

Nicholas Butts

CHIEF ENGINEER PROJECTS, DIRECTOR TECHNOLOGY DEVELOPMENT/PROOF-OF-CONCEPTS · EMBEDDED SYSTEM EXPERT

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Summary

Current Chief Engineer Projects, Directory of Technology Development/Proof of Concepts at Appareo Systems. 22 years of experience designing, building, and fielding rugged embedded systems. I am a passionate, enthusiastic, and results driven engineer. I enjoy all aspects of embedded systems, from system engineering and architecture to embedded software design, from 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 focused team. I push myself to continuously learn new technologies and tools.

Skills

Languages	C, C++, Python, C#, Bash, Matlab, Perl, various assembly languages, HDL
OS	Yocto Linux, Ubuntu Linux, Windows, Windows CE, Nucleous, FreeRTOS, Bare Metal
Frameworks	OpenCV, Tensorflow, Keras, Matplotlib, Pandas, Numpy, SciPy, Protobuf, Google Test, Google Mock, GStreamer, Docker
Networks	TCP/IP, ZMQ, CAN, J1939, ISO-11783, MQTT, RTP, RTCP, OpenThread, LoraWAN, Custom protocols
Technology Focus	Embedded Systems, Microcontrollers, Computer Vision, Machine Learning, FPGAs, RF radios, SDR
General	Team builder, Innovator, Hard Worker, Farm kid

Work Experience

Appareo Systems

Fargo, ND

CHIEF ENGINEER PROJECTS, DIRECTOR TECHNOLOGY DEVELOPMENT/PROOF-OF-CONCEPTS

Jun. 2020 - Present

- Leading group that investigates new technology, creates proof-of-concept demonstrators, and de-risks complex technologies.
- Technical lead, project manager, certification lead and lead embedded software engineer on an AI, CATM1 enabled rugged aviation camera that used the NVidia Jetson platform, 4K imaging, and Deep Neural Networks (DNN) for cockpit gauge recognition utilizing Yocto Linux, C/C++, Python, Tensorflow, GStreamer, ZMQ, Protobufs, and RTP.

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.
- Architected a complex real-time embedded control module to control certain aspects of agricultural sprayers.
- 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 algorithms 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++, Python, POE, ray traced optical simulation.

Appareo Systems

Fargo, ND

EMBEDDED SOFTWARE ARCHITECT

Jan. 2016 - Jun. 2017

- Lead team of embedded software engineers, created processes and procedures for company wide New Product Realization Process, guided software architecture on new products, mentored embedded software engineers.
- Technical lead on embedded acoustic mass flow detection device mounted inside combine processor/cleaning shoe utilizing C/C++, 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 a high speed image sensor capture of grain passing through the clean grain elevator. Then it applied computer vision techniques to detect material other than grain and broken grain utilizing C/C++, Python, CAN, Ethernet, and ISO 11783.
- Researched 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 1 and 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 several cockpit crash recorders for light helicopters and fixed wing aircraft, implemented and optimized image pipeline and robust, fail-safe data recording and recovery utilizing C/C++

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
US2016000008A1	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
US11018764B2	RF Communications System and Method

Presentation

VDI Smart Farming Conference

PRESENTING INTELLIGENT GRAIN QUALITY SENSOR

Düsseldorf, Germany

May, 2018

LAND.TECHNIK 2020

PRESENTING MASS FLOW COMBINE SENSORS

Hannover, Germany

Nov 2017

Education

NDSU(North Dakota State University)

M.S. IN ELECTRICAL ENGINEERING

Fargo, ND

Aug. 2001 - May, 2007

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

NDSU(North Dakota State University)

B.S. IN ELECTRICAL ENGINEERING

Fargo, ND

Aug. 1995 - May, 2020

Extracurricular Activity

IEEE (Institute of Electrical and Electronics Engineers)

MEMBER

CAP (Civil Air Patrol)

FORMER SQUADRON COMMANDER

Fargo, ND

Aug. 2012 - Apr. 2020

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

Boy Scouts of America

EAGLE SCOUT

Fargo, ND

Appareo Systems

CORE AWARD

Fargo, ND

- 2020 Pushing the boundaries of what is possible
- 2016 Pushing the boundaries of what is possible
- 2012 Pushing the boundaries of what is possible