

LABORATORY FOR INFORMATION & DECISION SYSTEMS

An interdepartmental research center Advancing the science and art of intelligent systems

> LIDS@80: A Celebration Information and Decision Sciences From the Past to the Future Nov. 1-2, 2019

It takes a village



Organizing committee











Really in charge









and many more from LIDS and IDSS



IDSS through its Industrial Partnership and Alliance programs



William Irving (PhD '95)

and other alumni gifts

Abhay Parekh (PhD '92)



LABORATORY FOR INFORMATION & DECISION SYSTEMS

An interdepartmental research center Advancing the science and art of intelligent systems

LIDS from the Athans Times to the Present

John Tsitsiklis LIDS director

LIDS80 Celebration Nov. 1-2, 2019

From the Athans times to today





shutterstock.com + 246451582



https://fineartamerica.com/featured/1-an-ancientclepsydra-or-water-clock-ken-welsh.html

From the Athans times to today

LDS

• Honoring Mike Athans (LIDS director, 1974-1981)



- What happened under his watch
- How it is all relevant today

The timeline



T 1939 Servomechanisms lab



Numerically controlled machines Radar for air defense Storage and retrieval Project Whirlwind

Jay Forrester Magnetic core memory



$$\min \int g(x, u) dt \quad \text{s.t.} \quad \dot{x} = f(x, u)$$
Pontryagin
$$\min \int \left(x'Qx + u'Ru \right) dt \quad \text{s.t.} \quad \dot{x} = Ax + Bu$$
Kalman

+ stochastic counterparts

ziiiiaii

Multivariable (MIMO) control

LQG methodology Robustness

Enter Mike Athans



 T
 T
 T
 T

 1939
 ~1960s
 1974
 1981

 Servomechanisms
 lab









• Bringing together communications and control







From the stars down to earth

- Make control theory practical
- Unbounded optimism
 - Command and control
 - Aerospace
 - Transportation: air-traffic control; roadways
 - Flexible manufacturing
 - Energy/power
 - Macroeconomic modeling and control
 - plus ça change, plus c'est la même chose





Some invariants





"...universities (at least the LIDS group at MIT) cannot and should not do **real** applications; industry does applications" (M. Athans report to NASA, 1984)

"We don't do deliverables, unless the word includes foundational research and educating the new leaders" (A. Willsky, paraphrased)

The sequel



2015 ~1960s 1974 1981 1939 INSS MIT INSTITUTE FOR DATA SYSTEMS, AND SOCIETY MIT STATISTICS DATA SCIE

- Center for Intelligent Control Systems
- LIDS joins IDSS
- Many new faculty
- Critical mass in Stats/DataSci/ML



Education





Athans & Dertouzos, 1972 "Systems, Networks and Computation"



School-wide offering on multivariable control, 1980s

Willsky, 1979 "Digital Signal Processing and Control and Estimation Theory: Points of Tangency, Areas of Intersection, and Parallel Directions"



Education





https://www.newsbeast.gr/travel/destinations/arthro/2364992/to-politragoudismeno-gefiri-

What's in a name





• Norbert Wiener:

"the problems of control engineering and of communication engineering are inseparable"

Laboratory for Communications and Control

Information

Decision Systems



Physical systems

Social systems

Data/ **"LIDS** Decisions Information **inside"** and control

Computing infrastructure