



Whittier
College

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September 10, 2020

University of Southern California

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Greetings,

My name is Jordan Hanson, and I am an assistant professor in the Department of Physics and Astronomy. I am recommending Nicolas Clarizio for admission to the University of Southern California. Nicolas is an especially gifted Whittier College graduate double major in business administration and physics. I first met Nicolas in the Spring of 2018 as his freshman mentor, and I became his adviser.

My research focuses on the ARIANNA project, a high-energy particle detector based on the Askaryan effect (<https://arianna.ps.uci.edu>). The goal of the research is to isolate signals from cosmic neutrinos and cosmic rays. For technical reasons, ARIANNA is operates in Antarctica. The nature of the signal from the neutrinos and cosmic rays is a radio-frequency (RF) pulse, and the ARIANNA modules are designed to record them. Cosmic rays are usually protons and other ions, and neutrinos are similar except they are electrically neutral.

Nicolas is interested in engineering and design, and we had an idea to build a drone capable of lifting an RF transmitter to calibrate the ARIANNA array of antennas. Later, this developed into a more broad proposal to create self-recharging solar-powered quad-propeller drones. Nicolas mastered skills in 3D printing, CAD programs, and electronics design to build a DIY drone patterned off of the DJI Inspire2. He began to research Lithium polymer (LiPo) batteries to find ways to boost the range of our drone.

I taught Nicolas in Calculus-based physics 1 (PHYS150), Calculus-based physics 2 (PHYS180), and an upper-division computer science course entitled Digital Signal Processing (COSC390). I am especially impressed with his ability to lead, and to work independently on a long-term project. Nicolas demonstrates discipline coupled with enthusiasm, and the ability to think independently. He has a good work ethic. He achieved a double major while working side jobs for a construction company while he was my student.

The drone he designed for our lab is capable of autonomous flight with way-points, and hand-held remote control. The engines operate receive power from rechargeable LiPo batteries, which also power the custom transceiver and control systems. While working with Nicolas, I observed that I could set the general parameters and project goals, and he would return with results without any hand-holding from me.

I highly recommend Nicolas Clarizio for the University of Southern California. Feel free to email me with any questions.

Sincerely,

Jordan C. Hanson, PhD