PEAK Trail-Blazer Award Selection Committee
Office of Undergraduate Research and Fellowships
Northeastern University

January 16, 2018
Re: Letter of Intent

To Whom It May Concern:

My name is Husky Paws, and I am a third-year student at Northeastern University pursing a combined major in Physics and Chemical Engineering. I am very interested in expanding the fundamental knowledge underlying electronic devices.

I am writing to inform you that I intend to submit a full proposal to the PEAK Trail-Blazer Award tentatively titled "Fabrication of High-Quality τ-phase MnAl Films via Molecular Beam Epitaxy." This research will contribute to a larger effort in my field to create efficient devices for spintronic (that is, relating to and exploiting the spin of electrons) and magneto-electronic applications, with wide implications for digital electronics, especially solid-state memory and data storage. Some of the most cutting-edge research in the field focuses on ferromagnetic alloys that have an easy magnetization direction perpendicular to nanometer thick films. I intend to investigate τ-MnAl on GaAs wafers, which have a huge magnetic anisotropy giving rise to a perpendicular magnetic moment.

The overreaching goal of this research is to produce high-quality MnAl films for novel magnetic tunnel junction and spin transfer torque memory devices. I will be using molecular beam epitaxy (MBE) to deposit Mn and Al on semi-insulating GaAs wafers. Once films are grown, I will use characterization techniques to measure the magnetic properties and crystallinity of the films in order to optimize the phase of the MnAl. I will use a scanning electron microscope (SEM) for imaging the surface of the films. I will also employ a SQUID magnetometer for carrying out magnetic measurements up to 5 Tesla.

I have completed coursework in Electricity and Magnetism and Physical Chemistry, and I have worked with electronics as a hobby for many years. My co-op in the research division of Excellent Corporation gave me foundational experience with all of the listed fabrication and characterization methods necessary to complete the research.

My mentor for the proposed project will be Prof. Ima Wizard (Department of Physics), who specializes in spintronics research and has all of the necessary equipment in her lab in Egan Research Center.

The Trail-Blazer Award funds will be used to support my stay in Boston while I work full-time on this project, as well as for laboratory supplies and machine time.

Thank you for considering my proposal. I remain at your disposal for anything I can provide to help in the review process.

Sincerely,
Husky Paws