Karlsruher Institut für Technologie

Personal Testimonial

Research Internship Information	
Institute: Institute of Microstructure Technology (IMT)	
Project: Solid-State Elastocaloric Cooling Based on Shape Memory Alloy Films	
Supervisor: Dr. Manfred Kohl	Duration of stay: May 2023 – August 2023

Contact Details	
Name: Colin Patrick Shinn	E-Mail: cshinn9@uncc.edu

MINTernship Program 2023

Personal Testimonial

The summer 2023 MINTernship program has been one of the best experiences of my life. While this is not the first time I've worked an internship in an engineering setting, it is the first opportunity I've received to work abroad. With the support of the International Students Office and my mentors and colleagues, this experience has been truly invaluable.

My journey began on May 15, 2023, after departing from Charlotte Douglas International Airport. We landed at Frankfurt Airport the following day and quickly boarded a train to Karlsruhe. While the weather wasn't the best, as it was mainly cloudy today, I still saw some breathtaking views of the German countryside en route to Karlsruhe. After arriving at the Karlsruhe Hauptbahnhof, my friend and I were greeted by Amara Scheel, who showed us to the regional city train and took us to our dormitories. We were shown our rooms, and she gave us a brief itinerary for the upcoming events. We were then free to get settled and explore the city.

The first few days in Karlsruhe were slightly tricky for me, as many adjustments and lifestyle changes were happening simultaneously. For starters, the jet lag from my nine-hour international flight took me a few days to recover from, as I couldn't help but to sleep at the most random hours of the day and night. Aside from jet lag, I experienced sudden culture shocks in public settings. For example, on my first day in the city, I decided to go to one of the nearby markets to grab some groceries and toiletries. I was unaware shoppers were responsible for bringing their bags and bagging their groceries. When I proceeded to grab a paper bag by the register, the cashier began yelling at me, and when I explained that I was confused and couldn't understand German, she snatched the bag out of my hand, scanned

it, and handed it back to me. While this encounter did not taint my overall experience, it was a stressful experience for me on my first day.

After spending nearly, a week in Karlsruhe, my internship started the following Monday. By this point, I had almost fully recovered from the jet lag and adjusted enough to the German culture and lifestyle. The first day of my internship went well, as the rest of the UNC Charlotte students all met up with KIT students and staff, and we spent the day touring Campus North, followed by a delicious full-course meal that the university covered. The next day, I went to the Institute for Microstructure Technology (IMT), where my mentor, Navid Aghdam, along with a few other colleagues, gave me a tour of the building, as well as a handful of training sessions for labs and pieces of equipment that I would later use for my research. I was also introduced to my project supervisor, Dr. Manfred Kohl, who warmly welcomed me. The remainder of my first week comprised more training, shadowing other Ph.D. students performing tests, and acclimating to my work environment.

Unfortunately, my mentor was sick with COVID the following week, so I spent most of this week researching my project and learning the theory behind my topic. I also assisted in the design of a children's game for an open event sponsored by the university. My topic is titled 'Solid-State Elastocaloric Cooling Based on Shape Memory Alloy Films,' which deals with the study of an alternative method of refrigeration that does not require the use of liquid refrigerants and has the potential to use significantly less energy. Despite the minor setback of not having my mentor readily available for that week, I was able to spend that time on independent research. After the first few weeks, I started learning new software related to my research. I continued to participate in tests that would better my understanding of the physics of material testing.

As I received my B.S. in Mechanical Engineering only days before departing to Germany, I was still new to many industry applications of all the material I'd learned throughout my education. Despite having a concentration in energy engineering, the topic of elastocaloric cooling was utterly foreign to me before my internship. In addition, I originally applied for a different project that I felt was closer to my area of expertise, but I was placed on this project instead. However, I've learned so much during the summer months working on this research. Between the different software applications, some of which I've never used before, and the hands-on experience like 3D printing and tensile testing, this experience has genuinely developed my technical knowledge on the subject matter beyond what I could've expected. While there were some challenges along the way, and the experience wasn't always perfect, as nothing ever is, I wouldn't trade this internship experience for anything.

Aside from work, I took full advantage of the scholarship money and my time in Europe. Most notably, I spent most of my free time wandering the beautiful downtown area of Karlsruhe and the castle behind the center city with a breathtaking park where I chose to spend some of my leisure time. Many nights, I would go into the city and grab a bite to eat with friends, and we'd end the night by relaxing at the park, playing games, and drinking beer.

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Karlsruhe, like many other European cities, has many similarities and differences compared to American cities. While roaming the streets, there are plenty of options for food and shopping, like in American cities, but the architecture and design of the city highlight the history and culture. Also, the amount of walking and biking areas and public transportation makes for more community and eco-friendly cities. In Europe, older buildings are constantly being renovated to preserve historical aspects of the city, and it is not uncommon for roads and sidewalks to be made from cobblestone instead of pavement. On the contrary, most modern American cities bustling with skyscrapers are fully paved everywhere, which, in my opinion, does not give off the unique and welcoming nature that a typical European city would.

Besides Karlsruhe, I had the opportunity to visit other German cities, such as Munich and Berlin, as well as other European countries. I traveled to six countries, including Germany, and while many aspects of European culture remain uniform in most European countries, there are also slight, subtle differences between each country. Most notably, the language or currency will likely differ depending on the country, the food, and how people socialize. For example, in France, they have a greeting known as “la bise,” which is the way French way of saying hello. This involves two people bumping their cheeks while making a kissing sound, and it is viewed as a sign of friendship and respect between two people. While I’ve seen instances of this in movies, it was different to see it in person. Overall, after seeing multiple other cities in numerous European countries, I can say that I am far more educated on the overseas culture, and it was a fantastic learning experience to see first-hand a different lifestyle outside of my native country.

In summary, I highly recommend that anyone considering this program in the future apply, especially to those who have been to a foreign country. The support from ISO and my colleagues at IMT contributed to this fantastic experience, and they understood my novice skill level regarding my topic. Additionally, the social and cultural knowledge I’ve gained in Europe is an experience I wouldn’t have traded for anything. This adventure will be something I will remember for the rest of my life.

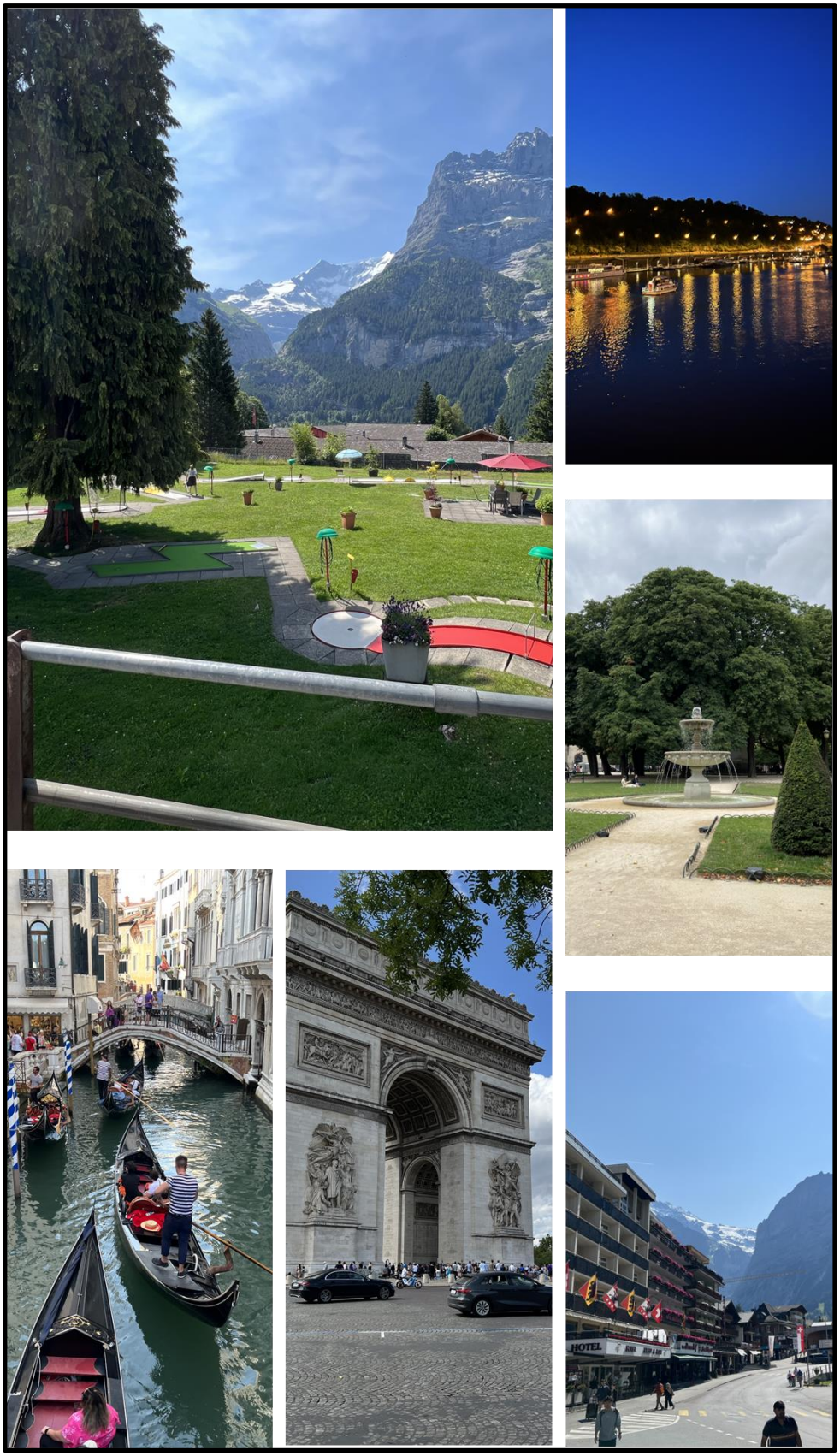
Below are some pictures captured from various European cities. I hope you enjoy it! 😊

Sincerely,

Colin Shinn

Colin P. Shinn

Karlsruher Institut für Technologie



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