**Mariano Ruiz**

1820 Bombay Lane, Knoxville, TN 37932 —— (865)566-3195 —— marianomruiz@gmail.com

***Experience****-***Research Professional-Data Acquisition/Software Engineer, SNS, ORNL, March 2009-Present**

***Software***-Developed a wide range of EPICS (Experimental Physics and Industrial Control System) and LabVIEW® software applications for the DAS (Data Acquisition System) at SNS. These applications are used to automate a wide variety of the beam lines hardware. The software developed controls and monitors sample changers, heating and cooling equipment, motors, power supplies, sample robots, neutron detectors, super conducting magnets, neutron choppers, neutron cameras, digital and analog modules, level meters, gas mixers, PLC’s, and vacuum systems. The SNS equipment is interfaced/automated using several communication standards and protocols such as vendor API’s, 232, 485, 422, Modbus, OPC, GPIB, Shared Variables, UDP, TCP/IP, SMTP, HTTP, NTP, EPICS CA, and FTP. The programming languages used are C, C++, Python, C#, LabVIEW, Ladder Logic, EPICS databases, and EPICS State Notation Language.

***Hardware-***Created numerous circuits and prototypes to interface hardware to DAS using microcontrollers, surface mount electronics, real time hardware, PLC’s, analog and digital modules, thermocouples, force meters, pressure sensors, leak detection sensors, capacitance sensors, and many others. Developed the first chassis to interface the Rheometers to EPICS. Prototyped the first Liquid He Auto Fill System using microcontrollers and digital electronics. Prototyped the main magnet Power Supply interface for the Magnetism Reflectometer beam line at SNS. Provided the idea and details to protect the newly acquired 14 tesla magnet when switching between asymmetric and symmetric mode. With the help of another engineer, created the first in-house built T-Zero chassis. With the help of a scientist, created the first Magnetic Force Meter hardware using multiplexors, force sensors, and analog and digital input modules. Developed circuits to disable detectors when SNS is producing lower amounts of neutrons at the SNAP beam line.

***High Impact Projects***-Developed the LHeAF (Liquid He Auto Fill) automation section of the software and hardware. The LHeAF has been multiplied across SNS and HIFR and considerably reduces Helium waste, experiment interruptions, and man-hours. With the help of another Engineer, developed the first T-Zero chopper Control System for Powgen. Currently, I am coordinating the development of the new T-Zero for VENUS. Additionally, developed the software to control and monitor the recent acquired 14 tesla magnet. Programmed and coordinated the control system/technical aspects of AGES (Automated GAS Environment System). Wrote the software to interface most of the superconductive magnets used at SNS. Recently wrote the interface to the Resonant Ultrasound Spectroscopy RUS-01 hardware. Increased the sample throughput at Bio-SANS by developing the software to control the Meca Robot Sample Changer. Modified the recent needle valve logic to reduce neutron and He waste. Contributed with the migration of the legacy DAS or SPICE beam lines to EPICS on SNS and HIFR. Architected the Legacy Slow Controls network transition topology to facilitate the conversion to the EPICS networks topology.

**Ticketing-Version Control-Prioritization-**Followed and assisted the enforcement of common software development practices using project tracking and issue tracking software such as Kanban, JIRA, SharePoint, TRAC and version control tools such as SVN, Gitlab, Redmine, and GIT. These tools greatly helped us organize project priorities, maintain software backups, easily recover software during computer hardware failures and revert to previous versions of the code.

**On-Call Support**-Provided 24/7 on-call support for DAS. The support covers EPICS software, accelerator timing, detector electronics, beam monitor electronics, data transfer, Python experiment automation, Detector Histogram displays, software and hardware support for choppers and sample environment. The on-call support expedites the recovery process during anomalies.

***Experience*-LabVIEW® Developer/Electronics Technician/IT/Network SNS, ORNL, October 2004-March 2009**

* Served for five years as the primary legacy Chopper Software Developer and primary Legacy Sample Environment Software developer by creating 100+ applications for slow controls excluding motor support.
* Created the first alert notification system for slow controls software at the SNS Beam lines.
* Repaired and troubleshot electronic boards at the component levels. Some of the cards are Optical Distribution Boards, Timing Cards, and ROC boards.
* Administered, configured, and installed the Legacy DAS computers and DAS networks at the SNS beamlines including the backbone CISCO switches. Additionally, configure and maintained the first 10Gbit network used at the Nomad beam line.
* Setup the Legacy DAS servers and networks for the Sample Environment and Chopper test stations at their cages.

***Experience***-**FitCube Barbell Level Invention, Product Development and Management June 2016-December 2020**

## From an idea created a product by inventing the first microcontroller-based Barbell Level Sensor, Patent US9623285B1. FitCube alerts the user if the posture of the barbell is incorrect during the lift. FitCube also informs the weightlifter on the acceleration and rotation of the Barbell during the lift.

* Developed all aspects of the invention encompassing, CAD enclosures, 3D prints, electronics layouts, electronic design, soldering, assembly, microcontroller programming, BOM and testers.
* Managed FitCube budget, orders, sales, and advertisement.
* Supervised two software developers assisting with the Android mobile applications and website creation.
* FitCube was selected to compete on the [Knoxville Entrepreneur Center What's The Big Idea 2019](https://www.knoxnews.com/story/money/business/2019/07/02/these-local-startups-cusp-making-big-meet-each-one/1422129001/). <https://www.knoxnews.com/story/money/business/2019/07/02/these-local-startups-cusp-making-big-meet-each-one/1422129001/>

***Experience***-**Research Internships**

**Oak ridge National Laboratory June 2004 to August 2004**

* Designed, build, and programmed the first needle valve Cryostat control system for the SNS beam lines. This needle valve was used for about 10 years at SNS and reduced many man hours of labor and Helium waste.

**Berkeley National Laboratory June 2003 to August 2003**

* Developed circuits to create High Voltage Arc Detector for the Venus Ion Source at the 88” Cyclotron. These circuits were used to protect Klystron amplifier in the event of reflective power.

**Argonne National Laboratory June 2002 to August 2002**

* Assisted scientist in determining the efficacy of electrodeionization (EDI), a treatment used to remove ionized impurities from water, experimenting with different settings using DC power supplies and digital and analog electronics.

***Experience***- **Aircraft Recovery Crew Leader Sergeant U. S. M. C. August 1995 to August 1999**

* Supervised and trained a six-person crew on all aspects of the arresting gear and lighting airfields. Ensured the six-person crew, arresting gears, and airfield lighting systems were operational to trap fighter jets in case of emergencies at all times.

***Education****-***University of Texas at Brownsville, Bachelor of Science in Electronics Engineering Technology, August 1999 to May 2004**

***Recognitions and Accomplishments.***

AGES: Automated GAS Environment System for in situ neutron powder diffraction (ORNL).

[*https://doi.org/10.1063/1.5031432*](https://doi.org/10.1063/1.5031432)

Development of a Modular Automation Scheme for a Liquid Helium Cryofurnace. (ORNL).

[*https://www.ornl.gov/news/cryogenics-equipment-maker-licenses-ornl-auto-fill-method-more-efficient-liquid-helium-use*](https://www.ornl.gov/news/cryogenics-equipment-maker-licenses-ornl-auto-fill-method-more-efficient-liquid-helium-use)

A high precision gas flow cell for performing *in situ* neutron studies of local atomic structure in catalytic materials [*https://aip.scitation.org/doi/10.1063/1.5000452*](https://aip.scitation.org/doi/10.1063/1.5000452)

A Unified User-Friendly Instrument Control and Data Acquisition System for the ORNL SANS Instrument Suite [*https://doi.org/10.3390/app11031216*](https://doi.org/10.3390/app11031216)

SNS INSTRUMENT DATA ACQUISITION AND CONTROLS

<https://accelconf.web.cern.ch/ICALEPCS2013/papers/tuppc076.pdf>

# Neutron scattering experiment automation with Python

<https://ieeexplore.ieee.org/document/5750475>

Automated Cryogenic Refill System 138974.183190-US (Pending).

[*https://uspto.report/patent/app/20190211970*](https://uspto.report/patent/app/20190211970)

Barbell Level Indicator US9623285B1 (Issued).

[*https://patents.google.com/patent/US9623285B1/en*](https://patents.google.com/patent/US9623285B1/en)

***Personal Projects***

**Stock Patter Analysis and Notifier-**Developed a stock trading pattern search based on C# and the google API.

**Home Data Acquisition and Control-** Created a Security System, garage automation, home temperature monitor, washer and dryer leak alert mesh using variety of sensors, Raspberry Pi’s, Python and IoT protocols.

**Air to Fuel Ratio Logger-**Wide band Air to Fuel ratio Arduino logger tool used for tunning of gasoline engines.

**CAD and 3D Printed Projects-** 3D printed and Designed with Fusion360 many tools and gadgets for home use.

**Solder Reflow Oven for PCBs**-Created a PCB solder reflow oven using Pulse Width Modulation, Arduino, FETs, Fans, and Solid-State Relays.

**Mobile Application Development**- Produced several Android accelerometer and Bluetooth BLE applications.