

## Logistics

Date: Thursday 02/16/2017

Time: 8:00a.m. – 4:30p.m.

Location:

Ohio State University

ElectroScience Lab

Room: MRC

Address: 1320 Kinnear Rd,  
Columbus, OH 43212

Lunch provided to those who  
register:

<https://ettuscolumbusworkshop.ventbrite.com>

Laptops and radios will be  
furnished, with priority given to  
registrants (attendees may be  
encouraged to bring their own PC  
and/or radio if need be)



## Agenda

- Introduction to SDR (architecture, HW and SW overview, application overview)
- Overview of the USRP devices (hardware and software)
- Introduction to open-source software tools and frameworks
- Building, installing, and configuring UHD and GNU Radio on Linux
- Practical hands-on laboratory for using UHD and GNU Radio
- Building SDR application based on USRP, UHD, and GNU radio
- Spectrum Monitoring using GNU Radio and Gqrx
- Overview of the FPGA toolchain (Xilinx Vivado)
- Introduction to building FPGA images, and FPGA programming using RFNoC
- Discussion of synchronizing multiple USRP devices for phase-synchronous and MIMO applications
- Discussion of cellular applications (OpenBTS, srsLTE, OpenLTE, Eurecom OpenAirInterface, Amarisoft)
- Discussion of GNSS applications (GNSS-SDR, Skydel Solutions, etc.)
- Discussion of embedded SDR workflow, embedded Linux environment (OE), and E310 SDK
- Discussion and demonstration of using the E310/E312

# Ettus Research SDR Hands-On Workshop: USRP, UHD, GNU Radio

Presenters\*

Neel Pandeya: Senior Engineer

Tim Fountain: Business Development Director

\*Bios on next page



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### Neel Pandeya:

Neel is a Senior Software Engineer and the Manager of the Technical Support group at Ettus Research, a National Instruments Company, in Santa Clara, California. His background and interests are in open-source software development, kernel and embedded software development, wireless and cellular communications, DSP and signal processing, and software-defined radio (SDR). Prior to joining Ettus Research in 2014, Neel Pandeya worked at several start-up, mid-size, and defense companies, such as Range Networks, Draper Laboratory, Envoy Networks, Texas Instruments, and Teradyne. Neel Pandeya holds a Bachelor's Degree in electrical engineering (BSEE) from Worcester Polytechnic Institute (WPI), and a Master's Degree in electrical engineering (MSEE) from Northeastern University. He also has a ham radio license, and is aspiring to obtain a private pilot license.

### Tim Fountain:

Tim has over 25 years' experience with industry leaders in electronics manufacturing in specific areas of RF, high speed analog to digital technologies, test and measurement, military & aerospace, consumer electronics, data acquisition and control. Tim works with customers to help them design, develop and deploy SDR technologies in the diverse areas of next generation communication systems, signals intelligence, satellite communication, telemetry and spectrum monitoring. Tim holds an MSEE in Electrical Engineering and is a Chartered Engineer.

### Mark Kaschner:

Mark is an account engineer with National Instruments based in Ohio. With an electrical and computer engineering background, he has worked the last 5 years with large organizations to increase efficiency in research and test tools and processes. Mark holds a BSEE from The Ohio State University and his Professional Engineer (P.E.) distinction in the state of Ohio.

### About Ettus Research

Ettus Research™, a National Instruments (NI) company since 2010, is the world's leading supplier of software defined radio (SDR) platforms, including the Universal Software Radio Peripheral (USRP™) family of products. With an overall affordable system price, expansive capabilities, and fully supported by the open source community, USRP products are used by thousands of researchers, engineers, and scientists worldwide and remain the top choice in software defined radio hardware for algorithm development, exploration, prototyping and developing next generation wireless technologies across a wide variety of applications.

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