1. What is your most significant technical achievement?

The most significant technical contribution that I achieved is a new approach for solving an acoustic wave propagation. For the first time, my numerical solution was validated by an experimental data from National Institute of Standard and Technology.

1. Are there areas of research you are particularly interested in? If so, please let us know.

Using the method above, we can apply for filtering dispersion error for sound or acoustic wave. For a machine learning application, I believe that we can use for speech-recognition application because sound is a vibration that propagates as an acoustic wave.

1. Tell us more about what teams or types of projects you're interested in. (Long answer)

Based on my area of expertise, I believe that works in Algorithms, Alignment, and   
Applied AI Research teams share my interest in AI and how we can build a speech-recognition application to use for human feedback and interactions. These works can help to develop a physical interface like a humanoid robot.

1. Please share anything else you want us to know, such as your motivation to apply or additional context for your application. (Long answer)

Having solve acoustic wave problems in parallel-computing clusters, I understand that even a small improvement in efficiency will have a major impact for many real-world applications which may require several days of computing. In most engineering problems, we can reduce relative and absolute errors because we have analytical solutions for comparison. Improving computing performance and reducing relative error is a part of my interest, especial for speech-recognition problems.

I have an interest for space exploration when I was in high school. I have worked in space industry for more than 10 years. I believe AI will play a major and crucial role in space exploration because there are many health-related risks for human to live and work in space environment.

1. Please provide an example or evidence of your exceptional ability. \*(Long answer)

At a young age, I often wondered how the natural world works and how we as a human species have developed tools or methods in predicting the future. I became interested in mechanical engineering and developed insight of how to design a mechanical system and be able to predict the behavior of this system.

Most physical and natural phenomena can be modeled as a differential equation in space and time. Because both space and time are inseparable problems, a mechanical system can modeled as the change in space and change in time in the same equation. To symbolize a smooth and continuous geometry in the real world, a discrete spacial domain is used, so that a certain loading condition can be applied and a functional field can be used to describe its behavior, such as velocity, stress, and strain. However, as a result of the solution, an inherent error (or systematic error) as a finite domain is divided into smaller regions. This is known as a dispersion error due to the application of a space-discretization method. For the first time, we can filter out this error correctly, so that we can observe a physical phenomena in its true form, especially for acoustic wave propagation problems.

Even though there are many numerical methods, such as standard Finite Element Method (FEM), Isogeometric Analysis and Spectral Finite Method, the approach that I developed is called Explicit Time-Integration Methods and Finite Linear Elements with Reduced Dispersion Error, which is the most efficient and most accurate method for wave propagation problems.

Together with my advisor, we won a research funding of $288,500 from the US Air Force Office of Scientific Research for the applications of elastic and acoustic waves. We published three professional journal papers as a result of this funding.