# Ed Barker

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### SUMMARY

Possessing a unique, interdisciplinary set of skills and experience, I analyze issues in complex technical, managerial, and policy environments, and effectively develop and propose solutions and implementation strategies to decision makers and stakeholders. I work on initiatives that advance the Science & Engineering workforce, and the STEM education ecosystem. I am equally excited about engineering research and product design using robotics, embedded computing, cognition, artificial intelligence, machine learning, HPC, and RF systems in aerospace environments.

## EXPERTISE

## Engineering & Computer Science, Product Design and Development, Project Management

- Over 35 years project management experience in multiple scenarios including hardware and embedded software development projects, facilities construction, logistics and event management, personnel management, human resources, budget responsibility, and executive reporting,
- Experienced in supporting academic research computing in higher education.
- Expertise incorporating full aspects of engineering, management, manufacture, implementation, budget, cost and status reporting in commercial, defense and Federal DoD environments.
- □ Expertise in full cycle product design and development, concept, and analysis, through to product design, implementation and delivery, presentations to executive leadership.

### Embedded Systems, Computer Science, Data Analytics

- Experienced with the L3Harris / Lockheed Martin next generation F-35 TR3 Open System Architecture (OSA)-based processing technology Mission Avionics System, ICP, PCD, AMS
- Experienced with elements of the GOES and other space satellite systems, used for earth and space science observation and research.
- □ Statistics, descriptive and inferential statistics, univariate and multivariate statistics
- C, C++, Python, Java, Linux, mpi, shell programming, text processing, data collection, cleansing, and validation, SPSS, R, STATA, MATLAB, Python, C, MySQL, Fortran, PL/1
- □ Linux kernel development, configuration management tools, compilers, debuggers, cross development tool chains
- □ Real-time embedded systems using LynxOS, LynxSecure, Linux, ARM, Cortex, ST, Keil
- SME for Inter-process Communication, 1553, UDP, TCP, message queues, shared memory, and RTOS systems, LynxOS, Lynxsecure, buildroot linux, and coreboot processes
- Proficient in using data and statistical analytical tools for decision making, using SPSS, R, STATA, descriptive and inferential statistics, univariate and multivariate statistics

### Public Policy Analysis: STEM and CTE Workforce Development and Education Policy

- □ Recognized leader committed to redesigning the 21<sup>st</sup> Century STEM Teaching Workforce that will enable broad access to a robust STEM learning ecosystem.
- Conducts statistical research on policies and measures that affect workforce development
- Expertise in Federal policy and initiatives intended to develop STEM and skilled technical workforce.

## Leadership & Communications – Policy and Social Enterprise Sectors

- Leader and problem solver working the intersection of the public, private, and non-profit sectors.
- Experienced in analyzing and communicating complex issues to decision makers and stakeholders, creating solutions and implementation strategies in complex policy environments.

#### EDUCATION

#### **Degree Programs**

Georgia Institute of Technology, Atlanta, Georgia Master of Science in M.S. in the History and Sociology of Technology ar	August 2020 - Present nd Science, Graduate Student
Georgia Institute of Technology, Atlanta, Georgia Master of Science in Public Policy	August 2016 – May 2020
<b>Kennesaw State University,</b> Kennesaw Georgia Graduate work for Doctoral Minor requirements, Educational Research, 8	June 2019 – December 2019 3000 / 9000 level
University of South Carolina, Columbia SC Bachelor of Science, Electrical and Computer Engineering	May 1983
Certificate Programs Stanford Online - Coursera Certificate Programs, Stanford California Machine Learning, ML Deep Learning, AI	
PROFESSIONAL EXPERIENCE	

# L3Harris Technologies Inc, Alpharetta, GA Lead Software Engineer,

#### Research & Development, Mission Avionics, Space & Airborne Systems Division

- □ Software Development Lead Engineer in the Space & Airborne Systems Division of L3Harris, an \$18 billion annual revenue company. L3Harris provides solutions for the aerospace and defense industry.
- Conducts software design, SI&T, Systems Integrations & Test for the L3Harris ICP, Integrated Core Processor platform, and the PCD/EU Panoramic Cockpit Display system to be used on the Lockheed Martin F-35 TR3 program.
- □ Lead Software Engineer in the L3Harris IRAD, Internal Research & Design laboratory, conducting applied research on next generation open system high performance computing platforms.
- Skills keywords: LynxOS, LynxSecure, Hypervisor, Atlassian, Jira, Git, SVN, Confluence, Crucible,
  BSP, MIL-STD-1553, HPC, C++, C, C#, Java, Python, MATLAB, bash, linux / posix, OpenCV, Eclipse,
  Visual Code, JTAG, UDP, TCP, CAN, RF, MOSA, SOSA, VITA, FACE, Cybersecurity, SEAL1, SEAL3
- Experienced with elements of the GOES and other space satellite systems, used for earth and space science observation and research.
- Support the development, maintenance, and deployment of RF systems to track and identify 5G signals that have the potential to interfere with a constellation of earth satellites. Knowledgeable of RF beamforming system, I&Q signal analysis, and earth station satellite tracking algorithms.

# Kennesaw State University, Kennesaw, GA

### Assistant Director for Advanced Research Computing

- Directed and managed projects that required implementation of HPC, High-Performance Computing infrastructure for research computing.
- Conducted and directed analysis, implementation and support activities to enable and enhance research functions that require the use of HPC, High-Performance Computing resources for numerical modeling and simulation.
- Managed the affairs the KSU research faculty and Los Alamos and Oak Ridge National Laboratories, supports researchers for NSF, National Science Foundation-funded initiatives for product acquisition and compliance.
- Provides computing support for researchers working on the CERN Large Hadron Super Collider Accelerator project.
- Collaborated with research scientists in bioinformatics, economics, mechanical engineers in the fields of computational fluid dynamics, MEMS (Micro-Electronic Mechanical Structures), and nuclear engineers

February 2020 – Present

July 2012 - November 2019

February 20

modeling nuclear reaction dynamics.

- Provided customer assistance, training, and problem solving and solution implementation that used HPC level bioinformatics, finite element analysis and other research software tools.
- □ Consulted with research faculty to perform needs analysis and solution requirements.

#### HI Solutions, Kennesaw GA

#### **Senior Engineer**

- Designed and implemented products for intelligent energy management and building automation.
- □ Mentored and guided engineers and management to address challenges in product design, development, and delivery.
- □ Expert knowledge in of design and implementation of products using embedded Linux SBCs, Linux kernel drivers, ARM7, ARM9, Cortex embedded controllers, and custom graphics screens and LCD drivers.
- Developed a new communications protocol to support the development of a Zigbee based lighting and energy control network. Developed extensively using TCP/IP, UDP/IP, MODBUS, USB, RS232, CAN, I2C, SPI, and proprietary protocols.
- Developed C language, Linux IPC processes using shared memory, semaphores, fifos, message queues, sockets, termio, ntermio
- Developed dynamic embedded system using linked lists, pointers, and various interprocess calls, custom embedded services using HTTP, Soap/XML protocols

### EON Communications, Kennesaw GA

## **Director of Operations and Engineering**

- Directed the design and development, production, and delivery of a line of telecommunications switching systems for FAA air traffic control, as part of the Federal Y2K system upgrades.
- □ Managed the design and construction of the corporate headquarters which housed administration, finance, engineering, marketing, manufacturing and distribution.
- Directed the operational aspect of corporate headquarters, housing administration, finance, engineering, marketing, manufacturing, and distribution. Developed budgets, performed career guidance and development, salary recommendations, and reviews.
- □ Managed the IT infrastructure, including networks, servers, MRP, security and accounting systems.
- Designed and implemented initiatives to accommodate a succession of mergers and acquisitions, including an IPO, Initial Public Offering.

### Raytheon E-Systems (Melpar), Washington, DC

### Senior Engineer & Project Manager

- $\hfill\square$  Held secret and special customer security clearances, now expired
- Supported national intelligence defense efforts for U.S. Department of Defense and other agencies.
- Designed high-performance RF receiver systems for SIGINT (Signals Intelligence), COMINT (Communications Intelligence), ELINT (Electronics Intelligence) and other related systems as required to accomplish the national defense intelligence mission. These systems were designed for satellite, and high altitude, high-performance aircraft.
- Designed and supported data collection systems for antenna range and flight vehicle range tests.
- Directed the design and implementation of advanced systems for RF systems design, modeling, simulation, and systems integration and test.
- Advised senior leadership, vice-presidents, and directors providing analysis and guidance on difficult issues that created significant risks that threated successful product development, delivery, and mission success. These efforts provided the company and customer a 100% project recovery and success rate.
- □ Supervised an engineering team that performed a variety of engineering design and test functions for the development of RF receiver products for military aerospace applications.
- Managed hardware and software development projects including technical design leadership, hardware and software design reviews, project management, scheduling, and accounting methods to track project progress.
- Co-designed radio receivers which operated over the 25 MHz to 18 GHz frequency range for aerospace

January 1984 – September 1992

October 1992, September 2001

#### September 2001 – July 2012

sensor applications. These receivers had broadband and narrowband AM, FM, CW demodulators, pulse detector, and SDU outputs. Designed, simulated, and built amplifiers, filters, mixers, switch, oscillators, and other items as necessary for use in prototyping and design.

- Supported the design of antennas using a Fortran based method of moments software package. Developed ATE software to conduct antenna field measurement utilizing Agilent (HP) test equipment and anechoic chambers.
- Designed, developed, and implemented Unix based automated test systems for RF receivers using custom in-house designed test fixtures and Agilent test equipment, such as network and spectrum analyzers, time bases, and a wide range of instruments, both custom and commercial off the shelf. The interfaces used were GPIB/HPIB, RS-232, RS-422, fiber optic and other interfaces. The test frequencies ranged from DC to 18 GHz, AM, FM, and pulse modulated carriers. The systems performed fully automated, unattended testing using environmental chambers. Created software development folders, maintained software QA procedures, conducted design reviews, implemented a configuration management methodology.
- Designed and implemented CAD Software for circuit, systems, and antenna design using Fortran, C, Pascal, and Basic/UX. Authored engineering applications using system of linear equations, method of moment analysis, Fourier transforms, inverse Fourier transforms, convolution, deconvolution, modulation theory, and other mathematical techniques.

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### STEM Leadership Foundation, Kennesaw, GA

## **President and Founder**

- The STEM Leadership Foundation, a 501(c)3 non-profit corporation, works to develop a deeper understanding of the evolving economy and its impact on 21st century STEM education. The foundation works to support a variety of initiatives, including supporting informal STEM learning by supporting students and teachers that participate in the FIRST Robotics Competition. The primary student organization supported by the foundation is the Kell High School Robotics Team, aka Kell Robotics.
- Kell Robotics' mission is to inspire the next generation of Scientists, Technologists, Engineers, Mathematicians, and Leaders. To accomplish this mission, the Kell team has been working since 2008 to change the STEM education process through strategic partnerships with political, educational, university, and business leaders; advocating and formulating public policy; building infrastructure; and creating public value through outreach and communications.
- I actively and continuously conduct research, examining Georgia's 'Educational Enterprise Effectiveness' to find opportunities to improve the P-20 STEM human capital pipeline. This work has led to me creating a model for developing the 21st-century teacher for high demand STEM fields. The model corrects some of the existing barrier and inefficiencies, addressing economic market failures, and other matters related to student development and success for the STEM career and STEM teaching pipelines.
- □ I frequently respond and support requests from state administrative and legislative leaders, for analysis and policy advice.
- My research includes evaluation of activities across the University of Georgia System and in other states, in particular the sixteen states of the SREB (Southern Regional Education Board) using the statistical information describing pre-college GaDOE STEM education career pathways, and of other related precollege systems that are of strategic interest to stakeholders.

## Georgia FIRST Robotics, Inc, Roswell, GA

### **Strategic Initiatives and Partnerships**

- Georgia FIRST is 501c3 non-profit organization dedicated to inspiring K-12 pre-college students to pursue activities that develop their potential. Primarily focused STEM activities, Georgia FIRST activities enables students to find their mission in life, across many domains. Georgia FIRST is primarily a volunteer organization with over 4,000 volunteers and mentors in Georgia, serving over 12,000 students on nearly 1,200 K-12 student teams.
- □ I work to support Georgia FIRST by designing and developing strategic initiatives that maximize the impact of the statewide volunteer community and the strategic partners of Georgia FIRST which includes corporations, governments, universities, schools, and non-profits.
- I meet with Georgia FIRST stakeholders on a statewide basis, at levels, from the grassroots level to the highest levels of state government, and also with federal legislators and staffers on a continuing basis.

# NATIONAL SCIENCE TEACHER ASSOCIATION, Arlington, VA

# Informal Science Education Directorate, Committee Member

I worked on the NSTA Informal Science Education committee to review annually all NSTA policies, programs, and activities relating to informal science education and see that the interests of informal science educators are served by the Association. This committee works with other NSTA Division Committees on K-16 coordination and additional charges as directed by the President, requested by the Board of Directors, or initiated by the Committee and approved by the Board of Directors.

November 2012 - Present

August 2010 - Present

June 2015 – May 2018

# ANALYTICS, DATA MANAGEMENT AND ENTERPRISE EFFECTIVENESS

# Graduate Student, School of Public Policy, Atlanta, GA

- Author and architect of the HDTI, the High Demand Teacher Initiative, under consideration by governmental leaders for adoption. The HDTI will contribute to the production of STEM & CS teachers for the 21-st century.
- $\hfill\square$  Practitioner in the art of statistical and econometric data analysis for policy and social science.
- Proficient at acquiring, converting, and wrangling data sources to support research, policy analysis, prepare briefings, and continuing exploratory research. Proficient in taking State, Federal, and other reports in multiple non-database formats such as PDF, MS Office formats, Unix & Linux formats, converting, cleaning, and rewriting the data into a clean database for postprocessing.
- Adept in using data public databases such as WebCASPER / IPEDS, NCES, Federal Reserve Bank, and the National Center for Education Statistics (NCES).
- I regularly submit data requests to state agencies such as GaDOE, and TCSG to support the analytical research work I do in STEM education ecosystems. This work seeks to identify patterns, find opportunities for STEM ecosystem path growth and development.
- □ SPSS, R, STATA, MATLAB, python, C, Excel Spreadsheets, and MySQL databases
- Proficient in Unix / Linux shell programming, file and text processing, and administration of Linux and real time safety critical operating systems.

# Independent Research, STEM student development and success

- I actively and continuously conduct research, examining Georgia's 'Educational Enterprise Effectiveness' to find opportunities to improve the P-20 STEM human capital pipeline. This work has led to me creating a model for developing the 21<sup>st</sup>-century teacher for high demand STEM fields. The model corrects some of the existing barrier and inefficiencies, addressing economic market failures, and other matters related to student development and success for the STEM career and STEM teaching pipelines.
- □ I frequently respond and support requests from state administrative and legislative leaders, for analysis and policy advice.
- □ My research includes evaluation of activities across the University of Georgia System and in other states, in particular the sixteen states of the SREB (Southern Regional Education Board).
- □ My research examines the pre-college GaDOE STEM education career pathways, and of other related precollege systems that are of strategic interest to STEM universities.

# Prior Work to Kennesaw Georgia Tech Graduate School

- □ IBM OS 360 / 370 system usage, data processing using Pl/1, PL/C, Fortran
- Deripheral unit operator, Cyber 74 mainframe, Rich Computing Center, Georgia Tech
- Unix, Linux, HP-UX systems administration, systems programming
- □ Progress Database administration for Enterprise Computing, finance, manufacturing, distribution
- □ Oracle Database administration. Oracle PL/C application programming, data collection
- MySQL Database administration
- Developed custom communications protocols using SOAP/XML protocols
- DEC VAX/VMS program development, file and data management
- Expert 'text terminal scraper' developed custom programs to move data across heterogenous platforms and networks.

August 1974 – August 2016

August 2012 – Present

August 2016 – May 2020

#### **MENTORING & TEACHING EXPERIENCE**

#### The Kell High School Robotics Team, Kennesaw, GA

Informal Educator, Senior Mentor

Directed and led Kell Robotics, a high school team that participates in the *FIRST* Robotics Competition, to earning the *FIRST* Championship Chairman's Award, and subsequent induction into the *FIRST* Hall of Fame. Kell Robotics is the 28th team in history to earn this distinction and is internationally recognized as a role model team for the 615,000+ students, on 72,000 teams, in over 100 countries that participate in *FIRST*.

August 2005 – Present

□ The *FIRST* Chairman's Award is the most important award that is given by *FIRST*. It recognizes the team that is exemplary in their efforts to advance society through STEM education. The Kell Robotics Team has led efforts to support education, by leading Georgia to create opportunities for teachers to receive extended day pay for coaching robotics teams after school, and by developing initiatives to provide teacher training in robotics and engineering.

The team has started a record-setting 25 *FIRST* Robotics Teams in Georgia, and South Carolina, a third of those team are in Title 1 and underserved communities. Over the past decade, the team has met with policymakers and educational leaders, advocating about the value of supporting a *FIRST* robotics team in afterschool programs.

The team earned the 2010 SeaWorld Busch Gardens Environmental Excellence Award, was selected as a 2011 MIT-Lemelson Inventeam and subsequently invited to the 2012 White House Science Fair to be recognized by President Barack Obama. The Kell Robotics team has produced three student leaders that have received international awards for leadership including the Dean's List Award and the Allaire Medal.

15 years' experience of teaching engineering and computer science in long-term informal settings

### RECOGNITIONS

- □ NSTA (National Science Teachers Association) Faraday Science Communicator Award
- □ FIRST Hall of Fame, FIRST Championship Chairman's Award Chief Team Mentor
- U.S. Presidential Awards for Excellence in Science, Mathematics & Engineering Mentoring 2017 Nominee
- □ *FIRST* Woodie Flowers Award Finalist Award, named after Dr. Woodie Flowers, MIT Emeritus Professor
- □ National Center for Women & Information Technology Regional Mentor Award
- □ National Judge, Discovery Education / Siemens We Can Change the World Challenge
- □ 100 Black Men of Atlanta, Inspiration Award
- □ MIT K-12 Strategic Alliance Committee, Past Member
- □ United States Congressional Robotics Caucus briefing
- □ White House Science Fair, Lemelson-MIT InvenTeams, Chief Team Mentor
- □ SeaWorld Busch Gardens Environmental Excellence Award, Chief Team Mentor

#### CONFERENCES

- 2018 NSTA National Conference Forum Host and Speaker Teacher Development for the 21<sup>st</sup> Century
- □ *FIRST* Conference Presentations
- □ .... Beyond FIRST Real World Applications
- □ .... MIT Mentorship Initiative video project
- □ .... Students Perception of Engineering
- □ .... Social Networking & Cultural Change
- □ .... Women in Engineering
- .... Beyond Advocacy: Growing FIRST® in a New 21st Century Education Model