September 22, 2021

Dear Colleague,

My name is Oren Civier. I am a fellow of the Australian National Imaging Facility, a faculty member of Swinburne University of Technology, Melbourne, and the data analysis expert of the university's MRI/MEG/EEG imaging facility. Our MEG facility is one of few in the world that are equipped with motion-tracking cameras to study motor control (my personal research interest). I am pleased to write this letter in support of Yorguin Jose Mantilla Ramos's application for the Globalink Research Internship. I was Yorguin's primary mentor in this year's Google Summer of Code, and have been working with him since (https://summerofcode.withgoogle.com/projects/5319232419528704). Yorguin contacted us first in early February (we are a team of 4 mentors from Australia), and as his proposal for the implementation of the project was by the far the best we had received, we chose him as our preferred candidate. The goal of the project was to implement a fully-automatic, heuristics-based converter from raw EEG data to the Brain Imaging Data Structure (BIDS). Yorguin worked on the project intensively for two and half months, and upon completion, we unanimously agreed that the final product is above all expectations (Work product: https://gist.github.com/yjmantilla/7004f6ba1bf517c1321b458165aee62b; Github: https://github.com/yjmantilla/sovabids). Yorguin's project is an integral part of NeuroDesk, an analysis environment for reproducible neuroscience that we are currently developing; and as such, my fellow mentor, Steffen Bollmann, was proud to acknowledge Yorguin's work in his recent presentation (https://mri.sbollmann.net/index.php/2021/09/20/neurodesk-at-the-anz-ismrm-reproducibility-workshop/, slide 18).

Mentoring Yorguin on his Google Summer of Code project, I learned of his many strengths. I believe that they put him one level up compared to other candidates. First, Yorguin is completing his 4th year of studies, and he is about to embark on a thesis project (Electronic Engineering undergrad degrees in Colombia are 5-year programs with a thesis). This makes him much more mature relative to other undergrad students I worked with, and is evident by his independence and general approach to problems and challenges. Secondly, Yorguin is a talented programmer with a lot of experience. Unlike other students who rush to implement their algorithms right away, he is much more strategic, seeking to take advantage of existing tools where available. This allows Yorguin to concentrate on the important parts of the project rather than spending a lot of time on unnecessary coding. From my experience, this virtue is very important for research projects that are limited in time, and where coding itself is not the goal. Lastly, Yorguin is extremely productive -- whereas most Google Summer of Code projects aim at improving existing software, Yorguin wrote a piece of software completely from scratch in just two and a half months. The successful completion of all milestones was not only the result of Yorguin's hard work, but also owing to his meticulous planning and organisation abilities. Unlike other students I worked with who often got "stuck" waiting for my feedback, Yorguin always worked on several components in parallel; this way he could keep advancing also when I was busy, contributing to a very efficient use of his time.

During my career, I supervised/mentored 6 undergrad students, not including Yorguin. Yorguin was definitely the most productive of them. The second-best student was a student I supervised in Bar-Ilan University in Israel. That student worked on a project roughly the magnitude of Yorguin's project, but he

required a full semester (4.5 months) to complete it. The other four students I supervised were even less productive. Given that the mentoring of Yorguin was done completely online (due to COVID-19 restrictions), this is an exceptional achievement. It is also of note that none of my other students developed an online documentation of their project or submitted a first-author abstract describing the work. This is in contrast with Yorguin who has already submitted an abstract to the upcoming eResearch conference in Australia. I think that part of the difference stems from Yorguin's superb writing abilities for students at his career stage from non-English speaking countries. When I worked with other students (who I co-supervised) on abstracts, they usually required many revisions, but Yorguin's abstract first draft was already excellent to begin with. The quality of his writing is also noted in the proposal and documentation of the Google Summer of Code project (https://sovabids.readthedocs.io/en/latest/gsoc_proposal.html; https://sovabids.readthedocs.io/en/latest/). To summarise, Yorguin is maybe the most talented student I've known in his career stage, and definitely when it comes to implementing a solution to a complex problem. As a non-native English speaker, he is still improving his oral presentation skills (he did a long way during the Google Summer of Code), but on all other criteria, I consider him superior to others.

I want to clarify that although the Google Summer of Code project is an open-source coding project, Yorguin's specific project had many elements that put his research abilities under test. To start with, Yorguin had to have a very good familiarity with EEG, including the range of possible file formats, acquisition parameters, experimental designs, and common recording problems. Without such knowledge, he would not have been able to write a tool general enough to handle any arbitrary dataset. Yorguin also demonstrated very thorough knowledge of EEG pipelines and their implementation in practice. This became apparent when Yorguin composed a survey to map the analysis steps taken by different research groups in Australia (to understand how BIDS can benefit them) – the survey included fine details that will only be familiar to an experienced researcher. Finally, the project included the development of an algorithm that will perform data conversion based on one or more examples. At this initial stage of the software, we only implemented a simple solution, but we did have the chance to engage Yorguin in discussions about more elaborate machine learning solutions. His ideas demonstrated both prior knowledge and originality, which corroborates his own account of experimenting with machine learning for research for some time now. I believe that applying his interest in machine learning to EEG could be an ideal career path for him.

In short, Yorguin is intelligent, highly productive and has a broad perspective on the scientific field. Moreover, his independence and conscientiousness turn him into a natural project leader; an ideal setting that allows the supervisor to focus on mentoring and training instead of constantly monitoring and pushing the student. I thus highly recommend Yorguin for the Globalink Research Internship.

Sincerely,

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