

A UROP perspective by Shirley Xu

Summer 2022 (undertaken in the Department of Materials)

Shirley was a year 2 undergraduate at Imperial College London in 2021-2022: MEng Materials Science and Engineering, Department of Materials

UROP title: Data mining for photovoltaic materials

Motivations:

I came to do UROP for a variety of reasons:

- I wanted to use a bit of my summer to experience some research work (to sample the life of a research group) and see if I would enjoy it. At that point, I did not know what I wanted to do in the future so I wanted to have a go at something I haven't done before.
- Getting involved in undergraduate research was something I was interested in and a lot of other students were also thinking about organising a UROP. I knew I had to plan carefully and early to organise something I would like.
- It was something I could do in summer. I could stay in London to make use of the flat I'd had to pay over the summer for and importantly to be with my flatmate since they had spent the previous summer alone.

Securing the UROP involved looking at who I wanted to collaborate with based on both personality and research group topics and then emailing or going to their offices and asking accordingly. Then it was a case of waiting for a response. There were a lot of professors that I have been grateful for (their teaching as part of my degree) but didn't get the chance to thank so this was a good opportunity to speak with them. For the UROP I eventually secured, in particular, the professor (who would be my UROP supervisor) had taught me a course in first year and I loved his friendliness and approach to teaching. His course was one that I really enjoyed and it felt like he created an open and inviting working/learning environment, which may also be due to his special guest that joined him for lectures. I quite like coding and was interested in machine learning so the project he offered also sounded right up my alley.

To prepare for the UROP, I emailed my supervisor what he would recommend for preparation and he gave me some optional reading. I had to complete applications for bursaries and funding because I don't think I could have funded myself. There was not much pressure to read before the start because the first week of my UROP was dedicated to reading papers and learning the basics of what the project is and how to approach it.

I think the **skills and experiences** I gained stem mainly from my mindset about the work environment going into the UROP, and how those changed as I progressed with the project. Initially I was so concerned about not seeing any progress that my supervisor needed to remind me to be patient and to relax about the progress made. She also encouraged me to take rests because I was experiencing a stressful/tiring time, especially when I had done a

presentation. This was very comforting and in the end it was important that I took care of myself. I also learned that communication is very important in almost all scenarios. The importance of a supervisor (as it is they who are committing to the UROP as much as the student) maintaining good and supportive contact is significant and I felt extreme gratitude for how supportive and transparent my supervisor was especially when she did not have the time to help straight away and would never the less take some action another day.

I learnt that it is important to be curious and ask questions and for both the student and supervisor to give constructive positive feedback.

I pursued my UROP alongside three other undergraduates and our research experiences included giving presentations. On one occasion I had made and prepared mine in a short amount of time so part of me was a bit nervous about the quality of my presentation. I was the last one to present and the other two both received such thoughtful, constructive, and positive comments from the overall supervisor and questions from the other members of the research group showed us all that they were actually interested in learning more from us. This allowed me to be relatively calm for my own presentation, and I felt very happy and comfortable presenting. My silly analogies and presentation quirks were received well.

I also learned that what I found most important was not the type of task I was doing but the environment and people I was surrounded with. A friendly, constructive and positive working environment is what I value more than anything, making or seeing people smile or laugh makes my work day so much better and enjoyable.

I think what I've gained will impact the rest of my course and future career pathway by making me:

- more inclined to be curious in lectures and try ask interesting questions if I think of them (or contact the lecturer after if anything comes to mind) to build a connection because I think that would enable me to improve my learning.
- a more positive and constructive person.
- More inclined to experience the company culture before accepting any future career offers or pathways to make sure I enjoy the environment I am in. I now think I would be able to suit many different careers as long as I like the people and environment I am in.

Outputs from the UROP: The results gained from my UROP project will be improved upon to increase the accuracy of the text miner and widen the range of texts it can handle. Future researchers will hopefully be able to use this resource to evaluate trends and progress of photovoltaic materials and easily identify new novel materials suitable for the applications they wish to use. They may use machine learning to predict the future pathway of materials progression or estimate properties of new materials. Researchers of different but similar fields such as BiOCI, can adapt the resource to use it for their sectors too. For the near future, my work will be passed on to a master student to continue for their project!

I am very grateful to have had this opportunity, and am very grateful to my supervisors and the research group I have been a part of. I wish that future UROP students also enjoy their time and have such supportive people working with them.