

IEEE MTT-Sat Challenge – Call for Proposals

Call for Ideas

Preamble

The MTT-Sat Challenge is a worldwide competition for teams of undergraduate and graduate students to design and build radio frequency (RF) and microwave hardware for small satellites. The MTT-Sat Challenge collects ideas from students and puts them under review by a scientific board. Promising ideas will be promoted by IEEE MTT-S and supported with funding. The MTT-Sat Challenge is divided into several phases spanning over all technology readiness levels (TRLs).

The main goal of the MTT-Sat Challenge is to advance space RF and microwave education, inspire students to pursue science and engineering educations and careers, and prepare tomorrow's leaders with the interdisciplinary teamwork skills, which are necessary for success. The program is intended to run over four academic years, starting in June 2019.

The most promising designs will undergo space environmental qualification testing and will be incorporated in a cubesat, which will be launched into orbit (in case MTT-Sat Challenge secures enough funding and a participation in cubesat projects). Proposals can be submitted for every single phase. The MTT-Sat Challenge is open to teams comprised of students from one university or more universities.

The MTT-Sat Challenge is managed by the IEEE Microwave Theory & Techniques Society (IEEE MTT-S), a federally-incorporated not-for-profit organization, with additional experts and advisors in the field.

For latest news, please also visit the competition's webpage at <https://www.mtt.org/sat>.

IEEE MTT-Sat Challenge is calling for ideas of Technology Readiness Levels TRL1 to TRL2.

Deadline for proposals: October 1st, 2019
Working period: November 2019 – May 2020

Proposal: maximum 10 pages
Seed funding: maximum US-\$ 3,000

TRLs are a set of metrics that enable the assessment of the maturity of a particular technology and the consistent comparison of maturity between different types of technology. TRL1 and TRL2 relate to the lowest level of technology readiness. According to ESA's TRL handbook they can be described as:

TRL	Definition	Explanation
TRL1	Basic principles observed and reported	Scientific research begins to be translated into applied research and development.
TRL2	Technology concept and/or application formulated	Once basic principles are observed, practical applications can be invented, and R&D started. Applications are speculative and may be unproven.

1 Proposal Requirements

1.1 Fields of Interest

Possible ideas might come from one of the following fields

- Transceiver based on commercial of the shelf (COTS) components,
- Antenna systems and arrays for cubesats,
- Ground terminals for low earth orbit (LEO) satellites,
- Radiation-hardened electronics based on COTS components,
- Inter-satellite communications,
- Electromagnetic (EM) sensors for cubesats,
- Novel RF technologies for space applications,

or other RF and microwave frequency related topics.

1.2 Form of Proposal and Submission

The proposal must be based on the template provided at the webpage. A proposal consists of two parts: (I) the proposal form and (II) an optional appendix, e. g., for quotes and detailed drawings. Proposals and appendices must be submitted in English. The project description (sections 1) and objectives and work program (section 2 of the proposal form) may not exceed ten (10) pages in total. The provided proposal template is designed in a way, that it can be used over all phases. Thus, the scope of the proposal and the balance between sections will change from call to call. For example, in this first phase, teams are not required to have a section on preliminary work or publications. This will change in later phases, e. g., a proof of concept section must be included for the call of demonstrators.

Please submit a short Letter of Interest by End of August 2019 to satchallenge@mtt.org if you plan to submit a proposal.

Please submit all proposal through Microsoft's conference management toolkit at <https://cmt3.research.microsoft.com/MTTSAT2020/> before October 1, 2019, 11 pm (Hawaiian Standard Time, HST). The submission site will open in mid of August 2019. The review of the first phase is scheduled for October 2019. Acceptance notifications will be sent out in early November.

2 Team Requirements

The MTT-Sat Challenge is open to teams comprised of students from one university or more universities. Individual team members must be degree-seeking students, i.e., enrolled full-time or part-time in a degree program at a university, in any faculty, or department. As the program is active until 2024, a team composition with undergraduate and graduate students is beneficiary but not necessary. Participating universities may enter more than one team in the MTT-Sat Challenge. For phase I, the team should consist of minimum three (3) students. There is no maximum number of students, which may be part of the team. Each team shall have a Faculty Coordinator, who is a legal faculty member of the university. The Faculty Coordinator will be the team's official representative for the purpose of on-going communications, information regarding regulations and requirements, and the settlement of finance plan. Each team may use any number of advisors, e.g., from space industry companies, university faculty, or elsewhere. The team's composition can be changed between calls.

3 Funding Requirements

The funding requests are subdivided into different modules:

- Module 1: Expenses for equipment, software, and consumables;
- Module 2: Travel expenses;
- Module 3: Expenses for external laboratories.

In this call, MTT-Sat Challenge is awarding up to US-\$ 3,000 seed funding for Modules 1 and 2. Expenses for external laboratories (Module 3) can only be awarded in later phases. The award is paid to the Faculty Coordinator or the team's financial officer by cheque or wire transfer. Appropriate tax forms (W8 or W9) must be submitted to MTT-Sat Challenge in order to receive the money.

4 Meetings and Symposia

We strongly advice teams to participate in IEEE MTT-S Radio & Wireless Week 2020 (San Antonio, TX). Here, at least one special session and one workshop in the framework of the IEEE Space Hardware and Radio Conference is planned. Deadlines for submission of papers to the special session will be announced in time. Travel support can be requested in Module 2. Also, MTT-Sat Challenges supports the participation in other conferences and meetings related to cubesats.

5 Review

The review will take place in October 2019. It will serve as an important basis for the MTT-Sat Challenge decision-making process. The main review criteria include:

- scientific and technical merit
- impact of application,
- objectives and work program, and
- capabilities of the team.

Anonymized statements of the reviewers will be made available.

6 Report/Follow-up Proposal

Each phase should end in a written report by each team. In case you request funding for the next phase, the follow-up proposal contains the scientific report. Only in case you do not continue the project, a separate report must be submitted. In addition to the scientific report, a short financial report must be submitted to the MTT-Sat Challenge. By submitting a proposal, you agree to submit these reports.

If you plan to submit a follow-up proposal, you should consider travelling to IEEE MTT-S International Microwave Symposium (IMS) 2020 (Los Angeles, CA). At IMS 2020, a reviewer meeting and panel discussions are planned.