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To Whom It May Concern:

I highly recommend Alan Wang for the Data Science for the Public Good internship program led by the Institute's Social and Decision Analytics division. I have known Alan for coming up to four years now, and in that time he has demonstrated resilience and aptitude as a researcher and a community leader. Allow me to provide examples to show what I mean.

Intellectual Merit. Alan has led the effort to develop a first-of-its-kind energy- and occupant-focused testbed for commercial, multi-occupant spaces. This has included deploying over 150 cutting-edge energy-harvesting sensors, hundreds of localization beacons, and tens of air quality sensors, to establish what is now known as the "Living Link Lab" infrastructure. **This testbed has been so influential we now get requests to expand it to other Engineering buildings, and the under-design new School of Data Science building.** Alan has also developed the necessary 70-page internal documentation for future students to understand, interact with, and visualize information using this infrastructure.

The testbed infrastructure has been a springboard for Alan's research, and demonstrates Alan's vision to understand that building foundations pays ongoing dividends. First, he led a project to understand the dynamics of energy-harvesting sensors, and importantly, determine when they fail. This is tricky, however, as these devices can appear broken when they haven't been exposed to harvestable energy for long enough periods of time. He proposed a new sensor score that predicts the likelihood of a sensor transmitting, given its historical transmission rate and location. This provides a tool for identifying broken sensors that need servicing. He then observed he could run this algorithm in reverse, and use it to evaluate advantageous locations for future sensors. This work was published in the BuildSys 2021 conference, the premier venue for smart building research.

Next, he made a key observation that indoor sensors are sensitive to subtle changes in the local environment, often in surprising ways. For example, while indoor light sensors are typically installed for single-room daylighting applications, Alan noticed they are sensitive to lighting conditions in adjacent rooms. His insight is that light sensor readings from multiple nearby sensors will be coupled (or not) based on the door open-close state between rooms. He then developed an approach for automatically determining which doors are open and closed, just from light sensor data. This surprising capability has helped spur a new research area examining what unintended insights can be gleaned from common, unassuming sensors. Prof. Heydarian and I now have a research project with LMI exploring this exact idea.

Integrating Research and Education. Alan was willing to use his experience with the Living Link Lab testbed to help Prof. Heydarian and I develop and teach a new undergraduate and graduate course on Smart and Healthy Buildings. He developed labs for the course, taught the modules on in-building simulation, and mentored the students in the course as they developed their course projects.

Service. As part of the community-building aspect of the Link Lab at the University of Virginia, Alan was a member of the inaugural student-led committee to support graduate students in the lab. I worked with Alan as he bootstrapped the Link Lab Food Shelf, an honor-based 24/7 store

for selling food to students, faculty, and visitors. Doing the leg work for maintaining this service benefits the entire lab. He also served as secretary of the group, and provided programming for students in the lab with substantial turnouts.

Alan's ability to build research foundations, identify key insights, develop new courses, and support his local research community is a testament to his capability as a researcher and willingness to pursue project with impact.

Sincerely,

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