IEEE MTT-Sat Challenge – Call for Proposals

Call for Proof of Concepts

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 http://mttsat.mtt.org/.

IEEE MTT-Sat Challenge is calling Proof of Concepts of Technology Readiness Levels TRL3 to TRL4.

Deadline for proposals: July 15th, 2020
Working period: September 2020 – May 2021
Proposal: maximum 15 pages
Seed funding: maximum US-$ 10,000

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. TRL3 and TRL4 are related to the lowest level for hardware demonstration. According to ESA’s TRL handbook they can be described as:

<table>
<thead>
<tr>
<th>TRL</th>
<th>Definition</th>
<th>Explanation</th>
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<tr>
<td>TRL3</td>
<td>Analytical and experimental critical function and/or characteristic proof of concept</td>
<td>Active research and development are initiated, including analytical/ laboratory studies to validate predictions regarding the technology.</td>
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<tr>
<td>TRL4</td>
<td>Component and/or breadboard validation in laboratory environment</td>
<td>Basic technological components are integrated to establish that they will work together.</td>
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1 Proposal Requirements

1.1 Fields of Interest
Possible ideas might come from one of the following fields:
- Transceiver based on commercial off-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 fifteen (15) 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 the first phase, teams were not required to have a section on preliminary work or publications.

Please submit all proposal through Microsoft’s conference management toolkit at https://cmt3.research.microsoft.com/MTTSAT2020/ before June 15th, 2020, 11 pm (Hawaiian Standard Time, HST). Please use only the subject area MTT-Sat Challenge Phase 2 for submission. The reviews are scheduled for July/August 2020. Acceptance notifications will be sent out by end of August.

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-$10,000 seed funding. The award is paid to the Faculty, the Faculty Coordinator, or the team’s financial officer by 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 advise teams to participate in IEEE International Microwave Symposium 2020 (Los Angeles, CA). Here, one special session on the MTT-Sat Challenge is planned. In 2021 there will be again a workshop in the framework of the IEEE Space Hardware and Radio Conference. Deadlines for submission of (non-archival) papers to the special session will be announced in time. Travel support can be requested in Module 2 of the proposals. Also, MTT-Sat Challenges supports the participation in other conferences and meetings related to cubesats.

5 Review

The review will take place in July/August 2020. 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.