

# Defense Systems

## DIGEST

25 AUGUST 2020 – THE LATEST FROM DEFENSE SYSTEMS INFORMATION ANALYSIS CENTER



#### COLLECT

Documents and metadata on identified technology domains are gathered from **open-source databases**. Collection can be automated through APIs and done via custom import of text files, Excel workbooks, etc.



#### PREPROCESS

Text and metadata are preprocessed and formatted into a **common document template**. Preprocessing focuses on cleaning up text, normalizing names, fetching geolocation data, etc.



#### EMBED

Documents are transformed into **fixed-length feature vectors**, giving each document a unique "fingerprint." Similar documents will be geometrically closer together in "feature space."



#### IDENTIFY

Feature vectors are fed into a graph-based **clustering algorithm** that identifies the fastest-growing trends. The algorithm also finds the most important documents for each trend.



#### SUMMARIZE AND VISUALIZE

Trends are summarized using a combination of **automated and expert-driven analytics**. Output can include topic summaries, keywords, geographic distributions, author networks, and many other insights.



## NOTABLE TECHNICAL INQUIRY

*What commercially-available data sources could be used to support analytic, deep-dive reports?*

DSIAC was asked for data sources that can be used to support technology horizon scanning and big data analytics. DSIAC leveraged the skills, tools, and subject matter expertise involved in our support of the U.S. Air Force Research Laboratory's Science and Technology Strategy for 2030 and Beyond initiative. DSIAC subject matter experts cataloged commercially-available repositories and databases related... [Read More](#)

Image Credit: DSIAC

▶ **SUBMIT YOUR TECHNICAL INQUIRY – 4 hours of research service for FREE**

## FEATURED NEWS

### DoD Innovation Speed Must Increase to Modernize

Speaking on a panel at the Aspen Security Forum in Aspen, Colorado, yesterday, Michael Brown said while the 5-year-old DIU has been successful since former Defense Secretary Ash Carter stood it up in 2015, more needs to be done.

DIU is a DoD organization Carter founded to help the U.S. military make faster use of emerging commercial technologies.

"I feel like we're just scratching the surface," Brown said, while adding that DIU has accomplished a lot in five years. "We probably influence about \$500 million worth of defense procurement. Big number in absolute terms, but ... what defense buys is probably [up to] \$400 billion a year. Depending on the year, we're a small drop in that bucket."



Photo by Army Spc. John Russell

VOICE FROM THE COMMUNITY



**Kharananda Sharma, Ph.D.,** *ORISE Postdoctoral Research Fellow*

I am an ORISE postdoctoral research fellow where I apply my physics, mathematics, and bioengineering skillset in several applied areas. I performed experimental work on novel core-shell, multiferroic nanofibers with potential for use in biomagnetic imaging. I was also a professor in the physics department at Oakland University. I have my M.S. in physics from Oakland University and my Ph.D. in medical physics from Oakland University. During my Ph.D. dissertation, I worked on the biomechanics of cardiac tissue using a new mathematical model of mechanotransduction called the mechanical bidomain model.

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HIGHLIGHT



**Webinar: A Three-Axis, Nonintrusive, Electro-optic Field Sensor for Electromagnetic Tests and Evaluations**

**26 August 2020, 12:00 p.m. to 12:45 p.m. EST**

For U.S. Department of Defense (DoD) directed-energy applications, nonintrusive electric and magnetic field probes can solve several technical problems associated with conventional probes. Conventional sensors perturb the field, but they could be used for test and evaluation (T&E) if the T&E tolerates such field perturbations. But in a complex test environment, they are not suitable, as the sensor's field perturbation results in irreproducible and inconsistent test results. Other problems, such as limited bandwidth and dynamic range and metallic cables, make the conventional sensors difficult or impossible to use for many critical tasks. To tackle these problems, we developed a nonintrusive electric field sensor made of all-dielectric materials, negligibly perturbing the field that it measures. The sensor has an extreme dynamic range and nearly-flat frequency response over the frequencies from 0 to 20 GHz. Its vector field detection capability enables us to measure the strength and direction of a radio frequency (RF) field simultaneously, fulfilling the DoD requirements for various high-power microwaves, high-power RF, and electromagnetic pulse applications.

DSIAC JOURNAL SPRING 2020



**A Computational Approach to Understanding Advanced Thermal Barrier Coatings' Performance**

**Also in This Issue:**

- Composite Overwrapped Pipe Burst Test
- Inorganic Optical Components Using Additive Manufacturing
- Can Compressive Sensing Solve Your Sensor and Measurement Problems?
- Additive Manufacturing High-Performance Polymers for Space and Aerospace
- The Importance of Early Prototyping in Defense Research, Engineering, Acquisition, and Sustainment



► Have an idea for a topic? Please contact us to write an article!

## RECENT NEWS



### DoD Officials Discuss Framework for Advancing Directed Energy Weapons



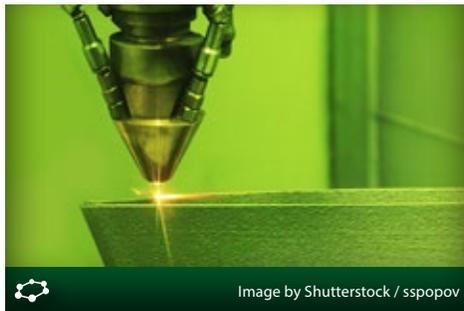
### Army Researchers Earn Patent for Secure Communications Invention



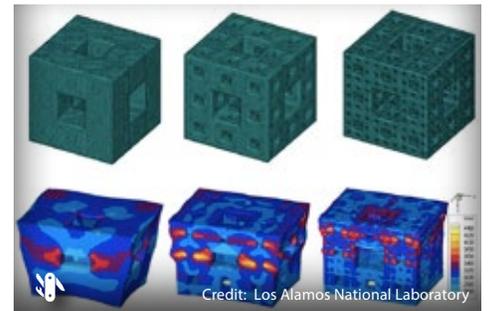
### Army Advances Learning Capabilities of Drone Swarms



### Summer Fury Showcases Reach of 3rd MAW's Lethal Weapons



### Promising New Research Identifies Innovative Approach for Controlling Defects in 3-D Printing



### Shock-Dissipating Fractal Cubes Could Forge High-Tech Armor

- Advanced Materials
- C4ISR
- Energetics
- Non-Lethal
- Survivability and Vulnerability
- Autonomous Systems
- Directed Energy
- Military Sensing
- RMQSI
- Weapons Systems

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