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AUTOREFERAT

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Master of Arts degree in animated film received in June 2010 at the Academy of Fine Arts in Poznań.
since 2011 Assistant at the 3rd Animation Studio at the Faculty of Multimedia Communication of the Academy of Fine Arts in Poznań
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a designated work:
„Human traces in furthest places...”

As soon as my creative search became at least a little conscious, the word interaction began to accompany it. Interaction as a form of dialogue, but also as a way to find additional fields for the development of traditional film techniques. Similar experiments have already taken place in the past, but most of them were subject to similar constraints resulting from the slow technological development of film tools. First such film “Kinoautomat: Man and his House", made in 1967 in Czechoslovakia, used a model of interaction often used to this day in television programs, consisting of the audience voting through a simple interface, most often in the form of a panel with several buttons. Interestingly, the film only gave the illusion of interactivity - regardless of the audience's decision - the final conclusion was always the same. Most later attempts adopted a similar pattern, but often used a tree structure (where each choice causes the story to split into two) to ensure true interaction. However, all these were strongly limited by quite primitive forms of participation, as well as the very form of recording the moving image. Due to the tree structure, the amount of data needed to describe all possible events grows at an avalanche rate and quite quickly encounters a technological barrier - the capacity of film carriers. The real era of development of interactive technologies has therefore come with the popularization of personal computers and their rapid evolution in comparison with the development of cinema. The technologies available today at your fingertips, you can get a headache - 3d glasses-free screens, a wide range From consumer VR devices, countless controllers, virtualizers, and the increasing development of haptic technologies. But this is just the beginning. On the other hand, we see a huge popularity of electronic prototyping platforms based on microcontrollers such as the Arduino (www. arduino. cc), which, accompanied by hundreds of different sensors (light, pressure, deflection, color, humidity. . .) gives almost unlimited possibilities to the average creator, removing the barrier of access to the latest technologies. The second keyword accompanying me in my exploration of film material is immersion. Immersion as a form of “deepest expirience” in the context of electronic interactive art. It was the deepening of this search that pushed me towards interactive film, and although it is actually an oxymoron, there are many forms of interaction possible in a film work. One of them is the interaction in the “perceptive layer”, which I developed during one of my first experiments - the diploma film “Babel” where the selected viewer could influence the camera's field of view by the movement of his head.

BABEL

The film told the story of production machines tired of the daily routine and somehow put the viewer's vigilance to sleep, presenting these processes quite profusely. It is only in the middle of the film that the machines, so far completely obedient, are subject to personification and decide to take action allowing them to change their burdensome reality.

A still from the film “Babel”, 2010

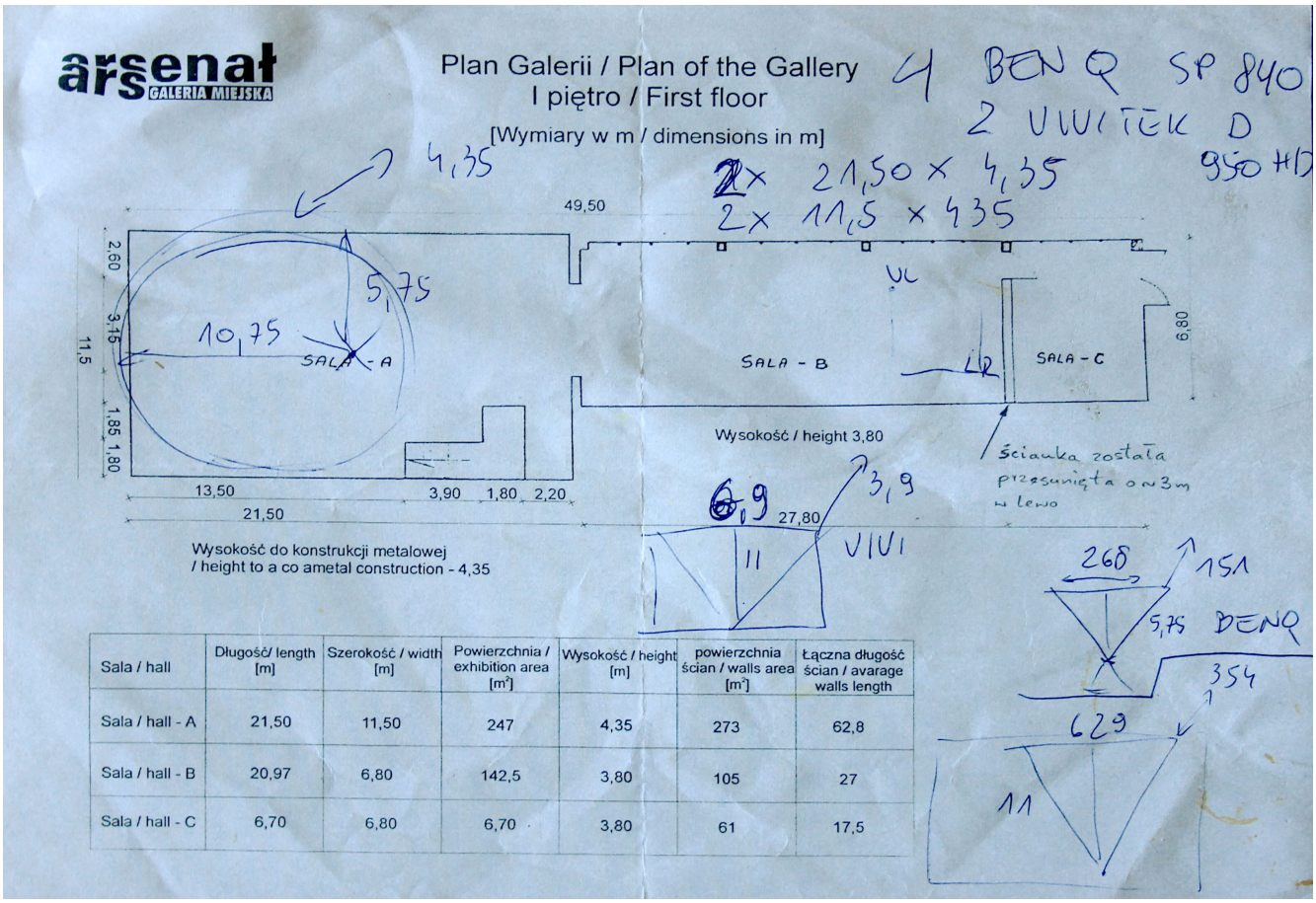
Although the interaction was not very deep and concerned only one of the viewers - the experiment is still considered successful because it allowed me to make many discoveries and learn more about the challenges and technologies involved in making an interactive film. The most important in this case was the aforementioned immersion - although it concerned only one man, it turned out to be so interesting that it encouraged me to continue my search.

TERAPIA

The next important stage for me as an artist was “Therapy", important both for my artistic and professional development. This was a key element of the doctoral thesis which, due to the far-reaching form of interaction, cannot be qualified as an interactive film, here we no longer observe the fate of the protagonist pointed out to us by the director, but it is us as a viewer who incarnate in him. In fact, we are becoming one of the two characters in the story. There is a kind of symbiosis between these two - both their physicality and emotions intermingle, leaving them sometimes unrecognized. „Therapy", like “Babel", is based on a real-time image producing engine which allows for complete flexibility in the length of the story and its course. This is quite an interesting case of a certain reversal of the roles - here not only the viewer/participant of the events evaluates the creation - here the creation also evaluates the viewer. For the purposes of the story, a system of evaluation of the user's behaviour was created - and depending on this evaluation, the other protagonist of the film changes his attitude towards us. Unfortunately, this resulted in a rather dramatic accumulation of dialogue lines. In this story of a few minutes or so, more than nine hundred of them had to fit in. Not all of them were played - only those relevant to the current story. This was due to the use of the double tree structure. The first one is quite classical for an interactive film due to breakups and decisions made on them - the second additional one is the result of the viewer's assessment. Therefore, the issue expressed by the “co-hero" is chosen from the pool of recordings not only because of our choices as a viewer, but also because of his assessment of our actions - an assessment that boiled down to choosing one of the three emotional states of the character - positive, neutral and negative. Another difficulty resulted from the full freedom to explore the space found by the viewer. It proved problematic to “encourage" the viewer to follow the director's preferred paths - here the light, sound and the “co-hero" himself and his verbalised preferences came to the aid of the director. Reaction to his demands influenced the evaluation of our actions. The film told the story of a young man growing up using fragments of his memories. Each of them was, as in our memory, only a fragment of reality, often without a wider context. These memories always had two faces from which we could only observe one. The choice depended on the current emotional state of our companion, who was also the narrator. Fragments of memories symbolized by images hanging in the room, which also appeared in two versions.

Two faces of “Therapy" presented on MODDB. com

After the experiences and difficulties connected to making two interactive films, I decided to take full advantage of the possibilities of the reactive environment by completely depriving another creation of the narrative layer. This would allow for the development and deepening of methods of interaction with the simultaneous exploration of unusual ways of telling stories. The offer of the Arsenal Town Gallery in Poznań has been an excellent opportunity to present a film project from the Department of Animation of the UAP to the exhibition commemorating the 65th anniversary of the institution. This proposal proved to be very attractive, but not without a lot of challenges. The largest of them turned out to be the exhibition space itself - namely a hall of nearly 300 square metres. Any attempt to develop such a large space by dividing it seemed disappointing. Eventually I decided to use the potential of the hall by creating one big object - that's how the concept of the rotunda was created.

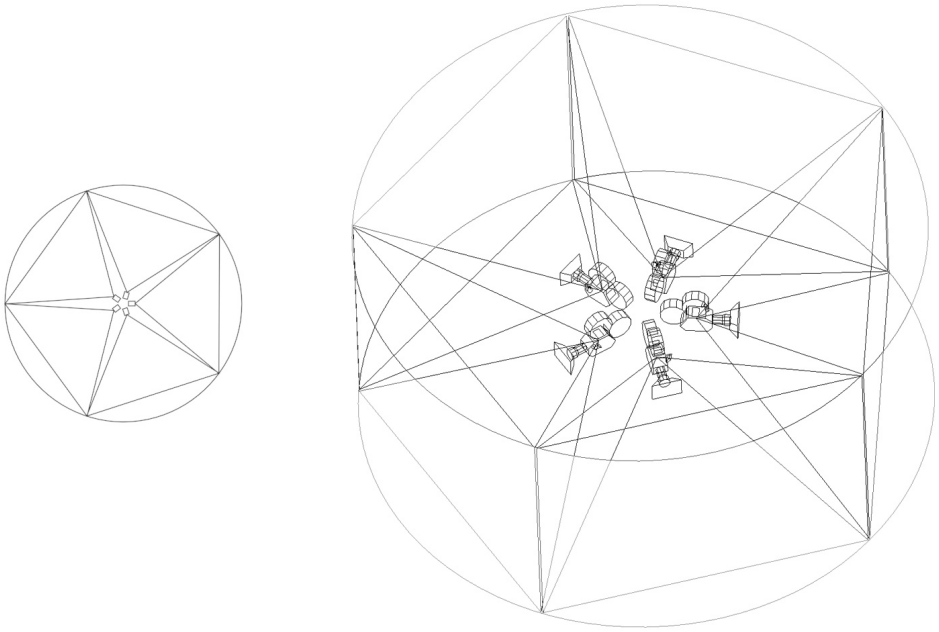


Sala / hall	Długość/ length [m]	Szerokość / width [m]	Powierzchnia / exhibition area [m²]	Wysokość / height [m]	powierzchnia ścian / walls area [m²]	Łączna długość ścian / avarage walls length
Sala / hall - A	21,50	11,50	247	4,35	273	62,8
Sala / hall - B	20,97	6,80	142,5	3,80	105	27
Sala / hall - C	6,70	6,80	6,70	3,80	61	17,5

First notes and ideas for the development of room A of the Arsenal City Gallery.

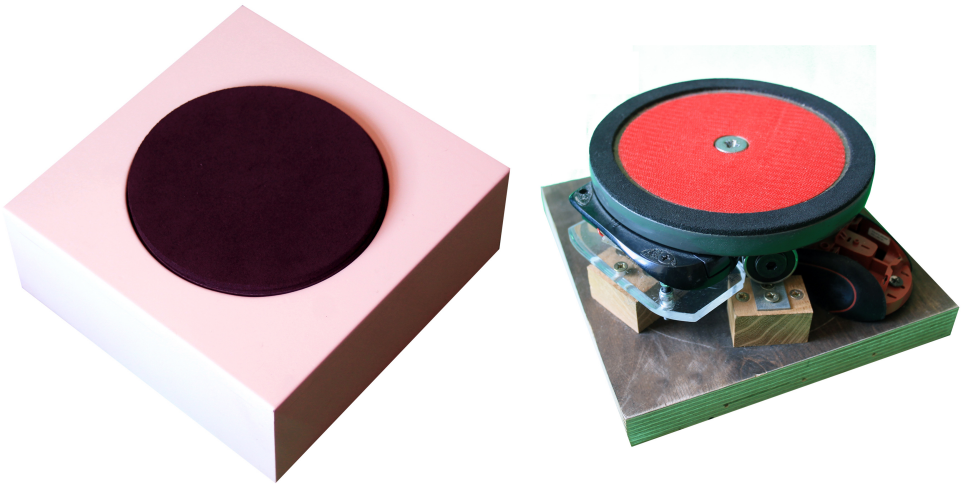
COMPLETELY UNTITLED...

The idea was to make a multimedia panoramic projection closing in a 10 meter diameter cylinder. A projection that will not be a collection of prepared images, but an interactive “electronic fetish” using a wide range of technological solutions being “proof of its (gallery's) readiness to enter new areas of art, fascinating successive generations of artists".
Due to the shape of the mapped surface, classic film framing was not an option. The frame is 16:9, here the screen ratio was 20:3, additionally the projection, being cylindrical, had no vertical edges - the picture had to repeat and close in a complete circle - hence the idea of project coordinator Bogna Błażewicz for the title of the event “Completely untitled...”.
In order to create images on the mentioned screen, I had to give up all the experience I had gained so far. Eventually, the image, being interactive, was created in real time and the generated virtual space was recorded by a system of 5 virtual cameras arranged so that the field of view of each of them would meet.

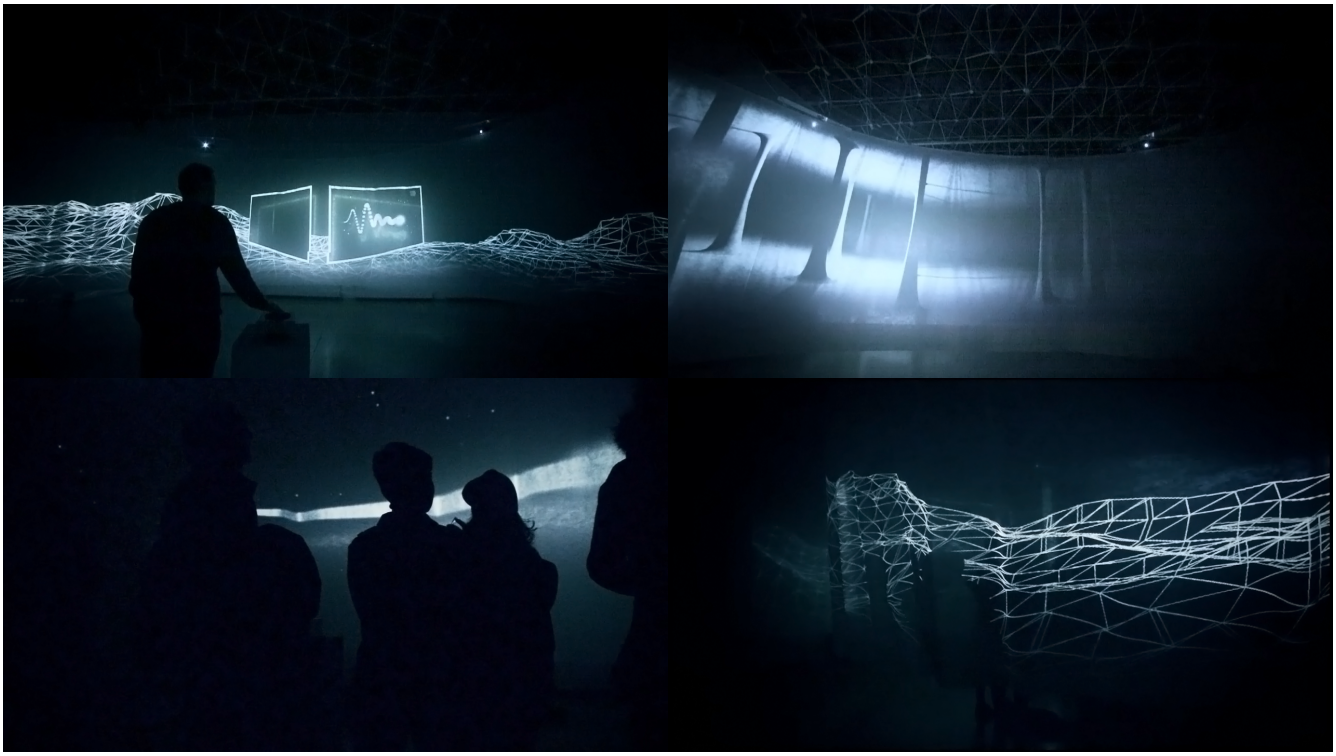


Each of these cameras recorded three-dimensional space in its own field of view and recorded the current frame as an image in the computer's operating memory. Then all the collected images were combined and the resulting image was displayed on the panoramic screen. Another problem to solve was the user interface itself. It was supposed to be simple, intuitive, aesthetic and, above all, durable due to the thirty-day public exhibition of the project. It was also important for me that this device was

a natural extension of the panoramic screen and continued the idea of “completeness”. Several prototypes were created, but in the end the most effective was using already existing solution - a computer mouse. With only one difference - while we usually move the mouse over a stationary surface, in this case the opposite is true, the mouse remains stationary and a circular surface rotates over it. This is how the controller was created, which, both in its shape and mode of operation, refers to the space surrounding the viewer and the events in which he or she takes part.



The projections appearing on the screen were a collection of several theoretically detached small experiences, but they were connected by a common idea - the idea of cyclicality, repetitiveness and space surrounding the viewer. From the cave with the light moving around it (the direction of which was determined by the movement of the controller), through operatic soloists surrounding the viewer to abstract landscapes. The visual link between all these elements was light - usually quite strong and moving in accordance with the viewer's will, it created an intriguing play of shadows inside the rotunda, and by using a transparent medium to project to a play of lights resembling caustic on the outside. The light coming out of the rotunda's interior caused the walls surrounding the screens to flicker. The audience could admire these riotous and subtle beings both inside and inside the rotunda. The interactor could only be inside - in the heart of the projection. This caused ambivalent feelings - on the one hand, he became the master of the situation, controlling the system, while at the same time being supposedly surrounded by a “wall of light" of over 120 square meters.



"Heart” of the rotunda, an interactor is visible in the upper left corner (photo by Mariusz Kołodziejczak)

HUMAN TRACES IN FURTHEST PLACES....

The postdoctoral work

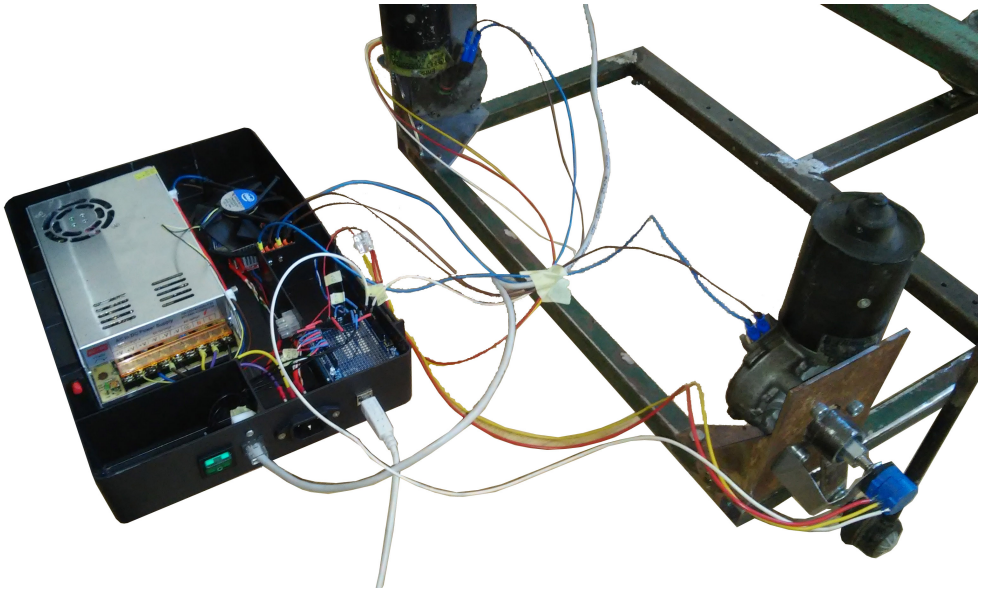
One of the phenomena that emerged during attempts to move around in virtual reality contributed to this complex system. The experience with VR-based projects so far has not allowed to create a reliable method of human movement. Although some of the VR systems allow for slight human movement in real space, translating this movement faithfully into movement in the virtual world by limiting the area of the created scenery. This size is determined by the size of the actual room, or the maximum operating range of the VR reference devices (for HTC Vive it is a 5m square). And the possibilities offered by virtual reality are theoretically unlimited, allowing to create whole worlds. The problem of movement in such a space must therefore be solved in order to be able to fully exploit this

potential. The idea of the project was to seek new solutions. Previous methods such as The teleportation was effective, although artificial in reception by means of interface elements visibly incompatible with virtual scenery, causing the viewer to immediately detach himself from the surrounding reality. On the other hand, methods based on different mobility cause the occurrence of simulator disease in some viewers/users. “Simulatory disease is a condition characterized by various symptoms, ranging from bad mood, headache to the symptoms of locomotion sickness, caused by various aspects of the impact of the virtual environment on humans".
This phenomenon arises mainly due to the dissonance between the image displayed in front of the viewer's eyes (illustrating movement in space) and contradictory information transmitted to the central nervous system by the inner ear. The symptoms of this phenomenon are similar to a locomotion sickness and their intensity depends on individual predispositions. This problem affects most of us to varying degrees. For this reason, VR's digital application distribution platforms introduce a comfort rating system for the offered applications. To counteract the simulatory disease, a set of rules was created for VR, the most basic of which says to avoid moving the virtual camera against the user's will or actions at all costs. However, this limitation is so significant that it causes a huge hindrance to the development of VR technology and thus also hinders the development of art based on this technology. An additional reason why I have been conducting my experiments for almost three years is the aforementioned immersion - in order to experience the surrounding space completely freely, we must be able to move around in it. The answer to these issues was to be a hardware platform allowing to “deceive" the inner ear by providing it with at least residual information about body movement. Before the platform reached its current state, it underwent many changes, most of them related to ensuring its liquidity and security, although a few of them were also important for its capabilities and final shape.

Phase one - Support point as axis of rotation.

The first goal af my project was to achieve only lateral tilting with a low mobility range. The position of the user was similar to the one we take when driving and the majority of the device was designed just to provide a support for the body. This surface was held by a simple double-sided hinge at the point

designated as the body's centre of gravity. It allowed for forward/backward and sideways leaning in a range of about 15 degrees, so the whole device was not too high. In order to be able to control the body position, there are two electric motors with small worm gears at both rear ends of the platform base, providing increased lifting capacity of the system. An arm about 7 cm long (whose doubled length gave a 14 cm range of the platform) was attached to the drive bar of the gearbox, the other end of which was connected by a movable joint with the rear corner of the platform on which the user was to sit. However, the engines used were not very powerful, despite the gears supporting them and the support point providing significant weight reduction, they could not cope with the weight of an average person. Movement in one direction or the other was quite smooth, but the moment of the greatest overload accompanying the change of direction, i. e. when the kinetic energy is still at work and the human body needs to be stopped in order to be able to change the direction of its movement, proved to be too much of a challenge for this project. Another conclusion from the construction of the first working prototype was the observation that each supported structure will not be able to achieve significant vertical accelerations which will limit its functionality too much. Accelerations in the gravitational axis are strongly felt by the average person (as we can see in a fast-moving elevator, for example), which resulted in another prototype.



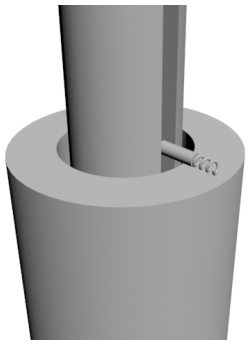
First version of the platform with visible motors and controls.

Phase two - Tripod

To obtain vertical accelerations, the total weight of the human body is measured, additionally multiplied by the speed of movement. Therefore, the first decision, which brought about significant changes, was to equip the platform with large electric motors with much more power. The choice was made for 36V motors used in electric scooters. The problem with this choice is that in order to control a high-power motor with PWN (Pulse Width Modulation) signal, a suitable quality and size controller must be used. These devices are quite expensive and not very popular. An additional problem is the fact that most of the solutions available on the market assume the use in various types of robots or self-propelled vehicles and are therefore equipped with a regenerative system that recovers the current generated when the engine changes direction in order to save energy in power cells. However, the platform was designed on the assumption that it would work for many hours, which excluded the use of batteries. While such a system is connected to the power supply, the returning current may permanently damage the power supply. So this version had to additionally receive an electrical system whose task was to utilise the energy obtained by the controller.

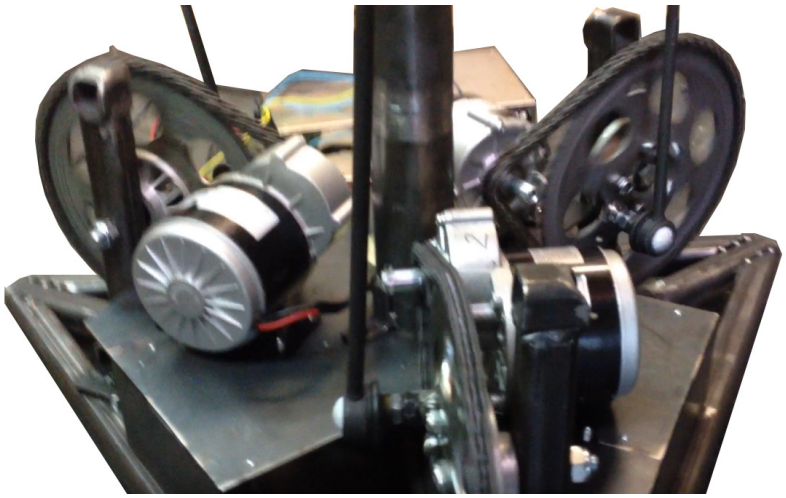
To be able to lift the user, the second version of the platform took on a completely different shape. At least three support points were needed - so the choice naturally fell on an isosceles triangle. The device became much shorter, but the structure began to move upwards. This time, in order to get a much bigger stroke of the platform movement I decided to increase the length of the arm connecting the moving end of the platform with the engine's rotational shaft. In order to provide a much longer element with a load capacity, I decided to use a wheel. The new arm has thus become the sprocket from the motorcycle, which has allowed the chain to be used as a fairly reliable and efficient (power loss is about 3 percent) method of transmission. From a gear wheel that was rotated by the engine, the rotation had to be converted into a swinging motion before it reached the platform. This role was fulfilled by an eccentrically mounted rod on a sprocket, equipped with a ball hinge. This gave full freedom of movement to the platform, but the first attempt revealed a flaw in this solution that completely disqualified it. The movable part of the platform thus supported (to which a seat for maximum safety was to be attached in this version) could freely rotate in the vertical axis, causing considerable inertia and thus low responsiveness of the system. The only way out of this situation was

to use an additional element eliminating twisting, but allowing for vertical movement. The element that fulfilled this role turned out to be a shaft resembling a shock absorber, which I additionally equipped with a milled slot into which a metal rod was introduced to prevent rotation.



Vertical axis rotation lock. Visualization.

Unfortunately, this solution also proved to be flawed. Although the platform did not rotate, the pressure on the anti-rotation bar turned out to be so great that it caused the edge of the milled slot in the shaft to corrugate - as a result of which vertical movement quickly lost its fluidity and equally quickly converted most of the energy introduced into the system into heat and noise. Additionally, it turned out that even larger engines could not handle the dynamically moving weight of the human body.

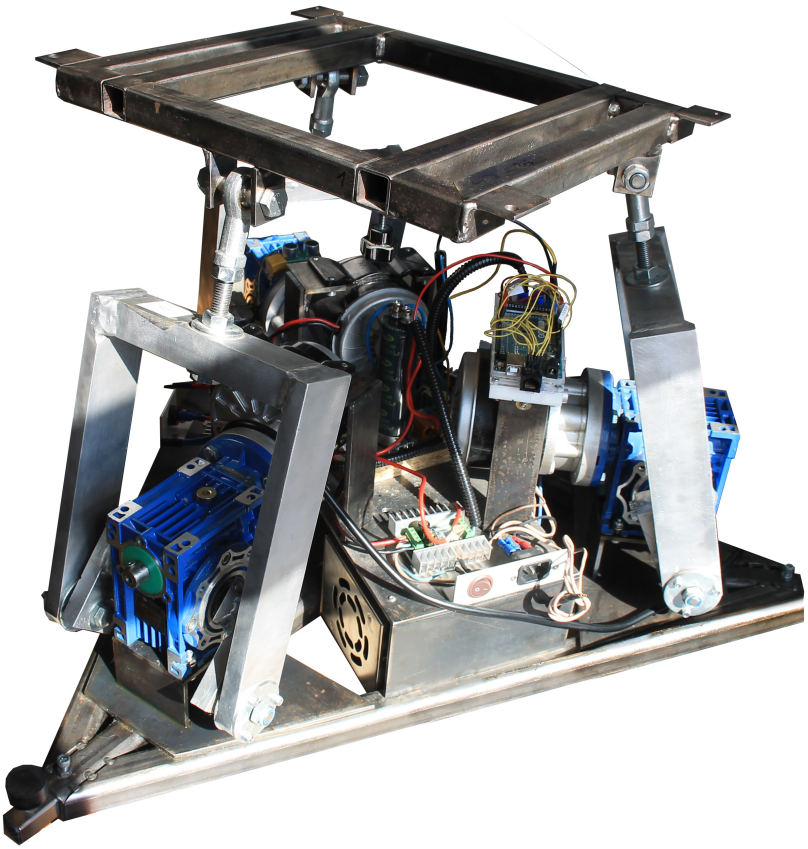


Version two. Visible chain drive and platform support piston.

The consequence of this unsuccessful experiment is the final version of the platform so far.

The third version, the last one?

The design of the next prototype of the machine had two tasks to fulfil, increasing the lifting capacity of the machine, and stabilizing the rotation without restricting mobility. The first problem was solved by using additional (industrial) worm gearboxes with a gear ratio of 1:7. This allowed to obtain much more power, at the expense of speed, which, even after the reduction, remained sufficient (the current version of the device is able to make a total vertical stroke of 60 cm in a time slightly exceeding 1 second). Thanks to the increased power of the drive system, it was possible to completely dispense with the platform support and its working load capacity is about 200 kg. No support was also needed due to the way the drive was transmitted - thanks to the use of double-sided, rigid arms and only one joint at the very end of the arm (where the system connects to the platform), the whole mechanism gained sufficient rigidity to ensure that twisting was not a problem. In this way, it was possible to create a mechanism with high precision and power (thanks to the use of gears), and high durability. The only disadvantage of such a solution is its weight, which is much higher due to the increased volume of supporting elements (both the frame itself and the drive system).



The current version of the platform. The picture shows the massive arms supporting the seat mount, worm gears and power supplies integrated into the platform. These elements have contributed significantly to the high weight of the device.

The next, equally important stage was to create a system of efficient, precise and safe control of the mechanical part of the platform. Due to the use of electric motors and the need to synchronize their movement with a computer application, the control is based on a microcontroller capable of generating PWM signal such as Arduino. This controller acted as an intermediary between the VR application displaying the image and the motor controllers that set this in motion. In order for arduino to be able to precisely control the engines, it was necessary to create a feedback loop providing the program with information about the current position of the engines. Such a system had to be created from scratch, because a typical engine does not “realize” its current position, and knowledge about it is crucial to be able to orient the platform in a controlled way. There are many methods of measuring orientation (gyroscopes, Hall sensors, distance detectors), however, due to the precision, simplicity and reliability I decided to use linear (multiturn) potentiometers. They are connected to the shaft of each motor and increase the current voltage depending on the current position. They are therefore devices that return information of an absolute nature. The last stage of work on the control system of the platform was to write a program running on the arduino controller allowing for smooth data exchange and system calibration. The creation of the program was accompanied by the simultaneous design of the user interface allowing control of the parameters of the entire machine. In order to make the device simple, the program that operates it assumed the use of a text interface controlled by two buttons and a knob. One button is used to confirm the commands, the other to cancel them, and the knob is used to select parameters from the menu, and to tune them. The names of the machine's functions appear on the liquid crystal screen displaying only strings.

The creation of the control system (also going through many development stages) completed the process of construction and testing the hardware platform. The time has come to create a VR application complementary to the platform and allowing to take advantage of its capabilities, while at the same time exploring how far the impact of such a system will be on the possibilities of locomotion in virtual reality. As the resulting device predicted a sitting position, the natural conclusion was to create a virtual equivalent of an existing vehicle. In order to make this choice interesting, stimulate the imagination and provoke reflection, my choice fell on space exploration. Even though the golden period of the conquest of space has already ended historically, and therefore the emotions connected with it have also fallen (the disturbing result of which is the “Flat earth” movement which is gaining popularity), for some of us the idea of travelling and conquering space is still romantic. So I decided to interpret the performance of the crews of the last three flights of the American Apollo program (15,16,17). During these missions, astronauts were able to navigate the surface of the moon on board the LRV (Lunar roving vehicle), an electrically powered four-wheeled lunar rover. I was most inspired to choose such a method of virtual space exploration by photographs taken on the surface of Mars by an autonomous vehicle which is an essential element of the Pathfinder mission (already celebrating its 20th anniversary).

On the pictures taken by this vehicle you can see mainly the Martian landscape, but my attention was initially attracted by the not-that-obtrusive traces of wheels left by the vehicle exploring the surface of the planet. These traces are a kind of autograph of humanity, a proof of our capabilities and a testimony of our slow conquest of the space around us. I also noticed how accidental and at the same

time intriguing are the shapes left by the rover wheels. Under the influence of these observations I decided to allow the users of the platform to leave their individual trace. To be able to achieve this goal, the VR application had to fulfil several tasks. Allow the exchange of information with the moving platform, create a model of the lunar vehicle, and allow the “drawing” to remain on the planet's surface. The first goal was achieved thanks to the newly created integration of Unreal Engine 4 environment (where the application was finally built) with Arduino microcontroller. The data exchange took place through the serial port at a frequency of 115200 bauds. Baud - a measure that determines the speed of transmission. The second task proved to be more difficult. After preparing a faithful digital LRV reproduction (based on original NASA photos and drawings) it turned out that the implementation of four-wheeled vehicles in Unreal engine is not perfect. The solution already available had to undergo far-reaching modifications. The last thing, i. e. leaving a wheelprint on the vehicle, was implemented thanks to the cooperation of two technologies - tessellation. Tessellation - dynamic, GPU-based thickening of the grid of a three-dimensional object, often additionally dependent on the distance of this object from the camera) and dynamic recording of texture to material. While the vehicle is moving on the planet's surface, each of its wheels make a sampling in search of the ground, when the information about the location of this triangle is found, it goes to a special material converting its location into UV coordinates. In the place specified by these coordinates, the program draws a white point in a black texture (8-bit raster image) in the memory. When this action is repeated while rendering each frame of the image, these points form a line, resulting in an image of four smoothly drawn white lines on a black background. The image is transferred to a surface-shaping material, where white fragments of the image are used to change the colour of the substrate to darker, to thicken the surrounding vertices, and to move these vertices downwards, creating a cavity. When the user completes his journey, a special virtual camera located high above the planet's surface shows him the track he left behind.

Version number three was presented during PGA 2018 as part of Mediations biennial, i. e. Virtual Garden.

The surface of the planet, still unspoiled by the viewer's activity, along with the LRV ready to conquer it.

After repeated presentations of solutions created for the project, several conclusions come to mind:

To fully recreate the model of a moving vehicle, it would also be necessary to generate front and rear overloads in order to simulate interaction with the environment, the solution so far consisting of a fairly fast one-way rotation and the following immediately afterwards reverse movement proved to be insufficient.

In order to achieve an even higher level of immersion it would be necessary to build a space around the armchair of the platform, simple in form, similar to the original one, e. g. the interior of the rover cabin to provide a haptic experience.

It would be safer to use a method of measuring the orientation of the chair that does not require a physical connection (despite the protection in the form of limit contactors it happened that the potentiometer monitoring the operation of the motor “turned".

Other selected projects

Epimimesis – Epizone 5

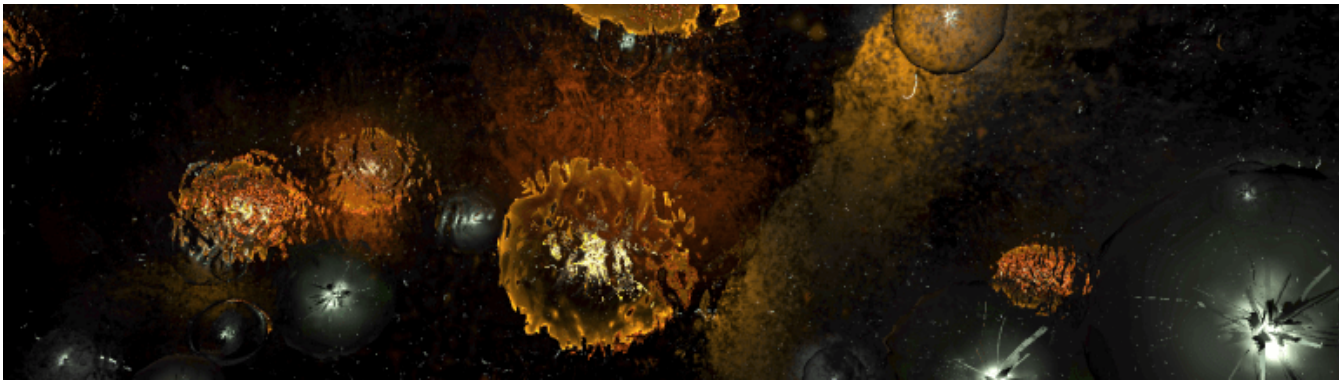
The culmination of my experience in the field of VR design and interface construction is the international project Epimimesis, in which I have been actively involved since 2016. This project is a collaboration on the borderline of science and art, carried out in cooperation with Art and Science Node Berlin, University of Arts in Poznań, 3IT Fraunhofer Heinrich Herts Institute, Institute of Bioorganic Chemistry of the Polish Academy of Sciences, International Institute of Molecular and Cell Biology in Warsaw.

"Dr. Milosz Marganski is head of the EpiLab working group. He is responsible for the realization of an interactive, immersive artistic narrative in the Virtual Reality environment combined with interactive projection". - Project Manager of Prof. UAP, Dr. hab. Joanna Hoffmann-Dietrich.

- The EPIMIMESIS project is co-created by:

Prof. UAP, Dr. Hab. Joanna Hoffmann-Dietrich, UAP, ASN
Dr. Miłosz Margański, UAP
Piotr Słomczewski UAP
Andre Bartetzki
Juliette Harvey
Prof. Dr. Hab. Janusz Bujnicki, International Institute of Molecular and Cell Biology in Warsaw
Prof. Eliza Wyszko, Institute of Bioorganic Chemistry, Polish Academy of Sciences
Agnieszka Fedoruk-Wyszomirska PhD, Institute of Bioorganic Chemistry of the Polish Academy of Sciences
Dr Thomas Koch, Capture & Display Systems Group in the Vision & Imaging Technologies Department at Fraunhofer Heinrich Hertz Institute
Lukasz Gruszka

The project has been presented at the session so far: Future STARTS Here, the Pompidou Centre in Paris, within the framework of STARTS Residencies Days, and has received twice as much funding from the European Residency Programme VERTIGO (art, technology, innovation). It is an artistic, interactive and immersive environment created with the efforts of Epilab. The project refers to the continuing human ambition to acquire knowledge based on “Big Data” in order to achieve a better future. Epimimesis refers to the concept of mimesis as a creative method of combining art, science, and technology to achieve new quality and mental awareness. Is that all? If we are a collection of data that is never completely independent and free, but which is continuously combined with other data or sets of data. Depending on many other environmental factors, how our unique data will change. What form they take. As defined in a different environment, with the participation of other operators. Challenging the latest imaging technologies, interactions, this interdisciplinary work combines data and scientific expertise from the fields of biochemistry, microbiology, biotechnology and humanities with artistic visions and strategies, especially those exploring our changing consciousness at biological, personal and social levels. The immersive and interactive narrative Epimimesis uses a super computer environment, assuming that the universe around us is a collection of data. The user-interactor (operating in a VR environment) acts as a catalyst for the changes brought about by the virtual system through different levels of matter organization from entanglement of elementary particles, through molecular geometry and cellular networks to more complex structures.



A still from Epimimesis Epizone V.

One of the biggest challenges during the project implementation is to maintain an interesting and visually attractive form in the VR environment which is subject to considerable technological limitations. In such an environment, each image is generated twice to achieve stereoscopic vision. Additionally, both images should be displayed at a frequency of at least 90 Hz. It is also important that the presented data and effects of the interactor's actions are characterized by visual quality not so far associated with the world of VR. My job is to take up these challenges.

The setting for the concert of the “JK Monogramist Ensemble" during the XXVII Festival May with Early Music

The concert, or rather a musical theatrical event, was created with a desire to preserve the tradition, and to bring back forgotten songs.

The accompanying visualization told about the uprising and the fate of the Bar Confederation. The visualization was based on old illustrations and maps that have been animated. On the screen, therefore, various characters scrolled, panoramic journeys around the former Republic of Poland and images animated by computer animation illustrating the fate of the confederation, such as “The Bar regiments"; by Corneli Szlegel, etc. Due to the quite unusual formula of the concert, which also consisted of short acting scenes and narrator's stories, the process of synchronization of images illustrating the action on stage had to take place in real time. Thus, a fairly extensive database of short moving sequences was created, collected in an application that allows for arbitrary recall and processing. The result was a fluid narrative that complements and supports the efforts of both actors and instrumentalists.

VR Painter project for the Art and Science Festival

The project was a prototype version of another project - Vanim, the difference was that it allowed to create drawings in space, but the resulting form was not spatial. The advantages of this project include the fact that the application did not use standard VR devices, but proprietary technological solutions, thanks to which the operation was completely wireless, which resulted in greater comfort and freedom of creation. In addition, a special glove was created for the project, examining the distance between the forefinger and the user's thumb, which translated into the thickness of the line drawn in space. The effect of full freedom and intuitive solutions were interesting, organic and ephemeral illustrations. The ephemerality resulted from the fact that the line left in space slowly disappeared. The work on the illustration was therefore a constant struggle with time. The project was presented during the Festival of Art and Science in Poznań in 2016.

Art&Science Festival, Poznan. 2016

"Chamber music in intermedia space” - interactive mapping as an illustration of contemporary music.

The project consisted in the visual arrangement of the organ space in the concert hall of the Poznan Academy of Music. Due to the instrument's rather complex, because it consists of many elements, the preparation of the illustration could not take place in the classic way - using a ready-made image source. The best way was to prepare a digital replica, i. e. a spatial model of the instrument itself. Thanks to this, I prepared all the textures, light and projection of the moving image using a virtual copy of the organ - which during the event itself was the background for the projection of previously prepared materials. The surface itself has thus become yet another instrument, enabling me to react, sometimes in sync, sometimes in counterpoint to what the musicians were playing on stage.

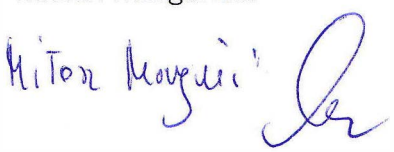
Interactive projection mapping in the concert hall of the Academy of Music as a visual setting for the chamber music concert “Chamber music in intermedia space” 03. 2016

Summary

In my everyday life the spectrum of my activities is quite wide, I'm interested in animated film and various realization techniques, I'm also active in the field of interactive arts - from video mapping, concert illustrations and installations, through interactive film, computer games to activities in virtual reality. The most interesting for me, therefore, is to learn and discover new implementation possibilities and technological challenges. My search for interactive cinema and VR began in 2009. So far, I've managed to create many applications for both art and craft, designing numerous hardware solutions - from controllers to motion recording systems. I try to pass on my passion and experience to my students. And although, due to the limited time of the classes, I cannot pass all my knowledge on

to them, I can try to infect them with curiosity and desire to search. The result of such an approach to didactics is a wide range of theses created with my help - both as a promoter (bachelor's and master's degrees) and as a consultant. These were classic animated films, computer animation, VR projects, computer games and interactive installations.

Miłosz Margański



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