Nicholas **Butts**

Staff Research Engineer · Embedded System Expert

908 7th St. East, West Fargo, ND 58078, USA

(701) 371-3358 | nlbutts@ieee.org | qnibbles.wordpress.com | nlbutts | nicholas-butts-1a456569

"A good scientist is a person with original ideas. A good engineer is a person who makes a design that works with as few ideas as possible. There are no prima donnas in engineering."

Summary

Current Chief Engineer Projects, Directory of Technology Development/Proof of Concepts at Appareo Systems. 21 years of experience designing, building, and fielding rugged embedded systems. Passionate, enthusiastic, driven engineer. I enjoy all aspects of embedded systems, from system engineering and architecture to embedded software design, code, and testing to electronics design and PCB layout. I've worked with bare-metal deeply embedded control systems to high end Linux based AI camera systems. I Enjoy solving complex problems with an innovative and driven team. I push myself to continuously learn new technologies and tools.

Skills

Languages	C, C++, Python, C#, Bash, Matlab, Perl
OS/Frameworks	Yocto Linux, Ubuntu Linux, Windows, Windows CE, Nucleous, FreeRTOS, Bare Metal
Frameworks	OpenCV, Tensorflow, Keras, Matplotlib, Pandas, Numpy, SciPy, Protobuf, Google Test, Google Mock
Networks	TCP/IP, ZMQ, CAN, J1939, ISO-11783, Custom protocols
Technology Focus	Embedded Systems, Microcontrollers, Computer Vision, Machine Learning, FPGAs, RF radios, SDR

Work Experience

Appareo Systems — *Fargo, ND*

Chief Engineer Projects, Director Technology Development/Proof-of-Concepts — *Jun. 2020 - Present*

- Technical lead and lead embedded software engineer on an AI enabled rugged aviation camera that used the NVidia Jetson Nano platform, 4K imaging, and Deep Neural Networks (DNN) for cockpit gauge recognition utilizing Yocto Linux, C/C++, Python, Tensorflow, and TensorRT.

Appareo Systems — *Fargo, ND*

Staff Research Engineer — *Jun. 2017 - Jun 2020*

- Project lead on a complex multi-radio communications Gateway for Northrop Grumman that utilized Iridium, OpenThread, Trellisware, and ultrawideband radio technologies developed in Yocto Linux and C/C++.
- Technical lead on a real-time embedded sensing module for liquid flow pressure and volume monitoring for agricultural sprayers utilizing C/C++, CAN, and J1939.
- Architectured a complex real-time embedded control module to control droplet size and flow rate on smart liquid nozzles for agricultural sprayers utilizing C/C++, CAN, J1939, and ISO 11783.
- Studied advanced acoustic designs for individual seed counting in air seeder applications. Created proof-of-concept hardware platforms for data acquisition and advanced signal processing algorithm to count seeds and separate singles from double impacts.
- Researched, designed, built, and tested a 2.4 GHz Frequency Modulated Continuous Wave radar for under crop canopy obstacle detection utilizing C/C++ and Python.
- Technical lead of an Emergency Use Authorization COVID 19 mechanical resuscitator that was designed, fabricated, and tested in three weeks.
- Research on various acoustic electro/mechanical conduction means for seed counting.
- Designed, built, and tested an innovative low light 360 degree underwater camera for fisherman utilizing C/C++ and Python.

Appareo Systems — *Fargo, ND*

Embedded Software Architect — *Jan. 2016 - Jun. 2017*

- Led team of embedded software engineers, created processes and procedures for company wide New Product Realization Process, guided software architecture on new products, mentoring and career planning of embedded software engineers.
- Technical lead on embedded acoustic mass flow detection device mounted inside combine processor/cleaning shoe utilizing C/C++, CAN, and ISO 11783.
- Technical lead on embedded grain quality sensor that is mounted on the clean grain elevator. This device utilized acoustic sensing to synchronize high output LED flash and high speed image sensor capture of grain passing through the clean grain elevator then applied computer vision techniques to detect material other than grain and broken grain utilizing C/C++, Python, CAN, Ethernet, and ISO 11783.
- Research on autonomous combine operation using advanced acoustic, electro-optical, LIDAR, 24/77 GHz radars sensors and fuzzy logic control systems.

Appareo Systems *Fargo, ND*

Senior Embedded Software Engineer *May. 2010 - Jan. 2016*

- Embedded software engineer on Stratus 2 portable ADS-B receiver. Wrote C/C++ code to interface with FPGA software defined radio, packet decode, power sequencing, firmware upgrading, and data recording.
- Embedded software engineer on Stratus 1 portable ADS-B receiver. Wrote C/C++ code to interface with FPGA software defined radio, packet decode, power sequencing, firmware upgrading.
- Embedded software engineer on cockpit crash recorder for light helicopters and fixed wing aircraft, implemented and optimized image pipeline and robust, fail-safe data recording and recovery utilizing C/C++
- Embedded Software Engineer on cockpit camera system for Bell helicopters.

John Deere Electronic Solutions *Fargo, ND*

Senior Software Engineer *May 2000 - May. 2010*

- Software lead on various rugged embedded systems: high end Windows CE displays, bare-metal embedded displays, transmission shift controllers, hydraulic controllers, center pivot control electronics.
- Researched new technologies and processors.
- Member of the Software Engineering Process Group and the Software Reuse library.
- Researched utilizing FPGA as a replacement for obsolete processors.

Patents

US8213321B2	Controller area network condition monitoring and bus health on in-vehicle communications networks
US9047717B2	Fleet operations quality management system and automatic multi-generational data caching and recovery
US9172481B2	Automatic multi-generational data caching and recovery
US9202318B2	Ground fleet operations quality management system
US20160000008A1	Harvesting machine capable of automatic adjustment
EP3192011A1	Non-image-based grain quality sensor
US9756785B2	Grain quality sensor
EP3530115A1	Innovative spraying system
US20160077075A1	Crop mass determination based on feed roller displacement
US20170235471A1	Harvesting machine capable of automatic adjustment
US20200027457A1	Wireless communications system and method
US20190049576A1	Ads-b transponder system and method

Presentation

VDI Smart Farming Conference *Düsseldorf, Germany*

Presenting Intelligent Grain Quality Sensor *May. 2018*

LAND.TECHNIK 2020 *Hannover, Germany*

Presenting Mass Flow Combine Sensors *Nov 2017*

Education

NDSU(North Dakota State University) *Fargo, ND*

M.S. in Electrical Engineering *Aug. 2001 - May. 2007*

- Controller Area Network Condition Monitoring and Bus Health on In-Vehicle Communications Networks

NDSU(North Dakota State University) *Fargo, ND*

B.S. in Electrical Engineering *Aug. 1995 - May. 2020*

Extracurricular Activity

IEEE (Institute of Electrical and Electronics Engineers) *Fargo, ND*

Member *Aug. 2012 - Apr. 2020*

CAP (Civil Air Patrol) *Fargo, ND*

Squadron Commander *Aug. 2012 - Apr. 2020*

- Lead group of volenteers, mentoring members on new skills, and education on aerospace.