

TECHNICAL RESUME

STEVE BEGEJ

5 Claret Ash
Littleton, CO 80127
Tel: 303 - 973 - 5042
stevebegej@yahoo.com
Updated: 20120508

Summary of Professional Experience:

Mr. Begej possesses a broad technical background involving materials science, mechanical engineering, electrical engineering, computer science, optics, and project management concerning R&D, system and component design, and manufacturing problems in automation technology, teleoperation, robotics, sensors and associated instrumentation.

Work Experience:

Current Work (2001 - Present):

Consultant pertaining to research, development and design of sensors, displays, and general instrumentation for robotic, medical, and industrial applications.

Mechanism Workshop (2001 - 2005):

Designed and fabricated mechanical models and cut-away mechanisms for educational purposes that included detailed instructions for disassembly and reassembly.

Mechanism Workshop (1998 - 2001):

From 1998 to 2001, Mr. Begej started a home-based school called Mechanism WorkShop (MWS) in which children with an unusually high interest in mechanisms, electronics, or programming could find an encouraging environment in which to foster and nurture those talents.

After a period of evolution, a class format emerged in which a student typically came for a 1.5hr laboratory session once or twice a week, during which time a project was worked on in a hands-on manner with assistance from the instructor, if needed. Projects included remote control cars and motorcycles, Armatron robot, LEGO Mindstorms, door locks, padlocks, coin sorters, clocks, large air-powered motor, Makita battery-powered drill, bike coaster brake mechanism, pulley experimentation board, pulley blocks, electric bike, pneumatic valves and cylinders, air-powered go-kart, and others.

The basic rubric was to present the student with a project that was fully functional (i.e., not broken), and assign them the task of complete disassembly, followed by complete reassembly and adjustment for proper operation. Students organizational skills were enhanced and developed by emphasizing orderly disassembly procedures and methods for

tracking the assembly sequence of complex two and three dimensional structures, e.g., air-powered go-cart, gear trains in robot arms, and clocks.

An important element in all projects was insuring that the student knew how to use the device and learned its behavior (e.g., electric drill, RC motorcycle, air motor), as such information was later used in reassembly adjustments and restoration of the project to its original functional state. Older, more experienced or more talented students could tackle projects of higher complexity over multiple sessions, e.g., RC car (2-4 sessions), Armatron robot (4-6), Kawasaki RC motorcycle (4), air-powered go-kart (4-8), and a custom-made single-cylinder air motor (4-7).

It was found that only one younger student (i.e., 5-7 years old) per session could be effectively taught in this format, but with ascending age more students could be accommodated - up to three in the highest age group (13-15 years old). Program subscription fluctuated seasonally, but eventually grew to approximately 20 students per week in the summer periods. Approximately 15% of the participants were female.

Mr. Begej had sole responsibility for all aspects of the program, including marketing, bookkeeping, student scheduling, teaching, and project creation and curriculum development. The latter activities turned out to be the most time-consuming aspect this endeavor, often entailing many hours of project modifications, development, and process documentation to enable unhindered study activity by the student.

The program was halted in the fall of 2001 due to insurance issues surrounding this home-based endeavor. A brochure from the program is available on request.

Begej Corporation (1986 - 1997):

From 1986 to 1997, Mr. Begej was the Director of R&D and President at Begej Corporation, Littleton, CO. His responsibilities included design and manufacture of special pressure, tactile, and force sensors, tactile displays, and associated instrumentation; marketing of various R&D proposals to private and government entities; and subsequent management of funded activities as the principal investigator. As summarized in the accompanying table, Mr. Begej was responsible for proposing and managing seven Phase I and two Phase II SBIR projects from NASA, DoD/Air Force, NIH, and NSF. The projects dealt with various tactile sensor and display technologies pertinent to robotics and teleoperation control, development of an exoskeletal glove for the control of dexterous robotic hands, and the application of optical pressure sensing technology to the characterization of esophageal pressure waves.

Additionally, Mr. Begej also was responsible for several commercial projects involving the manufacture of tactile sensors for robot grippers, development of instrumentation to measure SMT chip coplanarity by means of a planar tactile sensor, and the manufacture of an hemispherical pressure sensor array for characterization of high-pressure shock waves. Mr. Begej personally performed all design work and prototyping associated with these projects, and has relied upon a technician or external contractors to manufacture or assemble completed or stable designs.

PROJECTS MANAGED by S. BEGEJ at BEGEJ CORP.			
END DATE	CUSTOMER or AGENCY	CONTRACT TYPE	TOPIC DESCRIPTION
1997	Begej Corp.	Internal R&D	Develop miniature immersible pressure switch capable of operating at 6000 psi.
1996	NASA Johnson Space Center	SBIR Ph-2	Design and fabricate a 512-taxel tactile display suit for use in control of a dual-armed manipulator
1996	Private Company	Custom Sensor Fabrication	Design and fabricate hemispherical pressure sensor for application in shock-wave environments
1995	NASA Johnson Space Center	SBIR Ph-2	Design and fabricate an exoskeletal glove controller capable of controlling a three-fingered dexterous robot hand
1993	Begej Corp.	Internal R&D	Develop adhesive dispenser based on linear stepper drive with pressure feedback control
1991	NASA Johnson Space Center	SBIR Ph-1	Demonstrate feasibility of a tactile display system for the teleoperated control of dual-armed robots
1990	NASA Johnson Space Center	SBIR Ph-1	Demonstrate feasibility of exoskeletal robot hand controller utilizing new virtual joint design
1990	National Institutes of Health	SBIR Ph-1	Develop full-length esophageal pressure sensor and associated data processing and display system
1990	DoD / Air Force WPAFB	SBIR Ph-1	Develop tactile telepresence system for generic master/slave tool handles
1988	Private Company	Exploratory R&D	Evaluate feasibility of measuring coplanarity of SMT IC leads using optical tactile sensor
1988	NASA Jet Propulsion Labs	SBIR Ph-1	Develop tactile telepresence system for robotic hand control
1988	National Science Foundation	SBIR Ph-1	Explore feasibility of imparting shear-force sensing capability to optical tactile sensor
1986	Private Company	Custom Sensor Fabrication	Fabricate a planar tactile sensor (32 x 32 array, 1mm taxel spacing) for a parallel-jaw robotic gripper
1986	NASA Jet Propulsion Labs	SBIR Ph-1	Develop fingertip-shaped tactile sensor for robot hands

Martin Marietta Corporation (1985 - 1986):

During previous employment at Martin Marietta Corporation (1985-6), Mr. Begej was a senior electrical engineer responsible for sensor issues pertaining to robotic systems. Major contributions during his brief stay included authoring the Sensor Technology section of a proposal for a multi-year contract regarding autonomous robotics, and development of a prototype of an intelligent transponder capable of determining the identity, range, and orientation of tagged objects in structured environments such as space habitats, automated factories or warehouses.

University of Massachusetts (1982 - 1985):

During graduate studies at the University of Massachusetts, Amherst (1982-5), Mr. Begej developed a new optical approach to tactile sensing for robots. A version of this tactile sensor was developed at the University under a contract from Martin Marietta Corporation. This sensor system featured a high-resolution, compact sensor head, and was

integrated with a microprocessor that performed various tactile data acquisition and processing tasks.

Battelle Laboratories (1975 - 1981):

As a materials development engineer for Battelle Laboratories, Richland, WA (1975 - 1981), he was responsible for the design, development, and operation of various laboratory instruments to measure thermophysical properties of metallic and ceramic materials. Major projects included the initial design of a scanning electron microscope facility intended for remote examination of highly radioactive materials, and responsibility for the construction and operation of a semi-automated laser-pulse apparatus for measurement of the thermal conductivity and diffusivity of ceramic and metallic materials used in commercial nuclear reactors. Possessed "Q" clearance from DOE.

University of Washington (1973 - 1975):

During graduate studies in the Department of Metallurgical Engineering at the University of Washington, Seattle, from 1973 to 1975, Mr. Begej developed various arc-casting methods for fabricating superconducting compounds (Nb_3Al), and designed and built a hot-extrusion apparatus for fabricating copper and aluminum composites containing dispersions of these superconducting materials.

Education

1973 BS, Metallurgical Engineering, University of Washington, Seattle.

1975 MS, Metallurgical Engineering, University of Washington, Seattle.

Thesis title: "Superconductivity of Cu and Al Composites Containing Dispersions of Nb_3Al "

1985 MS, Computer Science, University of Massachusetts, Amherst.

Thesis title: "A Tactile Sensing System and Optical Tactile Sensor Array for Robotic Applications."

Professional Affiliations

IEEE	Institute of Electrical and Electronic Engineers
SME/RI	Society of Manufacturing Engineers/Robotics International

Publications

Begej, S., Tactile Display for Whole-Arm Manipulators, Phase-II SBIR contract NAS9-18901, NASA Johnson Space Center, Final Report No. WAM-300696FR, 30 June, 1996.

Begej, S., Glove Controller with Force and Tactile Feedback for Dexterous Robotic Hands, Phase-II SBIR contract NAS9-18558, NASA/Johnson Space Center, Final Report No. GC-170595FR, 31 May, 1995.

Begej, S., Tactile Display for Whole-Arm Manipulators, Phase-I SBIR contract NAS9-18704, NASA Johnson Space Center, Final Report, 9 Sept., 1992.

Begej, S., Telepresent Master/Slave Tools with Force and Tactile Feedback, Phase-I SBIR contract F41622-90-C-1002, Dept. of the Air Force, Wright-Patterson AFB, Report Final Report, 22 Jan., 1992.

Begej, S., Full-Length, Fiberoptic Esophageal Pressure Monitor, Phase-1 SBIR Grant 1-R43-DK42404-01, National Institute of Diabetes and Digestive and Kidney Diseases, US Dept. of Health and Human Services, Final Report, 12 March, 1991.

Begej, S., Glove Controller with Force and Tactile Feedback for Dexterous Robotic Hands, Phase-I SBIR contract NAS9-18308, NASA/Johnson Space Center, Final Report, Aug. 1990.

Begej, S., Tactile Sensor Subsystem Utilizing a Fingertip-Shaped Sensor with Shear Force-Sensing Capability, Final Report, Begej Corporation, Littleton, CO, NSF Phase I SBIR Grant ISI 87-60319, Final Report, 21 December, 1988.

Begej, S., "Planar and fingertip-shaped tactile sensors for robotic applications," IEEE J. Robotics and Automation, vol. 4, no. 5, Oct., 1988.

Begej, S., Tactile Telepresence System for Dexterous Telerobotics, Final Report, Begej Corporation, Littleton, CO, NASA SBIR Ph-I Contract NAS7-1015, 29 August, 1988.

Begej, S., "Fingertip-shaped optical tactile sensor for robotic applications," Proc. IEEE Int. Conf. Robotics and Automation, Philadelphia, PA, pp. 1752-1757, 25 April, 1988.

Begej, S., Fingertip-Shaped Touch Sensor for Teleoperator and Robotic Applications, Final Report, Begej Corporation, Littleton, CO, NASA SBIR Phase I Contract No. NAS7-968, September, 1986.

Begej, S., A Tactile Sensing System and Optical Tactile Sensor Array for Robotic Applications, Technical Report 85-06, MS Thesis, Computer and Information Science Department, Univ. Massachusetts, Amherst, May, 1985.

Begej, S., "An optical tactile sensor array," Proceedings of the SPIE Conf. Intelligent Robotics and Computer Vision, pp. 271-280, November, 1984.

J.E. Garnier and S. Begej, "Ex-Reactor Determination of Thermal Gap Conductance Between Uranium Dioxide and Zirconium. Stage-2: High Gas Pressure," Proc. 8th Symposium on Thermophysical Properties, Gaithersburg, MD, 16 June, 1981.

J.E. Garnier and S. Begej, "Ex-Reactor Determination of Thermal Gap Conductance Between Uranium Dioxide and Zirconium. Stage 2: High Gas Pressure", Technical Report PNL-3232 (also NUREG/CR-0330, Volume 2), Battelle Pacific Northwest Lab., Richland, WA, July, 1980.

J.E. Garnier and S. Begej, "Ex-Reactor Determination of Thermal Gap Conductance Between Uranium Dioxide and Zirconium. Stage I: Low Gas Pressure", Technical Report PNL-2696 (also NUREG/CR-0330, Volume 1), Battelle Pacific NW Lab., Richland, WA, April, 1979.

S. Begej and J.E. Garnier, "Ex-Reactor Determination of Thermal Gap Conductance Between Uranium Dioxide and Zirconium Interfaces," Proc. 16th International Conductivity Conference, Chicago, IL, 7 Nov., 1979.

S. Begej, J.E. Garnier, A.O. Desjarlais, and R.P. Tye, "Ex-Reactor Determination of Thermal Contact Conductance Between Uranium Dioxide and Zirconium Interfaces," Proc. 16th International Conductivity Conference, Chicago, IL, 7 Nov., 1979.

J.E. Garnier and S. Begej, "Ex-Reactor Determination of Thermal Gap Conductance Between Uranium Dioxide and Zirconium Interfaces," in Thermal Conductivity, edited by D.C. Larsen, Vol. 15, pp. 115-123, 1978.

A.B. Johnson, S. Begej, M.W. Martini, and R.P. Hayes, "Aluminum Alloy Performance Under Dry Cooing Tower Conditions", Technical Report PNL-2392, Battelle Pacific Northwest Laboratory, Richland, WA, December, 1977.

J.E. Garnier and S. Begej, "Ex-Reactor Gap Conductance Measurements," Proc. 15th Light Water Safety Info. Meeting, National Bureau of Standards, Gaithersburg, MD, 7 Nov., 1977.

Patents:

Marchant, D.D. and S. Begej, "Information Storage Medium and Method of Recording and Retrieving Information Thereon," (i.e., erasable optical memory disk), U.S. Patent 4,593,306, assigned to Battelle Labs, Richland, WA, issued 3 June, 1986.

Security Clearance:

Possessed "Q" clearance from DOE while working for Battelle Labs / Hanford from 1975 to 1981.

S. Begej Skill List:

Robotics Engineering

- Design of tactile sensors for robotic applications
- Design & fabrication of tactile display systems for robotic applications
- Design & fabrication of an exoskeletal glove controller for teleoperated control of robotic hands

Image and Optics Engineering

- Fiber optic devices and sensors
- Optical touch-sensor technology

Materials Science:

- Design & fabricate instrumentation for physical property measurement
 - o Thermal diffusivity
 - o Thermal conductivity
 - o SEM analysis of highly-radioactive materials
 - o Electrical Resistivity
- New materials development
 - o Superconducting alloys and composites
 - o Structured graphite objects
- Material selection studies
 - o Metals
 - o Ceramics
 - o Elastomers
 - o Adhesives

Business Skills

- Company formation
 - Incorporation
 - Financing
- Company management
 - Project planning (Timeline, MS Project)
 - Staffing (management of small R&D groups consisting of 1-2 technicians & consultants)
 - Accounting system (accrual, double-entry)
 - Financial planning and reporting
- Contracts management (bidding, compliance with government regulations, administration of SBIR government contracts)
- Patent preparation
- Marketing (proposals to private and government entities)
- Customer liaison

Mechanical Skills

- Machine shop skills
 - Lathe
 - Milling Machine
 - MIG/TIG/gas/arc welding and brazing
 - General shop tools
- Mechanical design software
 - Solidworks 2000, 2006
 - Mechanical Desktop (AutoCAD 13)
 - Generic CADD

Electrical / Electronics

- Electronic prototyping (protoboard, wirewrap, PCB)
- Electronic instrumentation use (oscilloscope, meters, ...)
- Data acquisition and processing software
 - Proprietary software from I/O board vendor
 - LabView (clone)
- Design of analog & digital circuits
 - Tango Schematic
 - Electronic Workbench

Programming

- C Programming language
 - VEX Robotics
 - Image processing involving data capture, extraction, and processing:
 - Tactile sensors of various geometries
 - Fiberoptic pressure sensors
 - Determination of SMT lead coplanarity using an imaging displacement sensor
 - Spectrographic analysis of pigments
 - Industrial Inspection
- Assembly (PDP-11)
 - System control and capture, calibration, and processing of data from a planar optical tactile sensor designed for parallel-jaw robot grippers

- BASIC
- FORTRAN
- RCX (LEGO Mindstorms)

Computer Applications

- Word processors / Desktop Publishing
 - Word, WordPerfect
 - Acrobat
 - Pagemaker
 - DreamWeaver (webpage authoring)
- Spreadsheet
 - Excel
 - Quatro Pro
- Image Editing
 - Photoshop & Photoshop Elements
 - JASC Picture Publisher
 - Picture Publisher
- Video Editing
 - Pinnacle Studio
- Plotting/graphing
 - Excel
 - Sigma Plot (Jandel)
 - Grapher/Surfer (Colorado Software)
- Drawing
 - Visio
 - Word (drawing tools)
- Mechanical CAD
 - Solidworks 2000, 2006
 - AutoCAD Mechanical Desktop and AutoCAD 13
 - SilverScreen
 - Visual CAD
 - DesignCAD-3D, Generic CADD
- Electrical Schematic CAD
 - PCAD
 - Tango (Accel)
 - OrCAD
- Accounting
 - BIS-II (Prism Accounting Solutions, approved for gov't cost tracking)
 - Quicken
- Project Management
 - TimeLine (Symantec)
 - MS Project
- PC Operating Systems
 - DOS
 - Windows 3, 95, 98, ME, XP

Computer Hardware

- Design, configure, debug PC systems (DOS, Windows)
- Interfacing personal computers to the lab (analog and digital I/O cards)