



The Robotic Piano Tutor

Monday 5th December 2016

The first leg of our journey required travelling to Leeds Bradford Airport at 4:30am, to allow plenty of time for flight check-ins, project declaration (due to the electrical elements of my invention) and of course a burger king breakfast before boarding at 7:00am for the second leg of our trip- the flight to Amsterdam.

Once we had arrived at Schiphol Airport we had a 7 hour stop over so we decided to find a comfortable seating area to rest. During the time spent in Amsterdam airport we explored the surroundings, played card games, completed school work and also observed people in their daily lives. The practicalities with air travel started occupying my mind; early starts, finding check-in desks, navigating through the hoards, finding places to sit and anticipation of how far the departure gate is from the pleasant seating position. In addition the age old questions of what time does my body think it is? And how much does it cost in pounds preoccupied the wait.

At 2:30pm local time we embarked on the third leg of the trip which was the long haul flight to Mexico City. After enduring 12 hours sat in a confined space, 2 very average plane meals and the film Mrs. Doubtfire we were very tired upon our arrival at Mexico City's Airport.

We had to collect our baggage from the baggage claim and the anxious thought of have the bags arrived clouded my mind. The conveyor belt that the bags had been loaded onto had stopped working, so our luggage wasn't apparent, this was a stressful situation due to our next flight looming only 40 minutes away. Eventually we obtained our baggage and dropped it off at another belt, ready to be loaded onto our last plane of the outwards journey and we boarded after passing security checks, in the nick of time.

After the fourth leg of the journey we arrived in Villahermosa at 11pm local time but our heads said that it was early morning back home. We were kindly greeted by Berenice who was our host for the week and after a 10minute transfer we were at the hotel. We were welcomed by iced beverages and fresh fruit before being left to sleep as it was almost midnight.

The trip so far for me had an equal mix of excitement and trepidation. The longest journey without family was the exciting part and arriving into an unfamiliar environment was providing the trepidation. Overall a successful start to the adventure!

Tuesday 6th December 2016

The first awakening in Villahermosa was welcomed by a traditional Mexican breakfast to kick-off the day. After experiencing the new tastes which consisted of refried beans, fried bananas and pulled chicken with peppers, which was indeed an interesting food choice for 8am local time; we decided to unpack and assess any damage that had been made to our project. A lot of Damage had been expected after a hefty 30 hour journey but in reality the project was still mainly intact. We claimed the hotel lobby as our workshop and we spent the morning building and wiring the robot.

As lunch time approached we decided to wander out of the hotel and find something to eat. Missing home cooking after an adventurous breakfast meant that we settled for a pizza hut lunch. After talking to the Mexican waitress in Spanish we concluded that our language skills were adequate and this made us even more excited to talk to people at

the exposition about our project; by knowing we had a decent means of communication.

We then walked miles to find a supermarket which in actual fact wasn't that far from where we departed from, to stock up on supplies. The midday heat had reached 32° by this point so we headed back to the hotel to avoid the sun and to finish constructing the robot.

We encountered a problem during construction, but I believe problems are an engineer's inspiration so it was in our nature to find a solution. We needed to solder wires to a copper strip in order to conduct electricity, however the soldering iron wouldn't heat to a sufficient temperature that would melt the solder; this was due to the lower mains voltage in Mexico (110v) compared to the mains voltage in the U.K. (230v). We pondered over how to solve this problem all afternoon and we tried various methods and techniques however all the ideas we had were ineffective. Feeling slightly disheartened because our robot couldn't function yet, we made the decision to eat dinner at the hotel restaurant. It was a lovely meal which came with a side of T.V. entertainment, which aired the wrestling.

After a long day acclimatising, our bodies were still tired so we got an early night, ready for the first day at the exposition hall on the Wednesday.

Wednesday 7th December 2016

Breakfast was at 9am which gave for a nice sleep in. As soon as we had left the hotel rooms we were surrounded by exposition participants from around the world. I was eager to start setting up by this point. After all participants had eaten we got the coach to the exposition centre. Transporting our project to the hall proved a challenge but we were helped by a nice group of Columbian people.

Once we arrived at the hall we were given lanyards and wrist bands for identification purposes and we found our allocated presentation stand. A productive two hours were then spent sticking up our Spanish posters which explained our project and its need within our society. By the time we had finished we were being beckoned over to eat lunch. Over lunch we made friends with the Portuguese and Turkish representatives.

After eating a staple diet of pork and rice we needed to make the robot work. In order to do this I went and asked some Argentinian people if they had a soldering iron which I could borrow. After several minutes of hand gestures, they understood what I wanted and thankfully let me use this piece of equipment to mend my project. 6 hours later after a lot of time spent; programming, sanding, soldering, painting and sewing we left the event venue and headed back to the hotel.

Once at the hotel we decided to head out for some food. Lunch wasn't to our favour so we went for a KFC to vanquish our needs for nice food. After dinner we walked back to the hotel and we went to bed revelling in the satisfaction that our robot functioned better than ever.

Thursday 8th December 2016

An early morning wake up was required for the first day presenting at the science fair. We left the hotel straight after breakfast and arrived at Park el tabasco where we viewed the opening ceremony for the 2016 exposition. It was presented in Spanish but we managed to engage and clap in sync with the other audience members, so we classed it as a job well done.

After the opening ceremony where the specialist STEM guest speakers had welcomed the different countries from around the world we started presenting our project. The project was a robotic piano tutor which displayed robotic musicianship. We invited users to watch and listen as the robot 'played' a melody, and they were then challenged to

replicate it as accurately as possible. They were awarded a score based on how close they were to the original melody in terms of pitch, rhythm and tempo. We also made the inner workings of the robot visible for elder visitors who wanted to understand the

programming and electronic aspects behind my device. Due to the interactive nature of the project a lot of exposition visitors attended my stall, including the Mexican press!

The first morning of presenting left me yearning for day two. After deliberating how the morning went I spent lunch time working out how I could improve my stall for the next day. Once we had devoured lunch which was boiled potatoes and pasta, we were taken to the local zoo and the museum of Villahermosa.

We spent the afternoon with an English speaking tour guide who showed us around the zoo and taught us about the history of Tabasco. An afternoon exploring the top rated places in Mexico caused for a relaxing evening sat by the swimming pool to rest.

For dinner all the participants of the science exposition attended a gala buffet. We ate lots of food throughout the night and enjoyed the music that was played to us. After dinner the exposition was celebrated by a presentation where each country was thanked for participating in this prestigious event and in return we thanked the event organisers for having us.

Dancing the night away was very fun, socialising with new people from different cultures and learning new dance moves were all a highlight for me, but after a long day a bed was certainly necessary.

Friday 9th December 2016

Today at breakfast instead of picking the traditional Mexican option, a continental choice was being offered, which we opted for. After eating, we travelled to the event hall where we had half an hour to install our projects ready for the day ahead.

At 10am crowds of people began to view the different projects at the exposition and amongst the many people who had come to look around were the exposition judges. The judges circulated the hall all morning and eventually came to observe my display. I tried to explain my project to them as clearly and concisely as possible. Once the judging had finished we walked across the building complex to eat lunch.

After lunch I looked around the other displays, the projects that were being showcased were very inspirational and it was interesting to learn about the range of problems people were solving. I found a mechatronics project which used the same electronic components I had used (22 relay modules) however it had a completely different design concept to mine, which solved a totally different problem. This allowed me to consider how engineering disciplines are linked. I really enjoyed looking at the theories and ideas people had come up with and it gave me new future ideas. The older representatives made me excited to go to university due to the amazing projects they had created and the younger representatives gave me hope for future leaders in engineering and advancing technologies.

We then went back to our stall to take our project down. Removing all of the posters we displayed and disconnecting the robot took a few hours but the time period was far shorter than when we installed our project display.

Mid-afternoon we arrived back at the hotel. We sat by the pool and I went swimming with the other international participants. We also played a multitude of different card games before getting ready for a cultural evening.

The hotel shuttle transported us to an outdoor arena where different countries were to showcase their cultures most significant goods. Throughout the evening we watched dance, acting and vocal performances, we saw traditional

outfits worn by models on a fashion runway and we also tasted traditional snacks given to us. We collected bracelets, badges and flags during our time at the event whilst in return handing out handmade keyrings and English sweets to the other countries.

Our expectations were exceeded by this very enjoyable evening. We expected a small event but instead the turnout and outcome was huge. Learning about other people's cultures was very interesting to me, so overall it was a good and knowledgeable day. Once we returned to the hotel, we ate take away pizzas and then went to sleep.

Saturday 10th December 2016

Waking up on this day left me with mixed emotions, but we were ready to make the most of our last full day in Villahermosa. We got dressed and had our final Mexican breakfast of the trip; however I wasn't sure whether it would be missed at the time. After Breakfast we took the coach to park el tabasco which was where the event hall was located and we attended a closing ceremony for the 2016 exposition.

During the ceremony which was presented in Spanish, awards were being distributed. There were several prizes which were up for grabs including: money, trips to other expositions, certificates and traditional cloths/photo frames.

There were 5 international prizes given out. These prizes were tickets to the 2017 exposition to be held in Brazil. The prizes were given out to the 5 best international participants based on the judge's scores and opinions of how we presented our projects throughout the event. We didn't win but we were still proud of our accomplishments due to the high level of competition out there.

After the closing ceremony all the participants went back to the hotel. We spent the afternoon playing water polo in the pool before sitting on the sun loungers to soak up the last bit of sun. We talked about the highlights and low-lights of the trip and the amazing experience we had all had.

An afternoon of relaxing was very enjoyable however we still had a few tasks to do before we left Villahermosa. We firstly packed which took a while because we had to ensure our robot was secure and wouldn't get damaged during transit. Then we headed out to the supermarket and bought gifts for our families (e.g. famous habanero chillies).

Once we had completed our main jobs we headed back to the hotel where we did our online check-in and ate our last supper. After dinner we decided it would be a good idea to sleep due to the early morning wakeup the next day.

Sunday 11th December 2016 /Monday 12th December 2016

The 3:00am wake up made us exhausted before the journey home had even begun. I was very sad to leave Villahermosa but I was also excited to be travelling back to home turf. The hotel arranged a bus to transfer us and a few of the other participants to Villahermosa airport. Once at the airport we checked in our bags, this was an experience because we had to pay for extra baggage due to exceeding the weight limit – we stocked up on gifts for our families before we left. Once we had checked-in, we boarded our first flight back which was to Mexico City.

At Mexico City we didn't have much of a wait so we got on our connecting flight straight to Houston.

Houston- It was my first time visiting America, although it was only to an Airport I still had an amazing time. The airport was huge and we spent a large amount of time on-board a bus trying to find our gate, due to getting lost. Once we finally found our gate we decided to eat lunch. We had a burger and it was absolutely stunning! Possibly the best burger I've ever eaten. After being fed and watered we boarded the long haul flight to Amsterdam.

After a very long flight which seemed to be never ending we finally arrived in Amsterdam. Very tired but nearly home we grabbed a coffee and waited to board our last plane of the trip.

Once we landed in Leeds, we could definitely feel the temperature differential between Mexico and home due to being welcomed back by light snow. As we went through security and awaited our baggage I thought about the amazing experience I had been given.

It was 9am Monday morning local time and we debated whether to go into school. Our bodies told us not to but our mind disagreed, but due to our baggage not arriving with us in Leeds we decided to go home and recover from jet lag for the rest of the day before having to come back to the airport to collect them.

I would like to thank everybody that has made this adventure possible for me.

Arkwright

Introduced me to this amazing once in a lifetime opportunity.

The experience has.....

- Opened my eyes and inspired me to keep designing new products which will benefit society's needs.
- This experience when written on paper sounds amazing, so it has enhanced my university application and my CV.
- The trip has allowed me to gain confidence as an individual.
- It gave me the chance to meet lots of new people.
- Taught me more about science and engineering and other global expositions (In turkey & Columbia which we were invited to attend).
- Improved my time management skills in terms of juggling A-levels with building my project.
- Allowed me to experience a field of engineering which was new to me (robotic systems and controls). I learnt programming software's and a lot about electronics during this project.
- Shown me how to fund-raise and pitch my ideas.

Titus Salt School

- Provided me with funds to attend this global event.
- Supported me through the trip.

My teacher – Mr. Reid

- Encouraged me to apply for this competition
- Helped me with the project and attended the event with me
- Introduced me to the visual programming software max/msp
- Supported me throughout the whole process.

