Education News

The 2021 MTT-S Graduate Student Fellowship Awards

■ **Giovanni Crupi, Roger Kaul, Changzhi Li, Wenquan Che, and Rashaunda Henderson**

The IEEE Microwave Theory and Techniques Society (MTT-S) Graduate Student Fellowship Awards are sponsored by the MTT-S to encourage and support graduate students from around the world who are interested in pursuing the field of microwave engineering. The fellowship honorees receive an award of US$6,000, presented at the annual IEEE MTT-S International Microwave Symposium (IMS), to support their research activities. Supplemental funding is offered to support recipients' travel to the IMS (up to maximum of US$1,000). In addition, the highest-ranked honoree is awarded the IEEE MTT-S Tom Brazil Graduate Fellowship, with an additional travel grant of US$1,000.

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Twelve graduate fellowships were awarded for 2021 in the general category and two in the medical applications domain. To be eligible for these graduate fellowships, applicants must be full-time students in a recognized M.S. and/or Ph.D. degree program. Full details regarding eligibility and application requirements can be found at www.mtt.org/students. The submission deadline for the 2022 awards is 15 October 2021.

For the 2021 awards, 38 applications from eight countries were received in the general category, and eight applications from three nations were received in the medical area. All of the applications were excellent and represented some of the best research being conducted around the world. The overall success rate was 30.4% because of the large number of submissions. The difficult task of selecting the awardees was performed by a group of dedicated, impartial MTT-S volunteers from both industry and academia. Special thanks to the volunteers who spent many hours reviewing and grading the proposals. Stavros Vakalis (Michigan State University, United States) was selected for the IEEE MTT-S Tom Brazil Graduate Fellowship.

Giovanni Crupi (crupig@unime.it) is with the BIOMORF Department, University of Messina, 98122, Italy. Roger Kaul (rogerieeemtt@gmail.com) is a Senior Life Member of the IEEE. Changzhi Li (changzhi.li@ttu.edu) is with Texas Tech University, Lubbock, Texas, 79409, USA. Wenquan Che (eewqche@scut.edu.cn) is with South China University of Technology, Guangzhou, P.R. China. Rashaunda Henderson (rashaunda.henderson@utdallas.edu) is with the University of Texas at Dallas, Richardson, Texas, 75080, USA.

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2021 Graduate Student Fellowship Awardees

Sohail Ahasan

School: Columbia University, New York, United States.

Advisor: Prof. Harish Krishnaswamy.

Project topic: A 60-GHz, > 50 Gb/s phased-array transceiver chipset using harmonic rejection/image rejection (HR/IR) mixer-based carrier aggregation.

In this work, we explore carrier aggregation in mm-wave frequencies to enable extremely high data-rate communication links.

Sohail Ahasan received his B.Tech. and M.S. degrees in electrical engineering from, respectively, the Indian Institute of Technology Kharagpur, India, in 2016 and Columbia University, New York, United States, in 2018. Since 2016, he has been pursuing a Ph.D. degree in electrical engineering at Columbia University. His current research interests include exploring new architectures to enable scalable millimeter-wave (mm-wave) multiple input, multiple output (MIMO) arrays; full-duplex receivers; ultralow-power Internet of Things (IoT) receivers; and integrated electro-optical phase-locked loops. He was a corecipient of the IEEE Radio Frequency Integrated Circuits (RFIC) Symposium Best Student Paper award (second place) in 2020 and the 2020 International Solid-State Circuits Conference (ISSCC) Analog Devices Outstanding Student Designer award.

Project Description

The massive unlicensed bandwidth across mm-wave frequencies allows us to design systems with high data-rate capabilities for short-range radios and cellular backhaul applications. In this work, we explore carrier aggregation in mm-wave frequencies to enable extremely high data-rate communication links. For transmit/receive (Tx/Rx) systems with high aggregate bandwidth, the need for high-speed, power-hungry analog-to-digital converters/digital-to-analog converters (ADCs/DACs) at baseband increases the system cost while degrading overall system efficiency. To tackle these problems, we exploit HR mixing and IR mixing to enable a power-efficient carrier aggregation architecture that reduces the sampling rate requirement of the ADC/DAC by four times and, consequently, can reduce the cost and power consumption significantly.

Francesca Benassi

School: Alma Mater Studiorum, Università di Bologna, Italy.

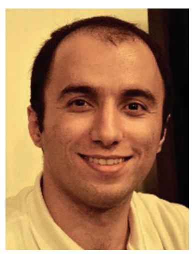
Advisor: Prof. Alessandra Costanzo.

Project topic: Mm-wave wireless power transfer (WPT) system for wearable devices.

Francesca Benassi received her M.Sc. in biomedical engineering from the University of Bologna. She joined the Interdepartmental Centre for Industrial ICT Research (CIRI-ICT) of the University of Bologna in 2017 as a research fellow within the EU-funded regional project HABITAT (Home Assistance Based on the Internet of Things for the AuTonomy). She is currently pursuing a Ph.D. in electronics, telecommunications, and information technologies engineering at the same university. Her research is focused on the design of WPT systems at microwave and mm-waves, specialized for wearable and implantable devices.

Project Description

The project aims to design an end-to-end WPT system in the mm-wave range, to be deployed for wearable devices. Focusing techniques for energy transfer in both the near and far field of the source will be investigated with the manifold goal of optimizing overall system efficiency, localizing energy transfer in real time, and minimizing wasted energy (and thus electromagnetic pollution) in unwanted locations. The approach will be based on cosimulation techniques (full-wave and circuit-level nonlinear design) to provide a reliable numerical prediction of the entire mm-wave WPT link. The solutions proposed will be compared with more traditional low-frequency solutions for both near- and far-field powering in terms of efficiency, miniaturization, and robustness with respect to misalignment between the power source and the harvester. It is expected that the research activity will conclude with a novel proof-of-concept prototype at 24 GHz. This project will also be the occasion to explore and understand related activities in different research premises.



Milad Frounchi

School: Georgia Institute of Technology, United States.

Advisor: Prof. John D. Cressler.

Project topic: An mm-wave frequency-agile high-image-reject silicon-germanium (SiGe) receiver for atmospheric sensing.

Milad Frounchi received his B.Sc. degree (with honors) from the University of Tabriz, Tabriz, Iran, in 2012 and his M.Sc. degree from the Sharif University of Technology, Tehran, Iran, in 2014. He is currently pursuing his Ph.D. degree in electrical and computer engineering at the Georgia Institute of Technology, and he is expected to graduate in spring 2022. His current research interests include designing integrated RF and mm-wave transceivers as well as high-speed optical receivers. He was among the Best Student Paper finalists at the 2020 IEEE RFIC Symposium, and he received the 2018 and 2020 IEEE Nuclear and Space Radiation Effects Conference (NSREC) Outstanding Conference Paper awards, the 2020 MTT-Sat Challenge Award, and the 2020–2021 IEEE Solid-State Circuits Society (SSCS) Predoctoral Achievement award.

Project Description

The challenge of data continuity in space-borne atmospheric remote sensing has induced a paradigm shift toward small satellites (e.g., CubeSats) for microwave radiometry of the atmosphere. In this project, we propose an integrated mm-wave frequency-agile high-image-reject radiometer. To improve the resolution of this radiometer, novel codesign techniques for the integration of a Dicke switch and a low-noise amplifier are investigated, and a low-noise front end is designed. An avalanche noise source is also coupled on the front end for on-chip calibrations. Such a low-noise radiometer improves the quality of the measured remote-sensing data; minimizes the risk of space radiometry missions by reducing the payload size, weight, power consumption, and cost; and enables economical manufacturing of mm-wave radiometers for the constellations of Earth-observing CubeSats.

Jinqun Ge

School: University of South Carolina, United States.

Advisor: Prof. Guoan Wang.

Project topic: Electrically tunable, miniaturized frequency-selective surface (FSS) with smart-engineered substrate.

Jinqun Ge received his M.S. degree in circuits and systems from Nanjing Normal University, China, in June 2018. Since September 2018, he has been with the Department of Electrical Engineering, University of South Carolina, United States, as a Ph.D. student under the supervision of Prof. Guoan Wang. He is expected to graduate in June 2023. His research activity is mainly oriented to microwave circuits and components, surface micromachining technologies, ferromagnetic and ferroelectric materials, and smart electrically tunable microwave components.

Project Description

This project proposes a miniaturized and electrically tunable FSS with magneto-dielectric engineered substrate, which has high and electrically tunable effective permeability. The prospective engineered substrate is implemented with multiple layers of embedded ferromagnetic (e.g., $Ni_{80}Fe_{20}$, permalloy) thin film on arbitrary microwave substrate. The ferromagnetic resonance frequency of magnetic film is increased with the created self-biasing magnetic field by selectively patterning magnetic thin film with a high aspect ratio. The effective permeability of the engineered substrate can be tuned by biasing dc through the patterned gold bias lines beneath magnetic film patterns. Based on this, magnetic FSSs are proposed to be designed on the implemented engineered substrate to demonstrate the efficacy of miniaturization and electrical tunability.

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Intikhab Hussain

School: Polytechnique Montreal, University of Montreal, Canada.

Advisor: Prof. Ke Wu.

Project topic: Multifunctional transceiver architectures for future wireless systems.

Intikhab Hussain received his B.Sc. degree in information and communication system engineering (with distinction) from the National University of Science and Technology, Pakistan, in 2013 and his M.Sc. degree from the University of the Witwatersrand, South Africa, in 2017. He is currently pursuing a Ph.D. degree in the Department of Electrical Engineering, Polytechnique Montréal, University of Montreal, Canada, and is expected to graduate in 2022. He was a winner (first rank) of the student challenge during 2019 European Microwave Week. He was also a recipient of the IEEE MTT-S Ph.D. Student Sponsorship Initiative in 2019.

Project Description

The rapid and continuous evolution of new wireless technologies demands novel approaches in redefining the current state-of-the-art transceiver architectures and microwave components. Energy efficiency is perhaps limiting the development of most future wireless systems such as 5G and the IoT. This research aims to investigate several innovative aspects of multifunctional wireless systems for energy-efficient and configurable radio terminals. In this project, we introduce and demonstrate a low-power receiver with simultaneous wireless information and power transfer capability, a power-recycling technique in microwave mixers to harness out-of-band mixing products, and a heterodyne interferometric receiver to maximize the reuse of power and building blocks. In addition, a methodology is presented to expose the latency contribution of RF front-end transceivers to next-generation mobile networks and RF interconnects.

Mohamed I. Ibrahim

School: Massachusetts Institute of Technology, United States.

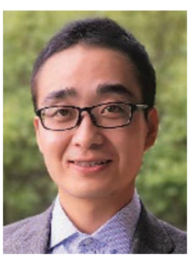
Advisor: Prof. Ruonan Han.

Project topic: Cryo-CMOS controller for solid-state color-center qubits toward scalable quantum processors.

Mohamed I. Ibrahim received his B.Sc. and M.Sc. degrees in electrical engineering from Ain Shams University, Cairo, Egypt, in 2012 and 2016, respectively. Since 2016, he has been pursuing his Ph.D. degree in electrical engineering and computer science at the Massachusetts Institute of Technology, Cambridge, Massachusetts, United States, where he also received an M.S. degree in 2020. His research includes integrated systems for quantum computing and sensing, in addition to low-power mm-wave ultraminiaturized wireless sensor nodes. He received the 2020–2021 IEEE SSCS Predoctoral Achievement award.

Project Description

Applications of CMOS integrated circuits in quantum systems are gaining attention due to the prospect of increased hardware scalability and reduction of cost, size, and power. This project proposes a novel cryogenic-CMOS architecture to perform the microwave control of individual solid-state color-center qubits (e.g., nitrogen-vacancy centers in diamond). These color centers are integrated into diamond waveguides attached to the top of the CMOS chip, where each waveguide contains a single qubit. We also investigate extending this architecture toward a multiqubit controller that can simultaneously address individual color centers. In addition, we propose to communicate with the cryostat through low-power wireless transceivers, reducing the heat transfer loss due to the conductive links. The proposed system opens the door for significant opportunities in quantum communications, computing, and sensing.



Lei Li

School: Cornell University, New York, United States.

Advisor: Prof. James C. M. Hwang.

Project topic: aluminium nitride (AlN)/gallium nitrate (GaN)/AlN high-electron-mobility transistor (HEMT) monolithic microwave integrated circuits (MMICs) for applications above 100 GHz.

Lei Li received his B.S. degree in electrical engineering from the University of Science and Technology of China, Hefei, China, in 2016 and his M.S. degree in electrical engineering from Lehigh University, Bethlehem, Pennsylvania, United States, in 2018. In 2018, he was a visiting scientist at the Leibniz Institute Innovations for High Performance Microelectronics, Frankfurt (Oder), Brandenburg, Germany. Since 2019, he has been with the School of Electrical and Computer Engineering at Cornell University, where he is pursuing his Ph.D. degree in electrical engineering. He is expected to graduate in December 2022. His research interests include mm-wave devices and circuits.

Project Description

GaN HEMTs are increasingly being used in commercial (5G and beyond) and defense (radar and satellite) systems, although they remain relatively expensive and unreliable. However, as applications above 100 GHz begin to emerge, the footprint of GaN MMICs becomes small enough to be affordable. Following the development of gallium arsenide (GaAs) MMICs, GaN MMICs promise better parasitic control and system reliability. Meanwhile, at the device level, we have replaced conventional aluminium GaN/GaN HEMTs with AlN/GaN/AlN HEMTs. The wide bandgap of AlN improves carrier density and breakdown voltage; the higher thermal conductivity of AlN improves reliability. Despite the challenge in AlN growth, together with my colleagues at Cornell University, we have demonstrated AlN/GaN/AlN HEMTs with cutoff frequencies above 200 GHz and output power of 3 W/mm on both silicon and silicon carbide substrates. Further work to demonstrate greater than 500-GHz AlN/GaN/AlN HEMTs and greater than 100-GHz MMICs is in progress.

Xin Liu

School: Tsinghua University, China.

Advisor: Prof. Wenhua Chen.

Project topic: Digital/analog hybrid spatial linearization technique for massive MIMO systems.

Xin Liu received her B.S. degree in electronic information science and technology from Xidian University, Xi'an, China, in 2017. She is currently pursuing her Ph.D. degree in the Department of Electronic Engineering, Tsinghua University, Beijing, China, under the supervision of Prof. Wenhua Chen. She is expected to graduate in June 2022. Her current research interests include behavioral modeling and linearization for RF transmitters.

Project Description

Linearization techniques are indispensable in wireless systems to compensate for the nonlinear distortion generated by power amplifiers. Due to its flexibility and outstanding linearization ability, digital predistortion (DPD) has become the most popular linearization technique in wireless systems. In massive MIMO systems, state-of-the-art DPD techniques suffer from significant performance loss in terms of linearization effectiveness and power consumption because of the increase in signal bandwidth and the introduction of phased-array and hybrid beamforming (HBF) architecture. Thus, DPD techniques need to be evolved for adaptation in massive MIMO systems, and some creative linearity enhancement techniques are needed to simultaneously improve compensation accuracy and reduce power consumption. The aim of this project is to investigate the nonlinear mechanisms of the massive MIMO array and then to develop a new technical route for linearization techniques with better linearization performance and low computational/hardware complexity that can be practically implemented in massive MIMO systems.

Minh Q. Nguyen

School: Johannes Kepler University Linz, Linz, Austria.

Advisor: Prof. Reinhard Feger.

Project topic: High angular resolution method for coherent frequency-modulated continuous-wave (FMCW) MIMO radar networks.

Minh Q. Nguyen received his B.S. degree in electronic and communication engineering from the Danang University of Science and Technology, Danang, Vietnam, in 2014. From 2014 to 2016, he worked for Uniquify, a U.S.-based fabless semiconductor company, as an analog design engineer. In 2016, he won a prestigious scholarship from the Vietnam Education Foundation that allowed him to continue to pursue his M.S. degree in electrical engineering at Texas Tech University, Lubbock, Texas, United States. In 2018, he began pursuing his Ph.D. degree in electronics and information technology at Johannes Kepler University Linz, Linz, Austria. His current research interests include automotive MIMO radar applications and radar signal processing.

Project Description

In this project, we investigate the feasibility of a high-angular-resolution digital beamforming method for coherent FMCW MIMO radar networks. The proposed coherent radar network system consists of two separate FMCW radars, where each radar unit comprises N_{TX} transmit and N_{RX} receive antennas. The proposed method will combine two separate FMCW radars into an FMCW radar network with $2\,N_{TX} \times 2\,N_{RX}$ virtual antennas for MIMO applications. The proposed method does not depend on the distance between two separate radars. The distance is arbitrary, and this will enable us to increase the number of radars in future coherent FMCW MIMO radar networks.

Moein Noferesti

School: Institut National de la Recherche Scientifique (INRS), Montreal, Canada.

Advisor: Prof. Tarek Djerafi.

Project topic: Application of ferromagnetic/ferroelectric material to design reconfigurable components for multiparameter smart mm-wave systems.

Moein Noferesti received his M.S. degree in telecommunication engineering with a major in wave and field engineering in July 2014 from K.N. Toosi University of Technology, Tehran, Iran. Since September 2017, he has been with the Department of Energy, Material, and Telecommunications Research at INRS as a Ph.D. student under the supervision of Prof. Tarek Djerafi. He is expected to graduate in December 2022. His research interests include mm-wave circuits, applications of ferromagnetic and ferroelectric materials, and tunable components and systems.

Project Description

This project aims to employ ferromagnetic and ferroelectric material to design multiparameter, reconfigurable front ends for mm-wave band communication, paving the way toward smart mm-wave communication. The reconfigurable parameters can be the operation frequency, power, bandwidth, or polarization. This will enable a smart system to reduce interference and increase the transmission capacity or self-compensate for any characteristic deviation (e.g., changes caused by environmental effects) via intelligent resource management. This is most beneficial for future multistandard communication networks (e.g., 5G) that employ mm-wave communication for different applications and scenarios.

Stavros Vakalis

School: Michigan State University, United States.

Advisor: Prof. Jeffrey A. Nanzer.

Project topic: Mm-wave sparse digital array for imaging at more than 250 frames per second.

Stavros Vakalis received his Diploma degree in electrical and computer engineering from the National Technical University of Athens, Greece, in 2017 and his M.S. degree in electrical and computer engineering from Michigan State University, East Lansing, Michigan, United States, in 2020. He is currently pursuing his Ph.D. degree in electrical engineering at Michigan State University. He was the recipient of second place awards for both the Student Paper Competition and the Student Design Competition at the 2020 IEEE International Symposium on

Antennas and Propagation. His current research interests include wireless microwave and mm-wave systems, mm-wave imaging, antenna arrays, radar, and signal processing. He is expected to graduate in spring 2022.

Project Description

The objective of this research is to design, build, and experimentally validate an mm-wave digital array system with interferometric processing and active noise illumination that can provide imaging at more than 250 frames per second. Microwave and mm-wave imaging has traditionally been associated with limited scanning speeds. Prior work has shown that it is possible to create imagery employing interferometry algorithms by mimicking the properties of thermal radiation using noise transmitters. In this work, by combining the benefits of passive and active mm-wave imaging, I propose to design and build a digital receive array in combination with an incoherent transmit array as well as an imaging algorithm that can provide image reconstruction orders of magnitude faster than the current state of the art.

Bingzheng Yang

School: University of Electronic Science and Technology of China, Chengdu, China.

Advisor: Prof. Xun Luo.

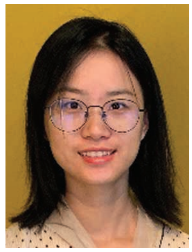
Project topic: Wideband, high-data-rate digital transmitter array with enhanced peak/average efficiency in CMOS technology for wireless applications.

Bingzheng Yang received his B.E. degree in microelectronics from the University of Electronic Science and Technology of China, Chengdu, China, in 2016, where he has been pursuing his Ph.D. degree in microelectronics and solid-state electronics since 2017. He is expected to graduate in June 2022. His research interests include digital-assisted microwave/mm-wave transmitters.

Project Description

Future wireless communication transmitter array systems require wideband operation to support multistandards and higher data rate with higher average efficiency. This research aims to achieve a wideband, high-data-rate digital transmitter array with enhanced peak/average efficiency that is capable of multistandards for different applications. As the result of the research plan, the proposed wideband, high-data-rate digital transmitter array will be implemented and verified using CMOS technology for microwave wireless systems.

2021 Graduate Student Fellowship in Medical Applications Awardees



Yingying Fan

School: Rice University, Houston, Texas, United States.

Advisor: Taiyun Chi.

Project topic: A thermal actuation/sensing array through efficient and localized heating of magnetic nanoparticles (MNPs) for tumor ablation and neural stimulation.

Yingying Fan received her B.E. degree in information science and engineering from Southeast University, Nanjing, China, in 2017 and her M.S. degree in electrical and computer engineering from the University of Michigan, Ann Arbor, Michigan, United States, in 2019. Since September 2019, she has pursued her Ph.D. degree in electrical and computer engineering under the supervision of Dr. Taiyun Chi at Rice University. Her research interests include integrated biosensors, bioactuators, and biology-electronics hybrid systems for healthcare applications.

Project Description

Localized thermal stress has wide biomedical applications such as tumor ablation and noninvasive neural modulation. However, predominant technologies including dielectric heating and ohmic heating suffer from limited control of the spatial extent of the thermal stress, which causes damage to surrounding healthy tissues or undesired temperature rise in nontargeted regions. Magnetic heating is an emerging technology utilizing MNPs to generate localized thermal stress in response to an external alternating magnetic field. Compared to dielectric heating or ohmic heating, MNP-based magnetic heating offers superior specificity because most of the biological samples are nonmagnetic. However, existing MNP-based thermal applicators rely on benchtop magnetic generators at kilohertz to megahertz frequencies, which face two daunting challenges—heating efficiency and spatial resolution. To overcome these challenges, we propose a CMOS microscopic-scale thermal actuation/sensing array based on ferromagnetic resonance of MNPs at gigahertz microwave frequencies. The proposed system features high energy efficiency, submillimeter spatial resolution, thermal regulation, reconfigurable frequency and magnetic field strength, and a scalable actuation/sensing area, which would be widely applicable in biomedical and clinical applications that require highly localized thermal stress with a cellular-level resolution.

Anna Mikhailovskaya

School: ITMO University, St. Petersburg, Russia, and Tel Aviv University, Tel Aviv, Israel.

Advisors: Alexey Slobozhanyuk and Pavel Ginzburg.

Project topic: RF coils based on high-permittivity materials with low losses and/or metamaterials for improved sensitivity magnetic resonance imaging (MRI).

Anna Mikhailovskaya received her M.S.E. degree from ITMO University, St. Petersburg, Russia, in 2017 and is currently pursuing her Ph.D. degree in electronics, radio engineering, and communication systems at ITMO University and in electrical engineering at Tel Aviv University. In September 2017, she started to work on new hybrid RF devices based on metamaterials and high-permittivity materials for MRI. Her main responsibilities are numerical simulations, data processing, preparing experimental samples, and performing MRI measurements and measurements on a vector network analyzer.

Project Description

Currently, MRI is a promising tool for medical imaging due to the high information content and accuracy of data acquisition. At the same time, MRI is a noninvasive and relatively safe method of medical diagnostics for patient health. Currently, human MRI examinations are becoming highly specialized, with a predefined and often relatively small target in the body. Conventionally, clinical MRI equipment is designed to be universal, which compromises its efficiency for small targets. It makes it difficult to diagnose and prescribe treatment for radiologists. This project is focused on the first application of an artificial-dielectric resonator in a volume coil design for a person's lower extremities, operating on two nuclei [31 phosphorus (P) and 1 hydrogen (H)], which gives a unique opportunity to study metabolic and microvascular functions in skeletal muscle tissue using measurements of P and H protons. The artificial-dielectric resonator operates as a passive wireless structure that is electromagnetically coupled with the body transmit coil on a commercial 3-tesla clinical MRI system. The design and a prototype of a wireless RF dual-frequency coil were developed that significantly increases the signal-to-noise ratio and image resolution at the same magnetic field strength, as well as reduces scan time at the same image quality.

Deadlines for the 2022 IEEE MTT-S Graduate Student Fellowship Awards

In 2022, the MTT-S will sponsor up to 12 graduate fellowships in the general category and two graduate fellowships in the medical applications area. Travel supplement funds will again be available for the awardees to attend next year's IMS.

The MTT-S strongly encourages students in microwave and RF engineering to apply for the fellowships. As noted previously, the next application deadline is 15 October 2021. Please consult the detailed instructions for the graduate fellowship program at https://www.mtt.org/students.

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15 October 2021 Deadline for MTT-S Sponsored General Category and Medical Applications Fellowships

The deadline for the General Category MTT-S Graduate Fellowships and Medical Applications Fellowships is 15 October 2021. Graduate awards include a $6,000 scholarship and up to $1,000 to travel to next year's IMS. Don't miss this great opportunity to be the next recipient. Please consult the detailed instructions for the graduate fellowship program at https://www.mtt.org/students.

15 October 2021 Deadline for MTT-S Sponsored Undergraduate/Pre-graduate Scholarships

The deadline for the MTT-S Undergraduate/Pre-graduate Scholarships is 15 October 2021. Graduate awards include a $1,500 scholarship to be used for realizing the proposed project or as a stipend, and a travel supplement to attend the IMS following the award, or a regional MTT-S sponsored conference. Don't miss this great opportunity to be the next recipient. Please consult the detailed instructions for the program at https://www.mtt.org/students.

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