

The Zenith

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Space junk: The cluttered frontier

Hundreds of millions of pieces of space junk orbit the Earth daily, from chips of old rocket paint, to shards of solar panels, and entire dead satellites. This cloud of high-tech detritus whirls around the planet at about 17,500 miles per hour. At these speeds, even trash as small as a pebble can torpedo a passing spacecraft.

NASA and the U.S. Department of Defense are using ground-based telescopes and laser radars (ladars) to track more than 17,000 orbital debris objects to help prevent collisions with operating missions. Such ladars shine high-powered lasers at target objects, measuring the time it takes for the laser pulse to return to Earth, to pinpoint debris in the sky.

Now aerospace engineers from MIT have developed a laser sensing technique that can decipher not only where but what kind of space junk may be passing overhead. For example, the technique, called laser polarimetry, may be used to discern whether a piece of debris is bare metal or covered with paint. The difference, the engineers say, could help determine an object's mass, momentum, and potential for destruction.

"In space, things just tend to break up over time, and there have been two major collisions over the last 10 years that have caused pretty significant spikes in debris," says Michael Pasqual, a former graduate student in MIT's Department of Aeronautics and Astronautics. "If you can figure out what a piece of debris is made of, you can know how heavy it is and how quickly it could deorbit over time or hit something else."

Kerri Cahoy, the Rockwell International Career Development Associate Professor of aeronautics and astronautics, and an associate professor in the Department of Earth, Atmospheric, and Planetary Sciences at MIT, says the technique can easily be implemented on existing groundbased systems that currently monitor orbital debris.

"[Government agencies] want to know where these chunks of debris are, so they can call the International Space Station and say, 'Big chunk of debris coming your way, fire your thrusters and move yourself up so you're clear,'" Cahoy says. "Mike came up with a way where, with a few modifications to the optics, they could use the same tools to get more information about what these materials are made of." Pasqual and Cahoy have published their results in the journal *IEEE Transactions on Aerospace and Electronic Systems*.

This research was supported, in part, by the MIT Lincoln Scholars Program.

New technique allows analysis of clouds around exoplanets

Meteorologists sometimes struggle to accurately predict the weather here on Earth, but now we can find out how cloudy it is on planets outside our solar system, thanks to researchers at MIT.

In a paper to be published in the *Astrophysical Journal*, researchers in the Department of Earth, Atmospheric, and Planetary Sciences (EAPS) at MIT describe a technique that analyzes data from NASA's Kepler space observatory to determine the types of clouds on planets that orbit other stars, known as exoplanets. The team, led by Kerri Cahoy, an assistant professor of aeronautics and astronautics at MIT, has already used the method to determine the properties of clouds on the exoplanet Kepler-7b. The planet is known as a "hot Jupiter," as temperatures in its atmosphere hover at around 1,700 kelvins.

NASA's Kepler spacecraft was designed to search for Earth-like planets orbiting other stars. It was pointed at a fixed patch of space, constantly monitoring the brightness of 145,000 stars. An orbiting exoplanet crossing in front of one of these stars causes a temporary dimming of this brightness, allowing researchers to detect its presence.

Researchers have previously shown that by studying the variations in the amount of light coming from these star systems as a planet transits, or crosses in front or behind them, they can detect the presence of clouds in that planet's atmosphere. That is because particles within the clouds will scatter different wavelengths of light.

Modeling cloud formation

To find out if this data could be used to determine the composition of these clouds, the MIT researchers studied the light signal from Kepler-7b. They used models of the temperature and pressure of the planet's atmosphere to determine how different types of clouds would form within it, says lead author Matthew Webber, a graduate student in Cahoy's group at MIT.

"We then used those cloud models to determine how light would reflect off the atmosphere of the planet [for each type of cloud], and tried to match these possibilities to the actual observations from the Kepler mission itself," Webber says. "So we ran a large set of models, to see which models fit best statistically to the observations."

By working backward in this way, they were able to match the Kepler spacecraft data to a type of cloud made out of vaporized silicates and magnesium. The extremely high temperatures in the Kepler-7b atmosphere mean that some minerals that commonly exist as rocks on Earth's surface instead exist as vapors high up in the planet's atmosphere. These mineral vapors form small cloud particles as they cool and condense.

Kepler-7b is a tidally locked planet, meaning it always shows the same face to its star — just as the moon does to Earth. As a result, around half of the planet's day side — that which constantly faces the star — is covered by these magnesium silicate clouds, the team found.

Helen Knight | MIT News correspondent

Expert Lecture/Seminars/Courses/Industrial Visits Organized

- State level workshop on “Hands on Training in VLSI Design and Verification” was conducted by Mr. Shrikant Atkarne from NI Logic, Pvt ,Ltd, Pune and Mr Mayur Deshmukh from CoreEL Technology, Pune on 5th March to 7th march 2018.
- A seminar on "Technology advancements - Bring autonomy further into reality" was conducted by Mr.Prasanna Deshpande and Mr.Amit Doshi,senior application engineer, MathWorks on 16th March 2018.



- A seminar on "Product Development Cycle in industry" was conducted by Mr.Uday Karlekar, Chief faculty, Technocrafts on 24th March 2018.
- A seminar on "Wireless Networks" was conducted by Dr.R.S.Tiwari, Director, Cognifront on 28th March 2018.
- Expert Lecture on "Interview skills and Resume writing" was conducted by Mr. Vishal Jategaokar on 28th March 2018.

- Industrial visit to MyFM, Nashik was organized for SE students on 27th March 2018.



- Industrial Visit to Signaling Department, Nashik Road (NK) Railway Station for SE students on 4th April 2018.



- Industrial Visit to DEN Cable Network for BE students on 5th April 2018.



Campus Placement

Sr. No.	Name of the Company	No. of students Placed
1.	CMS info Solutions	8
2.	Ramkrishna IT	4
3.	Shriram Transport Finance Company Ltd.	1

National Conference on Recent explorations & Advancements in Technology and Engineering (NCREATE-2018)

A one day National Conference on Recent explorations & Advancements in Technology and Engineering (NCREATE 2018) was held at department of Electronic and Communications Engineering of KKWIEE&R, Nashik, Maharashtra on 16th March 2018.



[NCREATE-2018 Decoration in the E & TC Department]

The objective of the conference was to provide a common platform for researchers, engineers and scientists to share their innovative ideas and original research and to motivate them. The conference was inaugurated by the chief guests Mr. Amit Doshi, senior application engineer, Mathworks and Mr. Prasanna Deshpande, Head, Control Design Application Engineering team, Mathworks.



[Inauguration function of NCREATE-2018]

Prof. Dr. D. M. Chandwadkar, Head of E & TC department welcomed all guests, participants, all other staff members and students. He emphasized on need of updation of knowledge by Engineers for their personal growth & for the growth of the country. In this era of interdisciplinary culture science & Engineering streams should be linked to create more real time applications. He also extended his heartfelt gratitude to all the resource persons, participating researchers, students and organizers for making this attempt of holding national conference. In the inaugural session, chief guests Mr. Amit Doshi and Mr. Prasanna Deshpande urged to create awareness among the upcoming student community and researchers by showcasing the potential of innovative trends.



[Inauguration function of NCREATE-2018]

Prof. Rupali V. Chothe, Assistant Professor, E & TC Department and Prof. Swanand S. Dongare, Assistant Professor, E & TC Department were organizers of the national conference. Dr. S. S. Morade, Professor, E&TC Department, Dr. M. R. Admane (Satone), Professor, E&TC Department, Mrs. S. P. Munot (Bhabad), Associate Professor, E&TC Department, Dr. S. A. Patil (Ugale), Associate Professor, E&TC Department and all other staff members of E & TC department were prominently present in the conference. All the participants were provided conference kits which include the document folder, writing pad, pen, conference schedule along with a lunch coupons. Finally, Dr. D. M. Chandwadkar announced the event open.

Mr. Amit Doshi, senior application engineer, Mathworks delivered the keynote address of the conference on “Technology advancements - Bring autonomy further into reality”.



[Keynote Address by Mr. Amit Doshi, senior application engineer,

Mathworks on “Technology advancements - Bring autonomy further into reality”]

The papers from all Engineering branches were invited and presented during the conference. Participation categories were Diploma students, Undergraduate and Post graduate students, Faculty members and research scholars.



[Technical session on “Simulation and Control of Multi-domain Systems Using MATLAB and Simulink” by Mr. Prasanna Deshpande, Head, Control Design Application Engineering team, Mathworks]

Total papers were divided in two tracks: Hard branches and soft branches. Separate technical sessions were organized during the conference. The technical session on “Use Big data and machine learning to solve real world problems” by Mr. Amit Doshi for soft branches and “Simulation and Control of Multi-domain Systems Using MATLAB and Simulink” by Mr. Prasanna Deshpande for hard branches were much appreciated.



[Prize distribution ceremony of NCREATE-2018]

The conference received the huge response from Diploma/UG/PG/Ph.D. students and staff members from many colleges across India. The conference was attended by more than 130 participants and 300 attendees. Total of 42 technical papers on various topics supported by recent

innovative trends in engineering Technology were presented by the authors. Many participants also presented their papers through skype.

Best papers were awarded in prize distribution ceremony of the conference. Selected papers will be published in IJCA journal.

TELEKINESIS 2K18

Department of Electronics and Telecommunication Engineering had organized State level Symposium “TELEKINESIS 2K18”, during 21st and 22nd March 2018. Event’s Chief Guests were Mr.Nitin Mahajan, General Manager, BSNL, Nashik and Mr. Pradeep Shenoy, Senior Divisional Manager, LIC, Nashik. In the event various competitions were organized like Project Competition, Recruitment Spark, Poster Competition, Circuit Building, Technical Quiz Competition, C-Programming, etc. under **TELEKINESIS 2K18**. As a result for the event we have received overwhelming response of 700+ participants from various Places across Maharashtra like Pune, Nashik, Jalgaon, Dhule, Chandwad, and Ahmednagar. Eminent Judges from various Industries and Colleges judged competition and many sponsors like Shivananda electronics pvt ltd - Nashik, LIC- Nashik, Shree Ganesh Enterprises- Nashik, JMJ Machine tools-Nashik, GATI-Jalgaon, TIMES- Nashik, etc.assisted **TELEKINESIS 2K18**.

First copy of Departmental magazine was also released in the inaugural function of Telekinesis 2K18 by Chief Guests and Dr. D.M. Chandwadkar, HOD E&TC/ELTX.



Inauguration function of Telekinesis 2K18



Dr. D. M. Chandwadkar felicitating Chief Guests Mr. Nitin Mahajan and Mr. Pradeep Shenoy



At Project Competition Participants from Sandip Foundation College are explaining their Project



Departmental Magazine first copy released in the inaugural function of Telekinesis 2K18

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Vision

Provide quality education to create engineering professionals of global standards by keeping pace with rapidly changing technologies to serve the society.

Mission

M1: To educate the students with the state-of-the-art technologies and value based education to meet the growing challenges of industry.

M2: To provide scholarly ambience & environment for creating competent professionals.

M3: To inculcate awareness towards societal needs.