interface Design Specification, Safety Risk Assessment, BOM, FAT/SAT, User's Guide, Support Log
- Project management including managing sub-contractors, customer interaction and negotiation, issuing change notices
- Project experience with saw mill, bridge cranes, multi-machine packaging line; Service/Field work, involving deep troubleshooting, thinking on your feet
- Proposal development work including conceptual design, customer/site visits, time/material estimation
- Attended Nachi Operator training course and performed simulation for reach study/cycle time estimation for two-robot workcell
- Sales Site Visit: investigating customer issue and proposing on-the-spot solutions that meet the customer's needs and budget
- Inherited control system design for saw mill and had to get acclimated with new hardware and processes (including RMC hydraulic controller) in order to rapidly develop code to provide fully functioning system in two weeks while on-site

Mechatronics Design Engineer, Adaptive Innovations Corp, Lakewood, Colorado Feb 2015 - Oct 2017

- Mechatronics role entailing mechanical, electrical and controls system design of industrial automation equipment, including multi-station assembly robotic cells, product life-cycle testing machines, machine-tending robots
- Develop control architecture for multi-station sequencers: manual/auto/diagnostic modes, collision avoidance, diagnostics and troubleshooting assistance, error management and E-Stop recovery; hierarchical, modular programming architecture; part/statistics tracking
- Knowledge of Ethernet/IP, RS-232 Serial communication protocols; PFD and control architecture development in Microsoft PowerPoint; cable management
- HMI development, intuitive, smart buttons, don't be afraid to touch any button, you will not hurt the machine, smart-phone inspired navigation
- Design machine performance test plans (experiment design) and analyze resulting data;; development of project specific feature testing, FAT/SAT demos
- Plan and perform on-site customer installation of machine and interactive operator training. Create user guides and other documentation.
- Interpret client requirements and develop design specs; Analyze project requirements and perform technical calculations supporting design including electrical requirements, robotic safety standards, and motor controls
- Oversee project workflow and support internal and external resources to ensure timely delivery of projects, expected quality, and allotted budget.
- Mechanical, electrical and software design of customized solutions including motor sizing, pneumatic/electro-pneumatic/and electrical routing.
- Support manufacture, build and validation of systems which include pneumatics, servos, VFDs, relays, communication networks, touchscreens, pushbuttons and robotic integration. Create customer documentation such as user manuals, programming diagrams, network diagrams, and electrical drawings.
- Ability to architect programs that are simple to test, well documented and versatile; Proficient in a multitude of PLCs and respective programming environments (A-B, others; Strong skills in AutoCAD electrical. Proficient with SolidWorks; Program smart BOMs in Excel with integration of ancillary purchasing documents

Application Engineer, Vicon Motion Systems, Centennial, Colorado Mar 2014 - Jul 2014

- Provided technical support to customer for 3D motion capturing systems used for life sciences, entertainment, and university research: researched, diagnosed, and troubleshot customer software and hardware issues via email, phone and on-site; Planned and performed on-site customer installation of hardware
- Developed and wrote MATLAB race car game for demo which integrated real-time Vicon software output of car positions from toy race track

Automation Development Engineer, Monsanto, Ankeny, Iowa Jan 2013 – Feb 2014

- Responsible for design, development, assembly, testing, debugging, implementation, support and enhancement of prototype machines for agricultural research
- Design parts and create technical drawings in SolidWorks; Perform design evaluations and redesign of prototype machines for mass production

Research in Science and Engineering Intern, German Academic Exchange Service (DAAD), UDE, Duisburg, Germany Jun 2008 - Sep 2008

- Participated in a summer internship abroad developing ground-force sensors for an autonomous, static-walking robot
- Modeled system behavior in MATLAB/ Simulink; Designed and built functioning prototype with signal amplification

Manufacturing and Development Engineer Intern, Club Car Inc., Augusta, GA Dec 2007 – Mar 2008

- Launch team member of new 4x4 utility vehicle; Prepared existing assembly line for integration of new vehicle by modifying previous manufacturing assembly sequence and designed and created technical drawings for new assembly fixtures for the assembly line using SolidWorks

Development Engineer Intern, Tyco Electronics, Winston-Salem, NC Jun 2007 – Sep 2007

- Developed automotive seat position sensor concepts in Pro-E; Performed product verification tests on prototype brake position sensors results analysis
- Designed and prepared technical drawings for sensor mounting brackets and its testing apparatus in Pro-E

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ACADEMIC EXPERIENCE

Master Thesis, UDE Department of Mechanics and Robotics, Duisburg, Germany Jan 2012 - Oct 2012

- *"Determination and Analysis of Kinematic Throwing Parameters for Varying Target Position for 2-DOF Overhead Throwing"*
- Independently conceived, designed, and managed project with minimal guidance from adviser; Acquired data using motion capturing system then converted and processed data in self-written MATLAB program which utilized pattern recognition techniques to detect phase transition times for each throw
- Built simulation models to resolve kinematics and dynamics of the throw using MATLAB/Simulink, verified accuracy using ADAMS and SolidWorks
- Investigated adaptive control to be used on a robot arm including iterative learning to facilitate an investigation of human motor control mechanisms

Miscellaneous Projects during Master's Program, UDE, Duisburg, Germany Aug 2010- May 2012

- Designed and simulated predictive controller for an automated meat smoker in MATLAB/Simulink and identified suitable heat source and sensors
- Designed controller for automatic cocktail machine in MATLAB/Simulink/Stateflow as well as an GUI for simulation of machine
- Worked on vehicle dynamics simulator project; adapted button-dependent output from steering wheel for controls to be used with xPC Target system

Capstone Design Project, OSU/Rockwell Automation (RA) Sep 2009 - Jun 2010

- Team designed and constructed Rube-Goldberg machine to demonstrate capabilities of automation components from Allen-Bradley/RA
- Served as team leader: managed progress between interdisciplinary team members, orchestrated completion of deadlines, and organized communication