The ElectroScience Laboratory (ESL) has influenced radio research like no other institution in the world. Since the 1940s, ESL has consistently maintained a national and international preeminence in electromagnetics (EM), Radar/Radio Systems and Wireless (Radio Frequency-RF) systems general.

Our faculty and researchers are among the most respected names in EM/RF research and education. ElectroScience faculty, researchers, and students are leading cutting-edge research in antennas, novel RF materials and crystals, Radio Frequency integrated circuits (RFICs), RFIDs, GPS navigational systems, remote sensing, wireless sensors, bioelectromagnetics, optics and more.

Current Composition of People
-- 38 professional staff (9 faculty, researchers, post-docs)
-- 10 support staff
-- 70 graduate students
1941-1967 TimeLine

- Invention of new model measurement techniques for antennas (Bill Everitt)
- ElectroScience (then Antenna Lab) grows to 50 people by 1946 (under George Sinclair)
- Lasers and non-linear optics became an important research; “Lasers and Applications” symposium in 1962
- Time division multiple access for satellite communication demonstrated
- Concepts of wideband and frequency independent antennas introduced
- Radar Cross Section (RCS/Stealth) definition and related studies introduced, including Radome research
1967-present

- Polarimetric imaging invented
- Uniform Theory of Diffraction invented, becoming the standard for high frequency EM analysis, leading to CAD tools that continue to define ESL’s impact
- First ever integral equation solutions using modern computers---leading the way for CAD design as we know it today
- Compact Range measurement techniques invented, becoming the standard across the world
- Finite Element Methods established, and leading to the most popular CAD package in the market

ESL secures a joint service electromagnetics project (JSEP) under Director C. H. (Buck) Walter. This project (ended 1998) stands as the largest project in ESL history.

Professor Leon Peters becomes ESL director. Growth at the lab continues supported by major contracts from NASA and the Compact Range Consortium.

Professor Walter D. Burnside becomes ESL director. Significant growth takes place in industrial research causing it to reach nearly 50% of total funding.

Professor John L. Volakis becomes director. ESL hosts its second IEEE Antennas and Propagation Symposium, Multidisciplinary Research Initiative (MURI) on Novel Materials for Antennas awarded.

ESL building is remodeled. College approves new ESL building financial plan.
At this time, five years after my formal retirement, I cannot resist a few personal words of appreciation to each and every member of the Laboratory who has served so loyally.

This Laboratory has not been run by any individual or group of individuals; it has been a cooperative enterprise in which every staff member, employee, graduate student, etc., has been an essential part. The spirit of cooperation everyone has shown and the enterprise and initiative which has been characteristic of the entire group have made the Director’s job a relatively easy one.
Electro Science Laboratory, approx. 1945

Front, L-R: Richard Ohlemacher, George Sinclair, Kenneth Yates, Jeanne Laughlin,
Ernest Jones, David Cleckner, Edward Jordan.
Back, L-R: Eric Vaughan, David Huffman, Wayne Rife, Harold Lucal,
Robert Jacques, Norman Kennedy, Fred Kransz, Larry Mannett.
25 June 1950
Photo of Antenna Lab Personnel

ANTENNA LABORATORY PERSONNEL
Ohio State University Research Foundation
June 25, 1950
Dr. Masters as featured on the 1951 Electrical Engineering Dept Brochure doing final touches on the just installed Empire State Building Color TV antenna
“My TV Broadcast Antenna project as ESL, about which you enquire, was a fortunate interlude for me. I joined ESL as Assistant Professor from a position of advanced development engineer at RCA, Camden, NJ, where I had accumulated a broad knowledge of TV transmitting requirements and a number of patents, most notably the so-called batwing radiator. To the chagrin of the more mature researchers such as G.H. Brown, P.S. Carter, etc., the batwing was what made possible the rapid implementation of TV broadcasting in the U.S. It has not been excelled in the 50 years since its introduction despite considerable research toward that end. The Japanese adopted the batwing for use in Japan, and it is used in a number of foreign countries.
Comments from Wayne Masters

The design of this particular antenna overcame the usual tendency of a broadside radiation beam of a traveling wave antenna to sweep rapidly with frequency variation, albeit only a narrow band just wide enough for one TV channel (six MHz in the range 174-261 MHz). The Harris Co. in Quincy IL, took over from RCA, who obtained the patent rights from the OSU Research Foundation. The important features were perfect input impedance match to the coaxial feeder, power handling limited…..
After some serious head scratching and mulling the objectives, I hit upon the idea of a traveling wave approach. A false start using radial monopoles loop-coupled to a coaxial transmission line nevertheless led us to the successful traveling wave scheme using probe-coupled diametrically opposed slot pairs spaced at quarter-wavelength intervals along the coaxial transmission line and rotated consecutively 90°. This was the ideal solution. We were able to obtain a patent on the invention, and the research report on the project constituted my Ph.D. dissertation. This report must be in the file somewhere at ESL. It was technologically the most satisfying piece of research I have ever done. As you perhaps know, my degree was conferred in 1957 at the University of Pennsylvania by J. Grist Brainerd, then Chairman of the Moore School of Electrical Engineering.
Likely, one of the first ever antenna measurements for early aircraft
Original Compact
Range:
44 inch lens
An early GPR antenna
“Those were good times, though rather anxious for the first year. When we left Deep River in April ‘48 they were still driving trucks out onto the river to cut ice blocks for the town’s ice house. It was a balmy spring day when we arrived in Columbus with $10 and two small kids and a car I learned to drive on the way. I asked Jack Bacon if he’d back it out of the parking lot because I had no practice at driving in reverse. I cannot begin to describe the kindness of the Bacons. Oddly enough, I discovered years later that Jack grew up in England in the same town where I grew up. Please give our best to any of our old friends”
The Familiar Satellite Antenna at the Saucer Field
Various views of the absorption cell and associated equipment 1962
New Antenna Lab at Kinnear Rd.
It was built with funds from the Ohio State Athletic Dept to move the earlier Lab located at the current St. Johns Basketball arena.
(the expansion to the left will occur in 1964)
Back side of the Antenna Lab at 1320 Kinnear Rd prior to 1964
Fully Expanded ElectroScience Lab after the 1964 addition
Early double stub tuner radar measurement system

Low RCS strings used to support target; Theodolites were used to align the target.
John Kraus (1910-2004)

Ohio State Professor and celebrated author of undergraduate and graduate texts in Electromagnetics; Designer of the Big Ear radio telescope at Ohio State University

Each of his books has sold more than 500,000 copies worldwide and translated in several languages
1974 ElectroScience Lab Personnel
1980 ElectroScience Lab Personnel

From Left to Right:
Row 1 (Sitting): Eleanor Trayler, Sally Keener, Holly Mandold, Lois Dusky, Dotty McInerney, Mary Steverley-Mooreman, Linda Eberle.
O.S.U. ELECTRO SCIENCE LAB PERSONNEL 1964

From Left to Right:
Row 1 (In front): Leon Peters, Jonathan Young, Molly Wambold, Constance Way, Gulbin Dural, Lois Dosky, Aghan Altintas,
Essaid Boulkache, Kwong Ng, Dennis Burnside.
Row 2 (First step): Sally Ells, Eric Walton, Karen Mitalco, Eric Bohley, Mary Moehrman, AJ Dominik, Jiti Gupta, Bob Davis,
Teh-Hong Lee, Cou-Yaw Wang, Mataru Ebihara, Jacob Kim, Bing Kwan.
Row 3 (Middle): Pete Bohley, Jack Richmond, Dean Svoboda, David Koberstein, Ross Caldecott, Max Gordon, Paul Griffith,
Roberto Rojas, Curt Levis, Sina Barkeshli, Fred Fok, Ed Damon, Kuan-Ting Lin, Nan Wang, Roger Rudduck,
Jim Lin, Robert Montgomery,
Row 4 (In back): Joe Usoff, Rick Hartenstein, Jim Gibson, Anthony Zwilling, Bill Leeper, Bob Evans, Alex Kamps,
Mike Pfeifer, Robert Burkholder, Ron Marhefsik, Yoshi Tamamura, Errol English, Keith Aberegg,
Neil Chamberlain, Jeff Hughes, Eric Evans, Mark Rader, Ming-Cheng Liang, Kevin Lambert, Albert Lai,
Richard Campbell.

(Photograph taken Thursday, October 25, 1964).
Radome Design:
Left to Right: Prof Ben Munk with (his student) Dr. Errol English
From Left: Tom Coveyou (now at Matrix Engineering), Brian Kent (AFRL), John Mehr (Ball Aerospace, Boulder), Errol English (ATK), Ben, Bill Kent, Steve Schneider (AFRL), Jeff Hughes (AFRL), Lee Henderson (practicing patent law)
Early work on the Compact Range developed at OSU-ESL by Prof. Burnside (mid to late 80s)
1984 Photo

From Left: Dennie Burnside (ESL Director 1993-2002), Leon Peters Jr. (ESL Director, 1983-1993), John Volakis (ESL Director, 2003--)

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Largest Univ. Compact Range (up to 115GHz)
2009 Photo
Nov 24, 2009 New ESL Ground Prep
Dec 1, 2009 New Building Prep.
ElectroScience Labs---2009

- Mixed Signals/RF Integrated Circuits
- Design & Computational EM
- RF Propagation
- Radar Systems and RF Wireless Components
- Metamaterials
- System-on-a-chip
- Microfluidics
- Microwaves Circuits and Devices
- MEMS Fab. and Design
- Retail RFIDs
- Wireless Lab (up to 115GHz)
- LTCC fabrication/Clean Room for 3D Electronics
- Largest Univ. Compact Range (up to 115GHz)