Avraham “Abe” Bernstein | CV

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Introduction: Cr8tive Solutions To Hard Problems

1. I have more than 40 years experience in state-of-the-art software development:
   - inventing new algorithms
   - inventing domain specific languages (DSL) which can grossly simplify many difficult problem domains, especially for non-programmers
   - using compiler tools to automatically refactor source code, and for anti-reverse engineering obfuscation
2. I am a "hands-on" master software engineer. I enjoy programming. I design prototypes and minimum viable products for *CTO* groups.
3. I have many inventions and some **recent patents** in a wide variety of application domains, e.g.:
   - digital automotive technology
   - Internet TV
   - cybersecurity
   - bioinformatics
   - accessibility
   - factory automation
   - VLSI CPU design
4. I am an expert generalist and an autodidact polymath[1]. I easily learn and become an expert in new fields.
5. In order to jump start my learning process I prefer to find a domain expert to mentor me, and I am also a good mentor myself.
6. I know many computer languages which I am able to learn easily due to my compiler background.
7. My "go to" *programming* languages in which I am quite proficient are the following:
   - C
   - Python and Beautiful Soup
   - Jinja2, the "gold standard" macro and template preprocessor
   - Pyexpander, which is much simpler to use than *Jinja2* and just as useful *except* where template inheritance is needed, *but* unfortunately is *polluted* by a GPLv3 license
   - bash, including Posix CLI commands
8. My "go to" *data* languages are *HTML*, *Markdown*, pandoc, srcML, *XML*, *YAML*, and *Excel*.
9. I thrive on undertaking new challenging projects. I am quite

comfortable engaging in and leading *flexible* "brain storming" sessions.
10. I have a long history of providing considerable value added to my employers. Browse the links that describe the details of my career. They will reveal a long history of "home runs". I am especially proud of my inventions in the fields of bioinformatics and accessibility (see here and here), even though they are not in the application domains where I usually work.

Work Experience

2022-25: Aurora Labs Tel Aviv IL

➤ Automotive Software Updates: CTO Group: (a) I invented a patent-pending algorithm to greatly reduce RAM consumption during FLASH updates which improves compression efficiency which is the core KPI of the software update industry; and (b) I greatly improved the CPU efficiency and RAM consumption of their core product which refactors embedded C source code

2022 part-time: Jerusalem College Of Technology (JCT/Machon Lev) Jerusalem IL

➤ Lecturer: Introduction to Cybersecurity

2021: Morphisec Beer Sheva IL

➤ Server Cybersecurity: Reverse engineering and refactoring of X64 object code

2021: consultant to Qedit Tel Aviv IL

➤ Banking Cryptographic Algorithms: Securing C algorithms in a web browser using WASM

2018-20: Argus Cyber Security Tel Aviv IL (restructured as PlaxidityX IL, subsidiary of Elektrobit/Continental DE)

➤ Automotive Software Updates: Patented algorithm greatly reducing FLASH memory required to implement bsdiff

2016 part-time: Canary Mission Jerusalem IL

➤ Consultant: SOHO Cybersecurity "Hygiene"

2014-17: Viaccess-Orca Ra'anana IL (subsidiary of Orange FR)

➤ Internet TV Infrastructure: Cybersecurity obfuscation manager

2013-14: *Discretix* Netanya IL (renamed *Sansa Security*, acquired by ARM UK)

The company sold their Internet TV business unit to Viaccess-Orca (2014) above.

2013 part-time: *NVT* (defunct) US

➤ CTO Nigerian Agritech

2012: Telequest (stealth) Jerusalem IL

➤ Vehicle Navigation Algorithms: VP R&D: Traffic jam reduction algorithms

2011: consultant to Syntezza Bioscience Jerusalem IL

➤ PCR MRSA Kit: Inventor of bioinformatic PCR algorithms using AI threshold technique, and more accurate bioassay normalization and noise reduction

2005-10: *NDS* Jerusalem IL (acquired by Synamedia UK)

➤ Internet TV Infrastructure: Cybersecurity researcher

2004: *Vyyo* (defunct) Jerusalem IL

➤ Broadband RF Networking: Architect of super-efficient cable modem testing laboratory

2002-03: *Virtouch* (defunct) Jerusalem IL

➤ Blind Accessibility Device: VP R&D: Inventor of product that allowed the blind to see/understand images in a PC/smartphone web browser ideally combined with a consumer grade graphics tablet

2002: *TMT* (defunct) Jerusalem IL; Local Area RF Networking

I did similar tasks for *Vyyo*. See Vyyo (2004) above and Vyyo (2000) below.

2002 part-time: *Jolt* Jerusalem IL (acquired by *MRV Communications* IL, and eventually by Adtran US)

➤ Free Space Optics Networking: Consultant: Designer of SNMP NMS client and agent

2000-02: *Vyyo* (defunct) Jerusalem IL

➤ Broadband RF Networking: Manager of S/W utilities group; inventor of cable modem hybrid (RF/dial-up) IP allocation protocol

1999: contractor to *Phasecom* Jerusalem IL (acquired by *Vyyo* above)

Broadband RF Networking: See the tasks that I did for the successor company Vyyo (above).

1998: contractor to *Fourfold* (defunct) Jerusalem IL

➤ Fabless VLSI CPU Design: Novel GCC compiler port for a FORTH-like CPU

1996-97: CEO *Pitkha* (defunct) Jerusalem IL, contractor to *Optimet* Jerusalem IL, subsidiary of Ophir Optronics IL

➤ Conoscopic Laser Interferometry: S/W architect of a DSL for a 2D measurement robot

1996: CEO *Pitkha* (defunct) Jerusalem IL, contractor to Elop/Elbit Rehovot IL

➤ Military Optical Devices: S/W architect of a DSL to implement a mil-spec automated testing laboratory for the BlackHawk helicopter weapons targeting system

1992-95: CEO *Pitkha* (defunct) Jerusalem IL, contractor to DSP Group Ramat Gan IL

➤ Fabless DSP CPU Design Center: Inventor and S/W architect of a DSL to implement the software tool chain for the PINE CPU

1990-91: contractor to Digital Equipment Corp (DEC) Herzliya IL (eventually acquired by Hewlett-Packard IL), contractor to Iscar Metalworking

➤ Metal Blade Production Factory: Co-inventor and S/W architect of a DSL to implement a shop floor production control system that orchestrated a completely automated factory

1988-89: contractor to *Cubital* (defunct) Herzliya IL, subsidiary of *Scitex* IL (acquired by Hewlett-Packard IL)

➤ One Of The Original 3D Printers: S/W R&D

1989: contractor to *Cubital* (defunct) Herzliya IL, subsidiary of *Scitex* IL (acquired by Hewlett-Packard IL)

➤ PC Accessibility Device For Quadriplegics: Inventor and S/W architect

1987: *Orisol* (defunct) Lod IL

➤ High Speed Sewing Robot For Leather Goods: S/W architect of a DSL used to control the robot

1980-86: Junior Programmer and Economist Positions in the US and Israel

1977: Ontario Energy Board Toronto Ontario

➤ Public Utility Commission: Public interest intervenor-economist at the ECAP77 hearings on marginal cost pricing for electricity

Unpatented Personal Inventions

➤ Inventions

Education

1. **1978-79:** York Univ Graduate School Toronto Ontario: **masters degree in economics with a minor in applied mathematics**[2]
    - My major project was an economic-engineering simulation of a hydro electric dam in *FORTRAN*.
2. **1976-77:** Univ Of Toronto Rotman Graduate School Of Management Toronto Ontario: **no degree, applied credits to York Univ (above)**
3. **1973-76:** Univ Of Toronto, Undergraduate School Of Arts & Sciences Toronto Ontario: **BA economics**
4. **1969-73:** Vincent Massey Secondary School Windsor Ontario: **"Honours" (grade 13) high school diploma**
    - I took my first course in computer science in *FORTRAN* on an IBM 1130 mini-computer with 16 KB RAM. My first serious program was a *perfect* game of *Qubic*, 3D tic-tac-toe, using 4 levels of boards each of which has 4x4 squares. Subsequently I became "addicted" to programming for life.

Personal

➤ Personal

Colophon

➤ Colophon

Footnotes

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1. **Autodidact Polymath:** There is a common misconception that only geniuses like *Leonardo da Vinci* deserve the appellation autodidact polymath, and therefore by referring to myself as one then I am making the bombastic claim to be a genius in the same category as Leonardo. There is an outstanding TED talk showing how children from Indian slums with the appropriate mentoring can become *autodidact polymaths*. And there was a similarly successful project done with children from Mexican slums. Many very intelligent people, especially as they get older, don't like moving outside of their intellectual comfort zone, whereas I revel in taking on intellectual challenges in new fields outside of my comfort zone. Note my "grand slams" in a wide range of application domains, where the only way to quickly achieve expertise was self-learning admittedly with the help of highly qualified mentors. I feel that I still maintain a high degree of child-like mental plasticity. Part of this skill I retain by regular interaction with my own young grandchildren, where my play with them is much more analytical than I used to exhibit with my own children.↩
2. **York Univ:** Exceptionally I passed my comprehensive examinations before I took any of the required economics courses! Therefore the school allowed me to take any accredited courses from any Canadian university. I had initially wanted to take a graduate degree in

engineering from the Univ of Toronto but they refused to accept me as a *regular* student, but they allowed me to enroll as a *special* student. In fact most of my courses for the York degree were from the Univ of Toronto graduate school of engineering.↩