USC Viterbi School of Engineering
Viterbi MAGAZINE
SPRING 2017

ARTICLES

USC VITERBI MEETS "GAME OF THRONES"

What if new USC Viterbi research centers were re-imagined as great houses from the HBO hit series? With unique heraldry, words, legends, etc. — just a little less dynastic violence.

By Adam Smith; Illustrations by Dave Murray

House SleepHuB

Colors:

blue, gray, pale yellow (optimal sleep colors)

Words:

Breathe, Sleep, Live

Prized Heirlooms:

Isolation, Meditation, Sleep Monitors, MRI Scanner, CPAP machine

Legends:

CHIME (Collaborative Home Infant Monitoring Evaluation) Study — Multicenter study whose leadership team involved: Tom Keens, Sally Ward, Toke Hoppenbrouwers). First MRI demonstration of upper airway closure during central

apnea in 2014 (Krishna Nayak)

Congenital Chronic Hypoventilation Syndrome (One of the largest cohorts of patients at CHLA – Tom Keens, Sally Ward),

Loop Gain for quantifying ventilatory stability during sleep (Khoo)

Lineage:

A noble alliance of the USC Viterbi School of Engineering and Keck School of Medicine of USC and Children′s Hospital Los Angeles

Sworn Enemies:

Sleep apnea

Ancestral Seat:

Viterbi

House MASCLE

(USC Machine Learning Center)

Words:

Never-ending deep learning

Prized Heirlooms:

Big Data, fast machines, effective machine learning models

Legends:

House MASCLE specialize in theories, algorithms and applications of machine learning, leading to major impacts in many domains, ranging from AI, health care,

climate change, traffic, education to public policy.

MASCLE hosts world-renowned researchers with many honors and awards, such as 2x Gödel Prize winner (Shanghua Teng), NSF CAREER award winners (Yan Liu, Ilias Dinokakolas, Yingying Fan, Jinchi Lv, Shang–Hua Teng), Sloan award winners (Fei Sha, Shanghua Teng), and Best Paper Award Winners in top conferences in machine learning and data mining.

The researchers have extensive experience working with major companies such as Google, Samsung, ExxonMobil, IBM, Mayo Clinic, Boeing, Yahoo and Facebook.

Lineage:

Combining the illustrious and storied researchers of USC Viterbi′s Department of Computer Science, USC Information Sciences Institute (ISI) and USC Institute for Creative Technologies (ICT).

In alliance with the USC Marshall School of Business

Sworn Enemies:

Small, poor-quality data

Ancestral Seat:

Ronald Tutor Hall, USC Viterbi School of Engineering

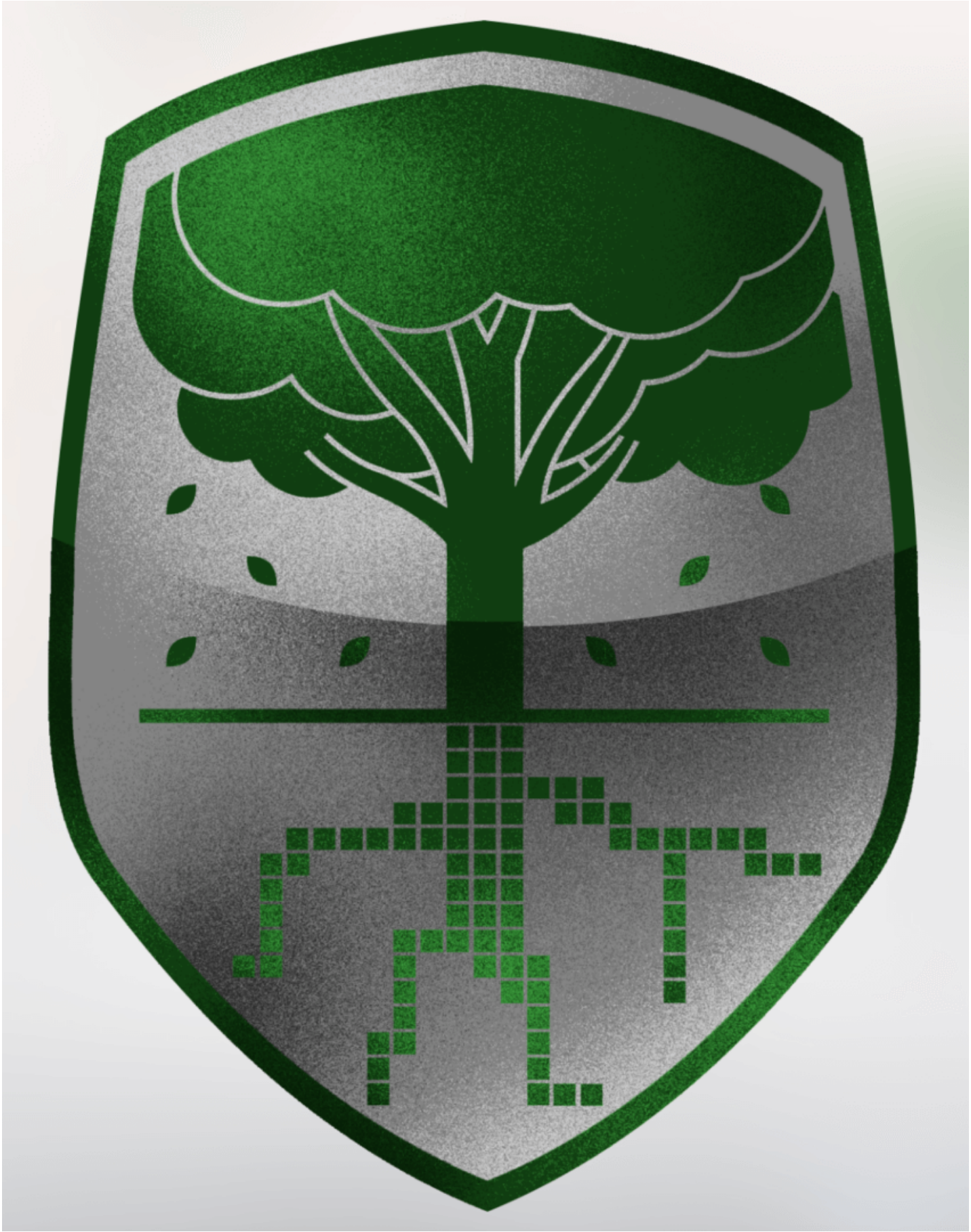
House CAIS

(Center for Artificial Intelligence in Society)

Colors:

Dark forest green and silver

Words:



> Strengthening society through Artificial Intelligence

Prized Heirlooms:

Stackelberg security games, BLADE algorithm

Legends:

PAWS (Protection Assistant for Wildlife Security) is now protecting endangered animals in Africa, Asia and the Gulf of Mexico. In August 2016, PAWS helped rangers find a large, hidden cache of elephant and antelope snares, which possibly saved multiple elephants from being poached.

A 2013-2016 collaboration with homeless shelters like My Friend′s Place resulted in 180 percent greater awareness about HIV/AIDS among homeless LA youth than traditional means of information sharing.

Lineage:

A noble alliance of the USC Viterbi School of Engineering and the USC Suzanne Dworak-Peck School of Social Work

Sworn Enemies:

Poachers, terrorists, HIV/AIDS

Ancestral Seats:

Salvatore Hall, USC Viterbi School of Engineering; City Center, USC Suzanne Dworak-Peck School of Social Work

House NG-ION2

(Northrop Grumman Institute of Optical Nanomaterials and Nanophotonics)

Colors:

> violet, blue, green, yellow, orange, and red

Words:

Let there be light … at the nanoscale

Prized Heirlooms:

Newport blue laser, black phosphorus, nonlinear crystalline materials, plasmonics

Legends:

Lead by Prof. Andrea Armani — one of Ćṙ ṿẴḵ ẃĎǜḙǴỖǜǴṫẎ 2013 "Brilliant 10" — this house of material scientists, electrical engineers, physicicists and chemists does fundamental research in how light interacts with tiny materials at the atomic level.

Lineage:

A noble alliance of the USC Viterbi School of Engineering and the Northrop Grumman Corporation

Sworn Enemies:

Light interference, optical loss, de-lamination

Ancestral Seat:

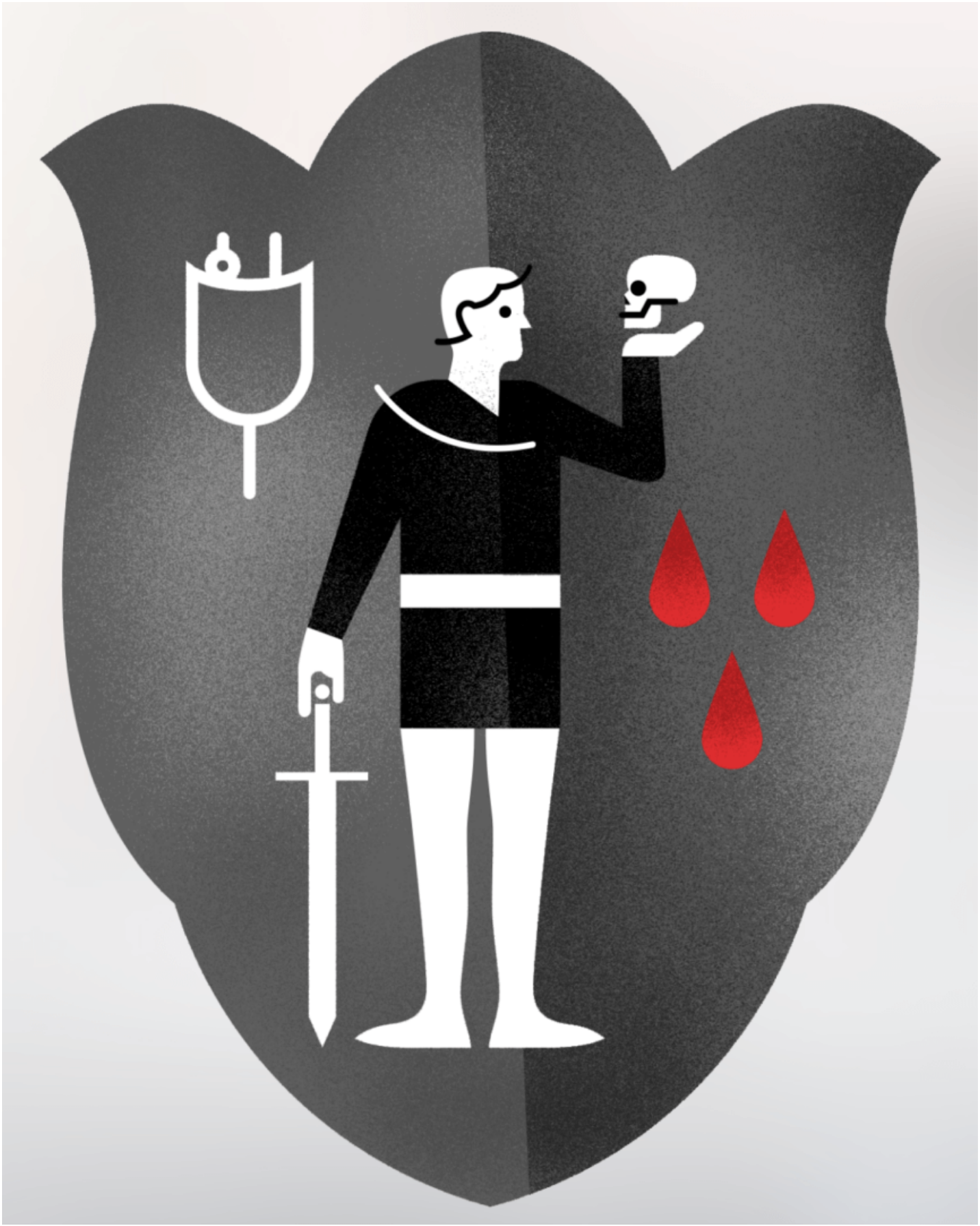
Vivian Hall, USC Viterbi School of Engineering

House DECIDE

Center for Interdisciplinary Decisions and Ethics

Colors:

> Black, white and gray



Words:

Decision vs. outcome. Know the difference.

Prized Heirlooms:

[illegible] decision making in public policy. Ahoona, an online social network with several thousand global users, helping spread decision-making skills to society.

Legends:

Since 2007, Abbas has worked with troubled teens at the Champaign County Juvenile Detention Center, helping them avoid the disastrous choices that can ruin lives.

In March, DECIDE launched a professional education certificate on decision-making and ethics for corporate executives.

Hypothetical characters such as the "Clairvoyant" (who knows the future) and the "Wizard" (who can make things happen) are used to aid in decision-making and underscore the value of information.

In October, DECIDE hosted a "Next Generation Ethics" symposium, outlining the ethical, legal and prudential dimensions of decisions.

Lineage:

A noble alliance of the USC Viterbi School of Engineering and the USC Price School of Planning and Public Policy

Sworn Enemies:

> Indecision, gut decisions, unethical decisions, irrational choices

Ancestral Seat:

Ronald Tutor Hall, USC Viterbi School of Engineering

House CCI

(USC Center for Cyber-Physical Systems and the Internet of Things)

Colors:

Gray, cardinal

Words:

Behold, the wisdom of things!

Prized Heirlooms:

USC Internet of Things (IoT) testbed, network protocols, data analytics, secure distributed computing, robotics and control

Legends:

House CCI aids in everything from connected vehicles to manufacturing to air quality, connecting insights from the Internet of Things (IoT) – including cars, phones, buildings, bridges, clothes, etc. – to humans.

Behrokh Khoshnevis was named one of 10 academic pioneers for the IoT in 2016 by Connected World

House CCI members Nora Ayanian, George Ban-Weiss, Burcin Becerik-Gerber, and Bhaskar Krishnamachari have all been featured in ⁄ ừǤ ǴǴùḎỖṙ ḵṙ ḅă đǴỴẹǴỹ īẎ list of top 35 young innovators

> Azad Madni received 2016 Lifetime Accomplishments Award and Visionary Systems Engineering Leadership Award from Boeing company on their 100th anniversary

Bhaskar Krishnamachari was named one of Ćŕ ṿ Ãķ ẃĎùęǴÕùǴmagazine′s “Brilliant 10” in 2015 for his work on Vehicular Networks

Ketan Savla received the 2015 NSF CAREER Award for his work on traffic signal control – responding in real time to current traffic patterns in Los Angeles

Lineage:

The union of more than 30 faculty of the USC Viterbi School of Engineering with faculty from eight other USC schools

Sworn Enemies:

Unreliability, high latency, inefficiency, cyber-attacks

Ancestral Seat:

Ronald Tutor Hall, USC Viterbi School of Engineering

House AWARE

(Arid Climates and Water Research Center)

Colors:

Yellow and Blue / Brown and Green

Words:

Thousands have lived without love, not one without water. One of these, technology can help.

> A Technological Approach to Addressing Water Scarcity Under a Changing Climate in Arid Areas

When the well is dry, we will know the worth of water.

Prized Heirlooms:

Microwave remote sensors, satellites, drones, RO-PRO technology,

Legends:

House AWARE unites engineers, scientists and public policy researchers to aid four billion people around the world affected by water scarcity.

In 2015-16, Mahta Moghddam′s team helped save the data from SMAP, NASA′s billion-dollar satellite, critical for the global prediction of drought and understanding global warming.

As part of the SoilSCAPE project, over 100 custom wireless sensors were installed in the soil of central California, as well Oklahoma and Michigan to track levels of water moisture.

Amy Childress′ Reverse Osmosis-Pressure Retarded Osmosis (RO-PRO) desalination technology holds the potential to reduce energy costs by 30 percent while making the planet′s oceans accessible to a thirsty world.

Lineage:

A noble alliance of the USC Viterbi School of Engineering and the USC Price School of Planning and Public Policy the USC Dornsife College of Letters, Arts and Sciences

Sworn Enemies:

Global warming, drought

Ancestral Seat:

> Hughes Aircraft Building, USC Viterbi School of Engineering

House VERTEX

> Words:

Vertex: the communication, sensing, computing and control nexus

Prized Heirlooms:

Sparse approximation theory, Mobile operating systems for body area sensors

Legends:

The explosion of data from complex networks, including communication, cyber-physical, robotic, biological and social media networks, has raised new challenges for the mathematics and control of such networks. House VERTEX Center members seek to understand, analyze, design and optimize such systems.

Andreas Molisch was named a 2016 fellow in the National Academy of Inventors.

Lineage:

A noble alliance of the USC Viterbi School of Engineering and the USC Dornsife College of Letters, Arts and Sciences

Sworn Enemies:

Errors, distortion, low power, exponential complexity

Ancestral Seat:

Hughes Aircraft Building, USC Viterbi School of Engineering

Issues

Search