



EXCURSION USA 2016

Students Report



Department of Engineering

Department of Management, Information and
Technology

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1. Introduction

The “Smart House Project” was one of two joint summer courses of Jade University of Applied Sciences and Texas Tech University (TTU). The cooperation between both universities exists for more than 25 years and contains regular summer courses as well as double degree courses. For the Smart House Project which took place for the first time, students from TTU came over to Germany for five weeks. All students learned the bases for the project in theory classes together and afterwards worked on the actual project. The excursion was the conclusion of this project work to present the results in the USA.

The main topic “Smart House” means to automate processes in a House. There were seven groups, every group consisted of German and American students. The subjects of the groups were:

- Heating Pool
- Heating Room
- Light Regulation
- Photovoltaics
- Communication Arduino – Android
- Optical Object Recognition (Alarm Management)
- Optical Object Recognition (Movement Detection)

The group work started in July 2016 and ended with the presentations at Texas Tech University in September 2016. In the time between we were able to work together in both Universities and also over long distance.

2. Daily Reports

2.1. Flight from Germany to Dallas

Sunday, the 28th August was the beginning of our trip to the United States. We met up early in the morning at Bremen Airport waiting for our first flight to Frankfurt. Arriving in Frankfurt, we took our plane to Dallas. It was an eleven hour flight with a huge time difference of +7h compared to Berlin time, so we arrived approximately 2 pm local time at Dallas Airport. After we'd picked-up our luggage we got our rental cars and drove to our Hotel in Dallas. In the evening the whole group of students were happy to get some food in a nice Burger restaurant in Richardson and had a nice evening after the long trip. So everyone was fit and in a good condition for the company visit the next day.

2.2. Visiting VarioSystems and trip to Lubbock

After the first day in the hotel in Dallas we visited the company "VarioSystems".

VarioSystems is a modern and international electronics service company with sites in Dallas/USA, Sri Lanka and China. With their modern working areas and environmental protection certificates they are acting as a sustainable and ahead planning company. What makes VarioSystems so "special" is, that they have the same working conditions in all their workshops in all countries. Due to that fact, they can decide where they want to produce a product. This leads to a high customer satisfaction in order to be as near as possible to the customer.



Another remarkable advantage is their constant investment in infrastructure, technology and the training or further training of their employees.

Meeting the requirements of the Code of Conduct of the Electronic Industry, VarioSystems takes care of their 1050 employees by creating “safe working conditions in the supply chain and that they are treated with respect and dignity” (Managing Director of VarioSystems).

As a manufacturer of high developed electronic devices VarioSystems offers their clients a global service and support. By connecting all sites via SAP they can ensure a successful long-term cooperation.



Visiting the site in Dallas, TX the project group got an insight in the company producing process. Initially one of the founders of VarioSystems and managing director bid us welcome in his company and told us about the founding process and what VarioSystems became since then. It was an interview-like presentation, so that the students

and professors could ask some questions belonging to the topic or not and were friendly answered by the managing director who could speak very good German to most students surprise. Later on he told us about his life and living in Switzerland and Germany. After his presentation we were guided through the company by an Engineer from the production of circuit boards and their usage later on, over the assembly line and testing area, so we got a very good insight in the company.

Some of our students of the group are now considering to write an application after graduating.

To sum up it was a nice experience in the company with some theoretical aspects and questions that could be easily and directly answered from the engineer that led us through the workshop. After reflecting the “guided tour” with the managing director we learned a lot of new things of the production process and the way a modern and “ahead-thinking” company looks like where the manager himself welcomed a group of students.

All in all, the visit at VarioSystems was an interesting visit and we hope that future excursions get the same insight in the company as we got. It was a nice visit and we would recommend to visit the company to everyone who is interested in a high developed modern company with a strong relation to their employees.

The Texas country really looked like it is stereotyped in movies with oil and gas pumps in the fields next to the endlessly long highways and little villages scattered apart in the desert-like landscape.

We reached Lubbock around 7 o'clock p.m and checked into our hotel. Then we went to a restaurant named Crickets to have dinner and meet some students from TTU.



2.3. First Day Texas Tech University

At our first day in Lubbock we started with Breakfast in our Hotel. Typical American we started with Plastic cutlery to eat our beagles and waffles. With our rental cars we took the way to the Texas Tech University Campus. This campus is really huge and on every gate stands a security guy to control the cars. The first point of the day was visiting the Student Union Building. It is a big building where you can eat at one of the numerous fast food restaurant or go shopping in one of the shops. In this building you can find also a Campus Police Station and a few presentation rooms.

After this first impressions we had a meeting in front of the industrial engineering building with a staff member from the Office of International Affairs. He guided us through the campus and we saw that everything on this campus is huge: huge places, buildings and stadiums all around us. The target of the tour was the



campus intern recreation center. In this gym are seven basketball courts, a boulder hall, an inside running course, a lot of fitness machines and much more – you won't miss anything there.

Outside of the building was a large swimming area which you can see on the picture. There are 25 meter pools and a fun area. The recreation center is only for members of the Texas Tech University.

After the tour, we met us with the students in the Student Union Building for lunch.

Next on our schedule was a meeting with the American students in the Engineering Building to work with them on our project themes to complete our presentations.



In the afternoon we were going out with a small group of German and American students to the Triple J Restaurant in order to eat an original Texan steak. The Restaurant was a typical Texan Restaurant and includes a real good brewery too. So we were

all eating a real good steak with French fries and a homemade beer. It was a real good tip from the American students.

After this tasty meal, the Americans drove with us to the Walmart where we bought some types of American beer, ending the day with an international “beer-tasting” together with the American students.

2.4. Second Day TTU and Visiting X-Fab

The 4th day of our excursion started with a group working session for the smart house project at TTU. All groups worked on their final presentations and tested it. The control of the house model via the app and the communication to Mr. Struß via Skype in Wilhelmshaven were also tested. All groups got more and more nervous, because the time until the presentation was running out. Therefore some groups arranged a last meeting in the evening to make a final test of their presentations.

In the afternoon, we visited X-FAB, a foundry group that produces analog and analog-digital semiconductor applications. X-FAB can be found in 5 locations which are Dresden, Itzehoe and Erfurt in Germany, Sarawak in Malaysia and Lubbock in the USA. Altogether there are 2500 employees working for X-FAB worldwide.

At 3 pm we arrived at X-FAB and our guides Graham Hill and Marcus Borhani welcomed us. They split us into two groups and led us through the company. They explained us the very complex process of the semiconductor production, showed us all different steps of the processing and gave us an overview of the history of the company.

X-FAB is a supply firm. That means that they don't produce their own circuits but get orders from their costumers and produce the ordered devices for them. They also support their customers with electronic design kits, full access to technical documentation and a solid expert knowledge about semiconductors.

In general, X-FAB produces wafers, which are circular silicon slices with a diameter up to 150 mm. These wafers are the base of every electronic circuit and can carry between 40 and thousands of devices. Because of the size of these devices, it is really important to have a clean room without dust or other sources of flying particle to prevent defects on the wafers.

X-FAB can produce wafers with a thickness ranging from 1.0 μm to 0.18 μm . This is not state of the art but it is good enough because X-FAB is specialized on devices which are very robust or work with high voltage. Therefore, X-FAB is a good partner for customers in the automotive or industrial and medical industry, because they usually need long live devices with a high quality.



This visit was really interesting and informative because some of us never saw a wafer before and did not know, how small an electronic device can be. Graham Hill and Marcus Borhani gave us an insight in the semiconductor business and impressions of the complex process of the wafer manufacturing.

2.5. Presentation Day

During the trip to Lubbock in the United States the participants presented their projects on which they have worked the last 8 weeks.

Next to the group members, the dean of the German University Of Applied Sciences Wilhelmshaven Prof. Dr. Heiner Köster, the project leader Prof. Dr. Josef Timmerberg, as well as Paul Beckmann and Nicole Jesse, from the technical assistance and Volker Lübben, who organized the field excursion, participated the event. From the American site Prof. Dr. Michael Giesselmann,

the chief of computer and electrical engineering, Allison Wright as advisor and Ashley Haseley with the job of assistance, took part of the presentation. Most of the participants knew the results of the groups before, but especially the American administrations did not.

Every group had have a time limit of a half-hour's for their own presentation.

The groups worked on typical topics of smart house automatization. Two House models were available and had do be extended with power supply by PV-cells plus accumulator, room and pool temperature control, burglar recognition by camera, presentation of house data on a display, light control by shutters and lamps and final a smartphone app for user control and information.



Burglar detection group using a Raspberry Pi3 plus camera module for edge detection

Depending on the topic of the group the members were concerned with sensor electronic, power electronic, programming of Arduino microcontrollers and Raspberry Pi computers, smartphone app development, webserver configuration or mechanical construction.

As some of the circuit boards were already prepared, not every group had to start from scratch. Therefore the center of interest for these groups was more programming of microcontrollers than electrical engineering. That also applied for the object- and movement detection groups, their

main task was programming as well. More practical work was done by the light group, which participants mounted lamps on the ceiling of the house, light barriers at the door for counting people coming in and leaving the room. They also constructed and mounted a shutter closing mechanic. During their presentation, the group presented different ideas for a shutter close mechanism and argued why they rejected the first ideas and choose and implemented the actual design.

Some groups used an online connection between the presentation place Lubbock to Wilhelmshaven, to show the real house next to the internet data or to make a live presentation of their work. The online communication was needed, because the model houses were too large to bring them from Wilhelmshaven. Thanks to Kai Struß, who handled the house model in Wilhelmshaven and adjusted the camera to see everything correct in Lubbock the live view was



Online communication between Wilhelmshaven and the light group

a success. For example the light group built a display out of LED-strips and showed a warning message on it, when a burglar is detected.

During the live connection, the audience was able to watch how Kai Struß opened the door and the warning message appeared on the display. The audience could also see, how the shutters opened and the lamps were switched on, when the light barriers were actuated.

Other groups presented a little movie of their project work. The temperature groups for example used this method, because watching their working results takes a long time, which is definitely rare during a presentation.

Another good presentation was given by the app group, who collected the data of other groups and made them visible on a smartphone display and a webpage.



Presentation of the "App Group"

2.6. Field Trip to Palo Duro

Morning: Cadillac Ranch

The two-hour journey led the excursion group off 200 km away to Palo Duro Canyon State Park. On the way the group visited the „Cadillac Ranch” close to Amarillo.



The „Cadillac Ranch" is a work of art, which was built in the middle of a cornfield. As the name suggests, the work of art consist of ten Cadillac's, which are placed in a line. The angle in which the vehicles are buried matches the lead angles of the pyramids of „Giza ". It is a living work of art, because visitors can bring their own colors to redesign the vehicles. The Cadillac's stand as a symbol for freedom.

Noontime: The Big Texan

After the creative phase the group had lunch in the restaurant „The Big Texan Steak Ranch“. The steakhouse is located directly at the well-known „Route 66“.

The interior design is a mix of saloon and a hunting lodge. The walls are filled with stuffed animals from the region. The restaurant is known for good and solid food. Among other things you can order a two kg heavy steak with side dishes. If you manage all within an hour, you do not have to pay for it.



Afternoon: Palo Duro Canyon

After lunch the group drove toward Palo Duro Canyon. The Palo Duro Canyon or as natives call it "Grand Canyon of Texas" is the second largest canyon in the United States.





The Canyon is 193 km long, measures a width of 10 km to in part 37 km and a depth of 244 meters.

2.7. Game Day

The day of the Game Day began very relaxed, we could sleep in because no other appointments or sightseeings were planned so we decided not to have breakfast at the hotel La Quinta. Instead we went to IHOP near campus. IHOP is in America a common restaurant chain with hearty breakfast, which can also be eaten at lunch or dinner. At 10 o'clock we met there, ate Pancakes with syrup, bacon and scrambled eggs or crepes with Nutella and sliced bananas or simply a great omelet.

After breakfast we visited the shop Cavender's Western outfit, where you could be dressed completely top to bottom, from cowboy hat to boots. Some of us bought a souvenir such as the cowboy hat.

Some of our group met with the Americans of our project at 12pm at a shooting ranch. The shooting and handling of different weapons were taught. The shooting itself cost only \$ 16 per person, the ammunition needed to be bought before.



The weapons used were all private weapons from the American students. We started with clay-pigeons-shooting with two different shotguns then we went into a hall behind the ranch, there it was allowed to shoot with pistols, revolvers and sniper rifles projectiles.

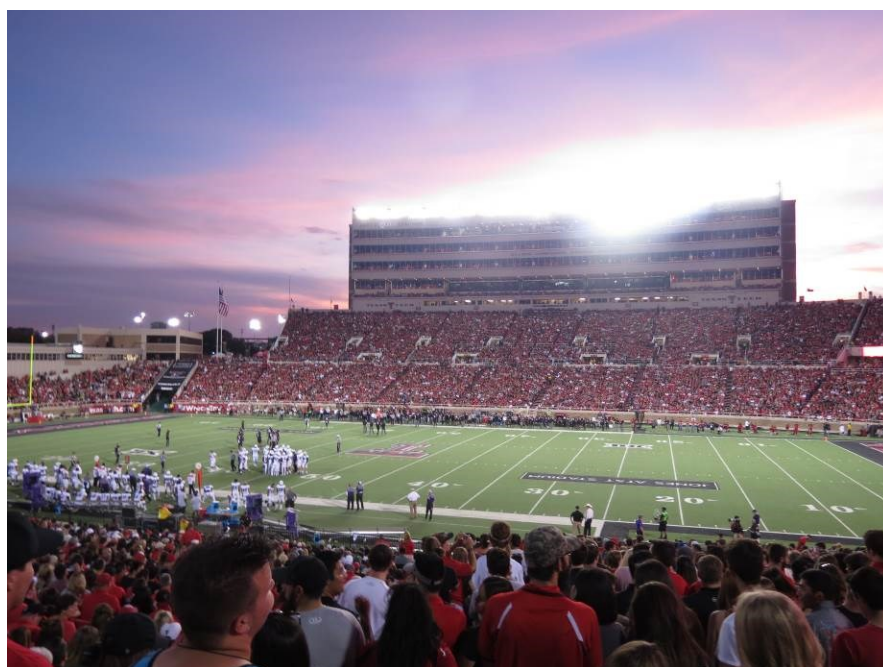


At 3 pm some Students and Professors went to the windmill Museum where the old American windmills or so called Western windmill can be viewed. This kind of windmill is a on a lattice mast-mounted, much bladed wind turbine with a banner to the wind direction guide. It was developed in the second half of the 19th century and was mainly used as a pumping station drive for loading and drainage, later also to generate electricity. This method used to be the best to get clean water as Texas is a very large and extensive dry land.

After the museum, all German Students met at 5pm in front of the grounds of the Texas Tech for a group photo. There we got our tickets for the big football game of the TTU Football team, the "Red Raiders". The anticipation for the game was great, we all bought us a Red Raiders shirt the day before.

Then we moved to the stage where American students invited us to their traditional “tailgating” in a pavilion to have a meal. There were sliced sausages, tacos and salad; moreover beverages such as water, soda and beer. Just before the game started we entered the stadium, it was huge, a stage for 50,000 people with a giant screen in the front of the stage. On this screen, some of the good-humored fans were randomly shown then they danced, shouted or made amusing movements. At 7 pm the show began, while the music of their team was played, each individual player was presented.

Then the marching band of TTU performed in the playing field, accompanied by dancers until they reformed on one side of the field. Suddenly a starting signal and the Red Raider mascot on a black horse ran on the pitch. The rider raised his right arm and formed a Colt



with his hand. When he arrived at the other side of the stadium there was a big firework display and thus the game was opened and the battle could begin.

Red Raiders from Texas Tech University played against the Lumberjacks from Stephen F. Austin University. The game was very one-sided, the Lumberjacks had no chance, the Red Raiders made one touchdown after another. From time to time all supporters raised their hands and formed their hand for a Colt. "Guns up" is a gesture for first downs, touchdowns or just to cheer. At half-time a music show of the marching band was shown. As the game lasted 4 hours, half of the Germans went back to the hotel after the break as we had to drive off to the next day at 6 am so

we could timely deliver our rental cars in Dallas. The rest remained until the end of the game and enjoyed the victory of the Raiders. The Raiders won the game with 69 to 17.

2.8. Trip to Dallas

On September 4, 2016 the excursion group returned to Dallas to take the plane to New York on the following morning. After a five hours journey by car over the Interstate 20 E the participants arrived about noon and checked in to the Red Roof Inn. The Sunday afternoon was used for returning the rental cars and having some cultural program. The students had the choice to visit the 6th Floor Museum, dealing with the historical Kennedy assassination or rather enjoy the afternoon at the famous Six Flags Hurricane Harbor Waterpark. The following evening was free for individual planning.

Sixth Floor Museum

Unfortunately we couldn't buy any tickets because there are too many people already waiting to enter the museum. So the group visited the museum store and Dealey Plaza, the place Kennedy was shot in 1963.



Historical Streetcar Ride

After the visit at Dealay Plaza the excursion group made a walk through the downtown and decided then to take a historical streetcar drive to get uptown.

The M- Line trolley provides a free service between many interesting attraction, such as the Klyde Warren Park, the Dallas Art District, Nasher Sculpture Garden, or the Crow Collection of Asian Arts. During the ride the students were able to enjoy some interesting background history and exciting stories, for example the legend of Bonny and Clyde.



Six Flags Hurricane Harbor Water Park

Six Flags Entertainment Corporation, is an amusement park corporation based in the United States, with properties in the US, Canada and Mexico. It is the largest amusement park company based on the number of property it owns.

Monday morning we were checking out early from the hotel in Dallas.

2.9 Flight to New York and First Day New York

We were transferred by shuttle to the Dallas international Airport. By 10:00 am local time we started our flight to Newark Airport. Landing time was about 2:00 pm New York time.



From Newark Airport a shuttle brought us to our hotel *Holiday Inn Madison Square garden New York City*.



After the check-in we arranged subway tickets and then drove to the Rockefeller Center. At the center we received our New York City-maps. With those we were able to visit numerous objects of interest the next days.

It was great to have the chance to see all the places of interest in NYC. The 9/11 Memorial was really interesting, but the best was the top from the one World Trade Center.

We redeemed the first ticket immediately by using the long lift up to the top of the RFC to have a great view over New York.



Rockefeller Center (RFC)



One World Trade Center

From the top we could enjoy the sunset and the great view of Manhattan with awesome weather.

Since the 5th of September has become a holiday (LABOR DAY), the RFC was very well visited.

After we had enjoyed the breath-taking sight for a while, some of us returned back to the hotel.

The other ones had a drink and a snack with our Professor Dr. J. Timmerberg.

The 5th of September was not just Labor day, it was also Mr. Timmerberg`s birthday. A good reason to end the day by having a “cold blond beer” in New York.

2.10 2nd Day New York, Visiting MTA and UN

Taking people from A to B - The Metropolitan Transportation Authority

As for many people, both locals and tourists, the day of September 6th started out with taking the subway. This time the destination would be the Grand Central Terminal. Being the biggest train traffic junction over 750.000 people pass through it each day. Just like us, a lot of people, nearly

200.000, are tourists who want to take a look at the impressive Architecture of the building which was opened in 1913.

When first entering the main concourse the first thing to notice is the huge size of the building with its high ceiling, big stairs, and remarkable windows. Eventually one would look to the center of the building which holds the information booth. As often seen in movies, this might be the most recognized place in Grand Central Terminal, because on top of that booth, the unique four way clock is placed. This would also be the start of our tour through the Terminal guided by Daniel Brucker. In his unique and lively way he guided us through the different concourses, always pointing out some interesting facts such as why the trains arriving and departing the Grand Central Terminal are more than 98 % of the time on time because of a wanted display error. The funniest fact about the Grand Central Terminal is probably the reason why there is a black hole in the ceiling. Due to calculation errors, they needed to drill a hole into the ceiling to be able to place the space rocket in the main concourse in 1957.

Not only was the obvious shown to us but also the secret staircase which led to the basement of the Grand Central Terminal. This dirty, stuffy, and dark basement holds the secret train track which was built for president Franklin D. Roosevelt to transport him right in to the city. Also the elevator which would bring the president in his limousine right to the surface is still present to this day.

Even deeper down the secret sub-basement was shown to us. After taking the long stairs down, we would see the old and new AC to DC converters which supply the trains with electric power. Today, even after the basements location is not so secret anymore, still only three staircases and an elevator (which has not been working for the last 18 months) lead down to the basement. In the early days this would be the only power supply for the trains which made it a target for enemies like Germans in WWII when they would try to sabotage the converters with sand which would have destroyed them. Not only because of that, but also because of the increasing power

that is needed today, there are several power supplies spread in and out of the city to make sure, that the trains are able to work at all times.

Back in the main concourse of Grand Central Terminal the tour was wrapped up with more interesting facts. For example that the new stairway is one inch lower than the old one. These three hours were for all of us very interesting. A lot of new information and facts were given to us, since most of us only knew the Grand Central Terminal from pictures and movies. We were very lucky to have Daniel Brucker as our tour guide. We look forward to visiting New York City and its subway again.



A Visit of the United Nations

The second part of the day covered a visit of the United Nations. The tour guide showed the group around and talked about the different parts of the UN, where they are situated in the building and what their task is. Besides the theoretical explanations, two meetings were visited, that were held at the time of passing by and also a lot of images could be viewed.

At the end of the tour, everyone had the chance to get a stamp of the UN in the passport.

The night was off. Some people went to the 9/11 memorial while others took a ride with the Staten Island Ferry or took a walk on the Brooklyn Bridge.

2.11 3rd Day New York

The third day in New York City was the day we were free to do what we wanted to. So we split into small groups searching for cultural activities like, for example, visiting the Museum of Modern Art, the Statue of Liberty, the 9/11 Memorial or the Air and Space Museum. Some others decided go shopping and explore the city like central park or Times Square.

The Statue of Liberty is placed on the Liberty Island and was a present from France 1886. The monument is 92.99 meters high.



One of the group members visiting the 9/11 Memorial said that the place has a very taut atmosphere. Due to that fact that our third day in NYC was very close to the date of the anniversary of the terror attack on the world trade center and to labor day a lot of relatives of the victims might have visit this memorial. The 9/11 Memorial is placed on the ground, where once the twin towers had been.

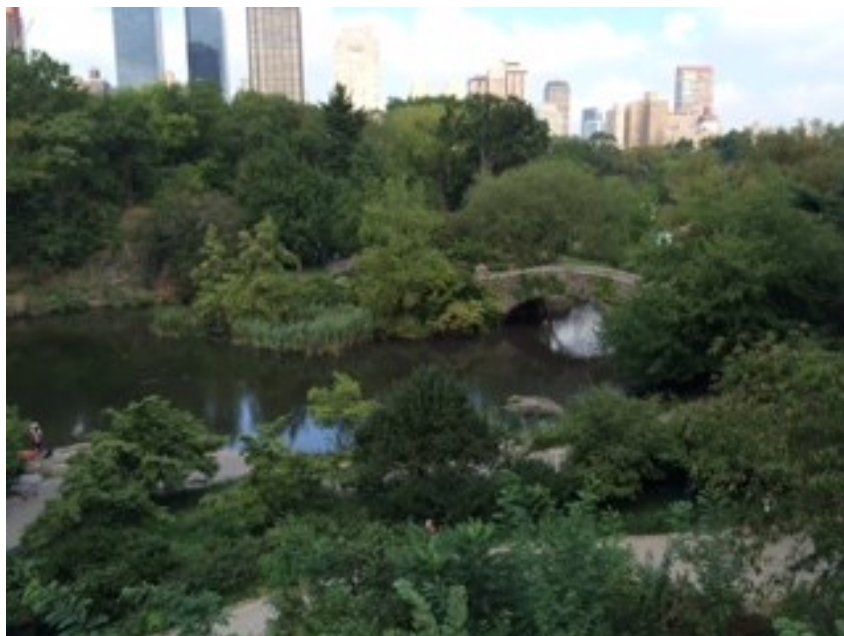
The Air and Space Museum is placed at the Hudson River on an aircraft carrier, which was reconstructed as a museum.

The Times Square is, due to all the bright advertisement, one of the most famous streets in NYC. It is named after a building used by the New York Times. There are a lot of theaters, restaurants and stores.

The Museum of Modern Art is also a great sight of New York City. It belongs to the most important and most influential collection about modern and contemporary art in the world. The collection

contains for example many works of architecture, design, drawings, paintings and movies of modern art.

The American Museum of Natural History is one of the greatest museums in the world. On 5 areas you can see the gradually development and history of the human race. It starts with the Stone Age and ends with Space age. The most important samples and exhibits are for example the IMAX-cinema, the Rose Center for Earth and Space, the life-size blue whale and many carcasses of dinosaurs.



The Central Park is a city park in the center of Manhattan. It was built in 1859 and is 4.07 km long and 860 meter broad. It is also called the green lung oh New York City.

Some of the groups visited the Empire State Building. It is placed in the center of midtown Manhattan. On the top of the Empire State Building, on the 86th and 102nd floor, there was the observation deck. From there, you have a great overview all over New York City.

In the evening we met us in an Italian restaurant to have dinner together. It was a very nice evening at the last whole day in New York. Everyone enjoyed this staying together. At least we went to the rooftop bar “230 Fifth” and drunk a cocktail together to get a very nice completion of the trip to America.



Inside in the Museum of Modern Art

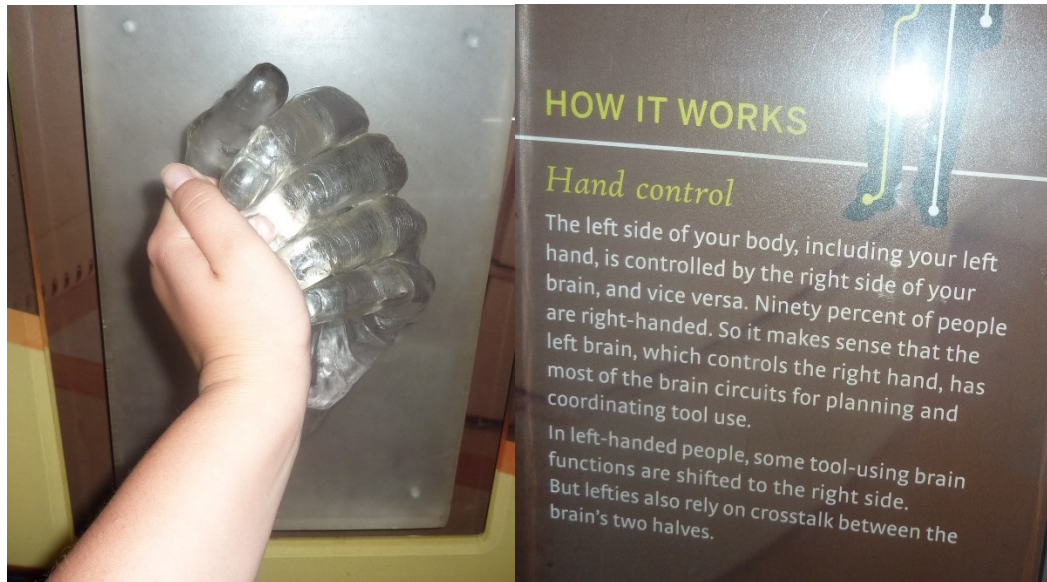
When you visit the museum you can take a free "audio tour". This is to explain the exhibits with the headset. There are different languages you can listen to. When you receive the "Visitors Guide" you should first make yourself familiar with the floors in the exhibit hall, to determine your tour route.

On the sixth floor you are not allowed to take pictures. The fifth floor is the 1880's - 1940's modern beauty. The fourth floor of the exhibition is 1940-1980's painting.

On the museum's second floor, there are educational centers, visitors can take part in the "interactive space" where you can participate in a variety of paintings and works of art production.

Museum of Natural History

The Museum of Natural History is located in the street Central Park West corner 79th and is one of the largest natural history museums in the world. The museum, which is about four blocks, was built between 1874 and 1877 by Calvert Vaux and Jacob Wrey Mould.



On 5 floors it virtually covers the entire history of mankind - from the Stone Age to the Space Age. The museum keeps more than 30 million objects and exhibits for its visitors and science.

It also has its own IMAX - cinema and its own subway stop. Especially worth seeing is the Rose Center for Earth and Space is the Hayden Planetarium and Space Show. This is opened in 2000.



Also, the museum is also a notable research institution with more than 200 academic staff in various fields, such as anthropology, astrophysics, geology, paleontology and zoology.

At 2:30 p.m. we were picked up by three shuttles to New York JFK (John F. Kennedy) airport. On time at 4:05 p.m. we departed New York to Frankfurt/Germany.



On 09/09/2016 at 5:35 a.m. local time we landed safely on the runway of the Frankfurt airport. From there we went at 7:00 am with a smaller plane to Bremen airport. This we reached shortly before 8 a.m. without loss of luggage!



3. List of Participants

Students:

Bernd Plaggenborg

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Inke Heynen

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