

I-STEM Software Request - Guide Approval Form

User Details

- **Name of Researcher:** Shubham Satappa Patil
- **User Type:** Pursuing Bachelor's in Mechatronics Engineering
- **Institution Name :** RAJARAMBAPU INSTITUTE OF TECHNOLOGY RAJARAMNAGAR
- **Institutional Contact No:** 9766386562
- **Research Topic:** Design And Development of Affordable Luneburg Lens by Using Fused Filament Fabrication

Software Request Details

- **Software Name:** COMSOL Multiphysics

Justification for Software Request:

COMSOL Multiphysics software is required to support my research work related to the design and simulation of acoustic metamaterials and wave-focusing structures such as Luneburg lenses. The software provides a powerful finite element analysis (FEA) platform that enables accurate modelling of pressure acoustics, structural mechanics, and Multiphysics coupling phenomena.

In my research, COMSOL will be used to design unit cells for phononic crystal structures, analyze acoustic wave propagation in air medium, and obtain band structure and effective refractive index for gradient index lens design. The software allows implementation of periodic (Floquet) boundary conditions, eigenfrequency analysis, and parametric studies, which are essential for predicting sound focusing performance before fabrication.

Additionally, COMSOL supports 3D modelling, meshing, solver customization, and visualization of acoustic pressure fields, which helps in validating theoretical models and optimizing geometric parameters. The simulation results will reduce experimental trial-and-error, save material cost, and improve research efficiency.

Therefore, COMSOL Multiphysics is essential for conducting advanced computational analysis, supporting additive manufacturing design validation, and achieving the research objectives related to acoustic wave control and metamaterial lens development.

Guide/Supervisor Approval

I, Shridhar Deshmukh

(Assistant Professor RIT)

- Confirm that the above-mentioned researcher is affiliated with our institution
- Have reviewed the software request and its relevance to the researcher's academic work
- Approve the software request for research purposes

Approval Confirmation

- I approve the software request
- The software aligns with the researcher's research objectives
- The request meets the institutional research guidelines

Guide/Supervisor Signature: _____

Date: 23/03/2026 **Official Stamp/Seal**

