Research Week Abstract Instructions and Template
Posters and Presentations

Research Abstract Instructions
Write a concise summary of the key points of your research. This abstract needs to represent your research well as it could be used as part of the judging criteria during the event. Your abstract should contain a strong literature review or introduction to your research topic, hypothesis or research questions, methods, results, and conclusions. You should also include possible implications of your research and future work you see connected with your findings. Your abstract should be a single paragraph double-spaced. Your abstract should be ***between 200 and 300 words.*** The second paragraph should address how your research is informed by a Christian worldview. **In 250-500 words**, describe how your Christian worldview has informed your research design and communication of your results.

When submitting your abstract, please use the template (abstract sample) provided below.

Abstract Sample

Title – Using Sound and Heat Waves to Produce Contactless Phase Change

Program of Study – Mechanical Engineering

Presentation Type – Choose one of the following: Physical Poster, Oral Presentation, Remote Oral Presentation (Online students only), Performing Arts, Juried Art, or Three Minute Thesis.

Subtype – Choose one of the following for poster or oral presentation types: Basic, Applied, Theoretical Abstract, Textual or Investigative, Creative and Artistic. See category descriptions for more information.

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Abstract: Sound waves exhibit fascinating properties. Particularly, they can generate heat as they are absorbed, potentially enough to create phase change. Through second law constraints, we are currently creating a levitating device that not only suspends objects with one source of sound but also generates heat through another source. A material's molecules and atoms have some amount of resistance before yielding to the strength from the sound waves disrupting the ordered pattern. The acoustic pressure from sound waves will maintain stability while a secondary source will produce heat without destructively interfering with the sound waves. These sound waves are positioned facing each other from two directions with the same frequency and wavelength to produce a standing wave, which is responsible for maintaining mid-air suspension. While the

levitation system maintains a standing wave to suspend objects, the second set of waves enters from opposing directions perpendicular to the standing wave to keep the object from moving outside the levitation boundaries while maintaining sound wave pressure stability. While the concept of levitation has been developed and applied in previous experiments, this experiment hopes to provide a new perspective and concept of acoustic levitation for other purposes such as material manipulation. We seek to demonstrate the efficacy of this process through a table-top experimental device.

Christian worldview integration: As a firm believer of the Sovereign Creator and the Word of God, this field of research has taught me that mankind was truly by God to glorify Him in everything that we do. While there are other methods of levitation, such as optical, magnetic, and aerodynamic levitation, acoustic levitation has shown to be the most common with the most potential applications. Acoustic levitation can ultimately reflect God based on the unusual but fascinating phenomenon of suspending objects in the air. Acoustic levitation explores the use of sound waves as stabilized sources of pressure at a high frequency. With this concept, it intrigues the mind with the use of sound for more than audibility. Sound can be used to not only express praise and worship towards God, but it can also be used for scientific purposes to develop remarkable uses for practical applications. Upon understanding acoustic levitation concepts, there are some methods and techniques have yet to be explored, such as levitated commercial transportation, container-less extraction of particles or sensitive objects, and the ability to levitate humans. Using acoustic levitation to generate phase change from solid to liquid objects will provide researchers and engineers the opportunity to explore possibilities to manipulate materials on a molecular level under heat. This will be beneficial to providing optimum alternatives to structural materials or safer analysis of the COVID-19 virus. With acoustic levitation, we seek to not only glorify God with our experiment, but we also hope to inspire and encourage others to explore and discover the wonders of God’s creation.