

## **Yorke J. Brown, PhD**

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*PhD, Physics, University of Virginia, 1979*  
*BS, Physics, Virginia Polytechnic Institute and State University, 1972*

### **EXPERIENCE**

#### **1988-Present. Scientific and Engineering Consultant.**

- Developed motion control systems and equipment for federal agencies and major companies.
- Provided special effects motion control systems for the motion picture industry.
- Consulted in flight simulation visual and motion systems for federal agencies and major companies in the US and internationally.
- Developed the Primary Mirror Support System for the telescope of the Sloan Digital Sky Survey, and for the 3.5 Meter Telescope at Apache Point Observatory.
- Provided extensive test engineering support for development of modern rail transportation equipment. Activities included the development of novel sensors and data acquisition equipment.
- Invented and developed several new devices including an acoustic head tracker, an inclinometer for steering underground drillheads, a hand ergonometer for clinical diagnosis and physical therapy, a system for sensing lubricating oil contamination, and a helmet loader for flight simulation.
- Provided flight and ground instruction for primary, instrument, and commercial pilots.

#### **1998-2007. Vice President, Sarnicola Simulation Systems.**

- Developed the electronic control systems, and the computer hardware and software control systems for the entire Sarnicola Simulation Systems product line.
- Developed the visual systems and multi-media playback systems for the Sarnicola entertainment simulator product line. Produced multi-media content for entertainment simulators.

#### **2006, 2010-Present. Fellow of the Department of Physics, Harvard University.**

- Led a team to develop a novel photometric calibration system for astronomical telescopes.
- Collaborating on the development of a new paradigm for astrophotometry.

#### **2003-Present (periodic appointments). Visiting Associate Professor of Physics, Dartmouth College.**

- Taught a courses in introductory physics and astronomy.

#### **1983-1988. Link Flight Simulation Division of the Singer Company.**

- Served in various positions starting as Staff Engineer assigned to the Manager of Visual Engineering, and ending as Manager, Visual Systems Engineering.
- Directed visual systems engineering and software development efforts on several major flight simulation programs, including AH-64 Combat Mission Simulator, CH47D Operational Flight Trainer, UH-60 Operational Flight Trainer, AH-1S Flight and Weapons Systems Trainer.

- Participated in development of new technology visual systems including the Link ESPRIT eye-slaved visual system, ATACDIG digital image generator, and the Link CRISP video-disk based image generation system.

**1980-1984. Assistant Professor of Physics and Electrical Engineering Technology, SUNY Binghamton.**

- Performed research in Low-Temperature Physics and taught a wide range of undergraduate and graduate courses in Physics and Electrical Engineering Technology.

**1978-1980. Instructor in Physics, Mary Washington College.**

- Performed research in Low-Temperature Physics and taught a variety of courses in Physics and Computer Science.

**PERSONAL INFORMATION**

I was born in 1950, and grew up in Northern Virginia, where I received my public school education. My wife, Carrie, is from the same area and holds a PhD in American Literature from the University of Virginia. She currently practices as a consulting museum curator. We were married in 1970 and have two sons. My non-professional interests include music, photography, aviation, mountaineering, and amateur radio. I am a commercial pilot and an instrument-rated flight instructor. I have been active in the community as a Boy Scout Leader and volunteer school science teacher. I am a member of the APS and the IEEE.

**PUBLICATIONS and PATENTS**

"Precise Throughput Determination of the PanSTARRS Telescope and the Gigapixel Imager using a Calibrated Silicon Photodiode and a Tunable Laser: Initial Results," (with CW Stubbs, *et al.*), *ApJS* 191, 376 (2010).

"A Technique for a Self-Luminous Flatfield Calibration Screen," *Astronomical Society of the Pacific Conference Series* 364, 571 (2007).

"Preliminary Results from Detector-Based Throughput Calibration of the CTIO Mosaic Imager and Blanco Telescope Using a Tunable Laser," (with CW Stubbs, *et al.*) *Astronomical Society of the Pacific Conference Series* 364, 373 (2007).

"The 2.5 m Telescope of the Sloan Digital Sky Survey," (with JE Gunn, *et al.*), *The Astronomical Journal* 131, 2332-2359 (2006).

"Support and control of primary and secondary mirrors for the Sloan Digital Sky Survey (SDSS) telescope," (with L Carey, *et al.*), *Proceedings of the SPIE*, 4836-24 (2002).

"Improvements to the Apache Point 3.5-m Primary Mirror Support System," (with J Davis), *Proceedings of the SPIE*, 3351-39 (1998).

"High Speed, High Resolution, Ultrasonic Position and Orientation Tracker," (with SC Puma and JB Sinacori), *US Patent* 5,339,259 (1994).

"Analysis and Development of Advanced Techniques for Cuing the Force and Motion Environment in the Simulator of the Future," (with FM Cardullo and GR McMillan), *Invited Paper at the Royal Aeronautical Society European Forum on Matching Technology to Training Requirements*, London (1992).

"New Approaches to Motion Cuing in Flight Simulators," (with FM Cardullo, GR McMillan, GE Riccio, and JB Sinacori), Air Force Technical Report AL-TR-1991-0139 (1991).

"Advanced Techniques for Cuing the Force and Motion Environment in the Simulator of the Future," (with FM Cardullo and GR McMillan), AIAA Flight Simulation Technologies Conference paper 90-3135 (1990).

"Visual System Lags: The Problem, The Cause, The Cure," (with FM Cardullo), IMAGE V Conference, (1990).

"Need-Based Evaluation of Simulator Force and Motion Cuing Devices," (with FM Cardullo and JB Sinacori), AIAA Flight Simulation Technologies Conference paper 89-3272-CP, (1989).

"An Improved Measurement of the Surface Area of DLX-6000 Microspheres," J. Low Temp. Phys. 60, 183 (1985).

"The Shape of a Superfluid Vortex Nucleated at a Sharp Edge," J. Low Temp. Phys. 54, 155 (1984).

"Inhomogeneous Nucleation of Superfluid Vorticity at a Sharp Edge," (with GB Hess), J. Low Temp. Phys. 49, 265 (1982).

"Superfluid He-4 Flow Through Pinholes," (with GB Hess and GM Shifflett), Bull. Am. Phys. Soc. 24, 606 (1979).

## MAJOR CONSULTING PROJECTS

**Harvard University and Dartmouth College, 2010-2011.** Leading a team developing a stratospheric balloon system for calibration of astronomical telescopes involved in experimental cosmology research.

**MDM Observatory Consortium, 2010.** Developed a novel spectrograph slit-viewing optical system for the 1.2 and 2.4-meter telescopes.

**Effects in Motion, 2006-2010.** Consulted for and provided systems and equipment for motion special effects on several major motion pictures including *Speed Racer*, *Live Free or Die Hard*, *Terminator Salvation*, *Five Killers*, *Knight and Day*, and *Green Lantern*.

**L-3 Communications.** Working with Effects in Motion, developed the electronic and computer systems for a motion system for testing shipboard communications antennas.

**Sarnicola Simulation Systems, 1992-2007.** Developed all the electronic and computer systems for the Sarnicola Motion Platform and for simulators based on the platform. This activity has involved developing mathematical models for various implementations of the unique kinematics of the system; analyzing the associated control problems; designing computer-controlled analog control systems; preparing computer software for control-file generation, both from hand-generated input and from various methods of live data capture; and designing audio and visual display systems. Customers have included Lockheed-Martin, Anteon (for USAF), Custom Engineering (for Chrysler Corp.), Cinema Systems, C&M Technologies (for US Navy), Trex Enterprises (for USAF).

**Harvard University Department of Physics, 2006.** Oversaw the development of a novel calibration screen for astronomical telescopes.

**Benet Laboratories (US Army Corps of Engineers), 2004-2005.** Designed and implemented a modernized control system for a legacy Link simulation motion platform. This project involved developing electronic control hardware for the platform and developing a software application to provide complete user control of the platform in a research environment.

**Timken Aerospace, 2000-2005.** Analyzed the process of assembling precision ball bearings to fitup tolerances smaller than the size spread of the component parts and developed an algorithm to sort

components for optimal assembly. Developed an automated part gauging system and computerized the sorting and assembly process.

**Continental-Teves, 2003-2007.** Provided complete motion control package for the Continental-Teves mobile demonstration simulator. This project involved developing hardware, software, and motion programming to control a six degree-of-freedom simulator motion platform used to demonstrate a dynamic braking and vehicle control product.

**Stealth Amusements (India), 2002-2004.** Developed all the electronic and computer systems for a line of entertainment simulators to be manufactured and marketed in India.

**Apache Point Observatory, 1996-2000.** Developed a precision pneumatic support system for the 3.5 meter primary mirror of the Astrophysical Research Consortium and Sloan Digital Sky Survey astronomical telescopes. This project involved analysis of the problem of supporting a 4,000 lb optical mirror on an array of small air pistons, and the subsequent development of a suitable servo control system to control the pistons so as to maintain mirror figure and position during pointing excursions and wind gusts.

**AAI-SMI, 1994-96.** Analyzed the performance of the SH-60 Dome Visual System and recommended strategies for improvement. This project involved extensive mathematical analysis of dome optics and the geometry of visual image projection onto spherical surfaces.

**SOGITEC, 1995.** Developed a flight simulation helmet loader for simulation of the high-g flight environment.

**GreyStone Technology, Inc., 1994.** Supported the development and application of a new simulation motion platform by providing geometric analysis, control system analysis, and design of cuing algorithms.

**ABB Traction, 1992-94.** Performed a wide range of functional, operational, and performance tests on a new generation of computer-controlled, high-performance railroad locomotives and passenger railcars. This work involved hardware design, development of high-speed, computer-controlled data acquisition systems, preparation of test procedures and test reports, conduct of testing, and preparation of software for specialized data reduction and analysis.

**IBM, 1991.** Conducted a trade study of visual system vendors and products in conjunction with IBM's proposal for the Close Combat Tactical Trainer (CCTT). The task involved analyzing vendor specifications and making detailed evaluations of their proposed visual systems relative to specifications and requirements of the RFP.

**Atlantic Research Corporation, 1990.** Participated in an analysis of NASA's long range needs in simulation technology. This project involved surveying the research programs and expectations of NASA's research laboratories, surveying the available and anticipated new simulation technology (particularly with regard to visual and motion systems), analyzing both, and formulating recommended acquisition strategies.

**SOGITEC, 1990.** Assisted in the preparation of SOGITEC's proposal for the Shuttle Mission Simulator Visual Upgrade. This project involved analyzing the capabilities of the SOGITEC product relative to the specification, drafting portions of the proposal, and editing the technical sections of the proposal.

**AAI, 1989.** Contributed to the visual-motion integration proposals for the HH-60J and P-7 simulators, making significant novel contributions in the area of visual-motion cue synchronization.

**USAF, Armstrong Human Resources Laboratory, 1988-92.** Participated in a major study aimed at developing improved methods of simulating the aeronautical force-and-motion environment, particularly the sustained-g regime. The project, which came to be known as the "CUMOD" study, involved surveying the existing technology and the state of scientific knowledge of the physiology, psychology, and psychophysics of motion sensation and perception; developing a unified and rational method of analyzing the problem of creating an artificial motion environment; and conceiving and developing several new ideas for the advancement of motion cuing technology and research.

*References are available on request.*