

Spherical Projection
SPIN
Interface



Report October 2000

TIME'S UP



Introduction

For a detailed background into the reasons why SPIN was developed and the project BodySpin was undertaken, please refer to our previous reports (October 1999, January and May 2000). The following will summarise these ideas briefly, before explaining the current state of the interface and the results from the project undertaken in September 2000.

Over the last few years **TIME'S UP** has assembled a variety of innovative devices, designed to help bridge the gap between virtual and physical environments. We are aiming for a close correlation between virtual and physical worlds. Even though we like the dinky glasses and the spacy helmets, we also find them a hindrance for our purposes. Nevertheless we want sensurround even in wireframe and a most natural way to take our physical body into this world and use as many of its capabilities as possible. Thus SPIN, the Spherical Projection Interface.

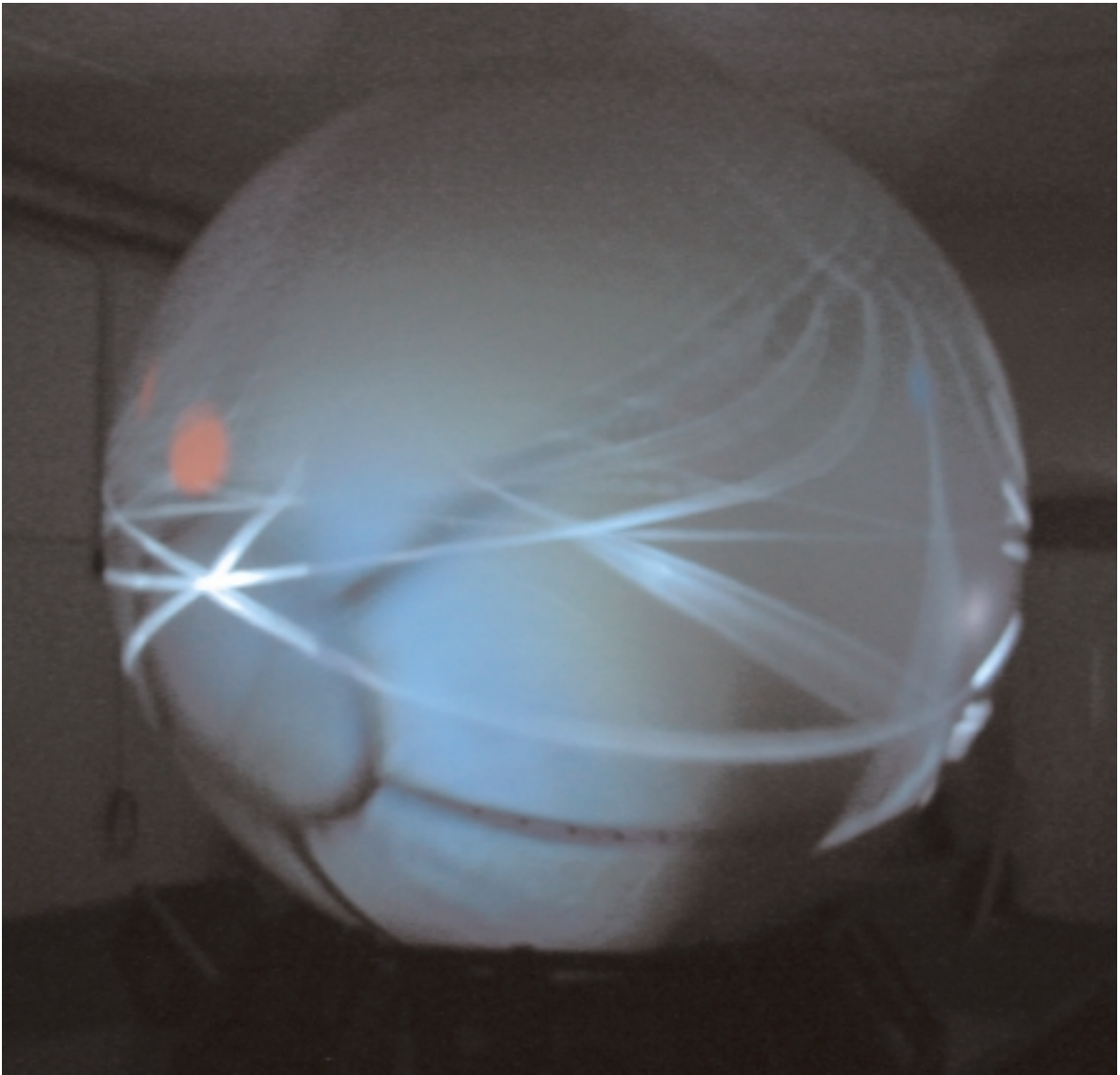
SPIN is a three meter diameter translucent sphere supported on bearings allowing it to roll in all directions. The client can walk inside the sphere, which rotates beneath their feet, their movements tracked. This motion is then transferred to a virtual space and the images from that virtual space are projected upon the walls of the sphere, so that the client is *inside* the space. The term "walk through" obtains real meaning at last.

This document collects information about the newest developments within the SPIN environments, explain the BodyGear and the context in which the BodySpin project was presented at the Ars Electronica festival with the SubCity adjacent environment. As this project is ongoing, we will look at some of the planned future developments. Appendices outline some of the technical details as well as thanking our assistants and supporters.

SPIN started its life as just one part of a planned project dealing with the intertwinedness of real and virtual space. BodySpin is a form we have chosen as a test-ground both for SPIN and our own research into the capabilities, properties and propensities of the public individual. We plan to take all these subprojects into many development in the future.

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SPIN in motion



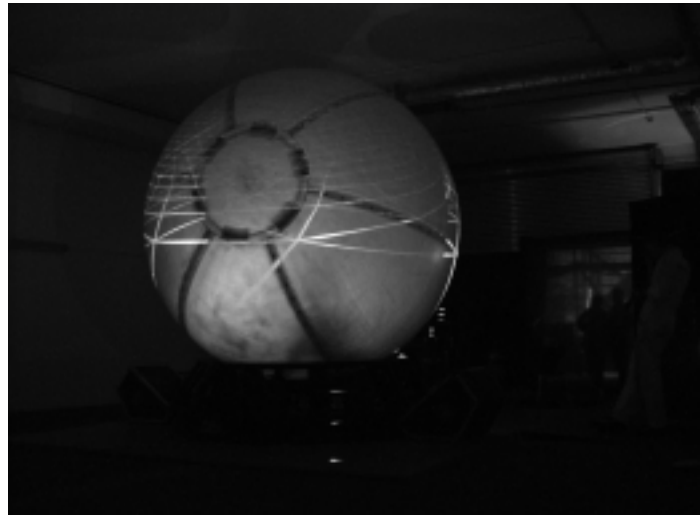
BodySpin - The Project

An Overview of the Premiere of SPIN

BodySpin, the public premiere of the SPIN system, was presented at the Ars Electronica Festival in Linz in September 2000. BodySpin is a project that deals with the body of the visitor, the client, as an intimate part of the system. Integrating the bio-mechanical functions of the visitor into the mechanics of the virtual world, the visitor comes to move inside the effects of their own body.

The clients wore a specially constructed outfit that measured the various body functions and transmitted this data wirelessly to the central station. This gear that they wore also contained an audio link to the assistants outside for safety and explanatory reasons.

The client was instructed and assisted by the Agent, a collection of texts designed to help the client orient themselves and to understand what was going on.



The clients began their experience in BodySpin in the central world, the Inverted Reality System, where they started to move and to get used to this new way of walking. From this space there were portals to other environments.

The bodily functions breathing, heartbeat and degree of muscle activity were used in order to obtain an overview of the biomechanical state. The resulting values were used to control aspects of three specially programmed environments; Pulse Fall, Brain Maze and Breath Surf.

The following pages describe aspects of the BodySpin environment in more detail.



Wireframe worlds and Tron physics

We are not in the business of replacing or emulating a reality in which the user may find themselves or which may be appropriate for an experimental situation. Ways in which environments can be constructed and the ways in which we are able to interact with them in spite of their obvious unreality are of interest.

The expression "Real Virtuality" has been coined to describe many of the previous Time's Up experiments, where the environments are composed so as to move between a real and a virtual realm, to take on other physics or logics of operation. One of the core motivations for the development of SPIN has been to further our experiment field into worlds with methods that defy mechanical solutions - gravity is something that is hard to get out of with current technologies.

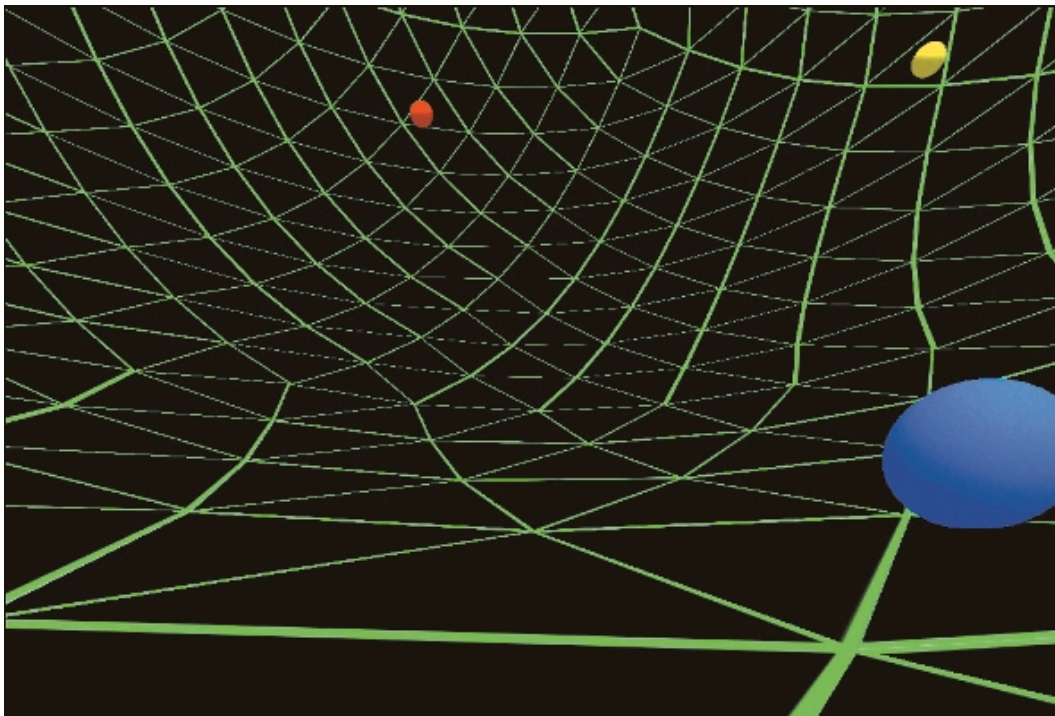
Thus we opt for an appearance that has more to do with the possibilities of abstracted motion than with attempts at maximally realistic wallpaper. In much the same way that the ability of the human biomechanical unit to discern and deal with unexpected complexity is a pleasant surprise, so is the ability to accept simplicity and to imbue it with the same degree of reality.

Immersing the visitors in a sphere, possibly the most pure of the basic three dimensional geometric forms, we are already moving towards a Platonic abstraction. As the worlds developed, we found that wireframes and blocks of solid colour made the experience of interaction more whole. We imagine the visitors immersed into the mechanics of a world not unlike that which the protagonist of Tron found himself sucked into as he was pixellated and fed into the machine. The strangeness of physics of data as opposed to the physics of mass and gravity, the infinite perspective of mirror worlds and hollow earths.



BodySpin - The Spaces

Inverted Reality System (IRS)



The client finds themselves initially situated in a central space, the Inverted Reality System (IRS). A two dimensional surface, curved inwards to form a sphere - the client and various moving balls all on its inside surface. The IRS serves as a place where the client can begin to learn to use the SPIN, to walk, to stop, to turn, to get used to the new inertia of their motion.

The autonomous balls that populate the IRS are portals to other environments in the space. Colourcoded, they activate on contact and take the client to one of the experimental environments; Brain Maze, Breath Surf or Pulse Fall. If the black ball touches you, it is like the black 8-ball in pool - you are out: Time's Up.

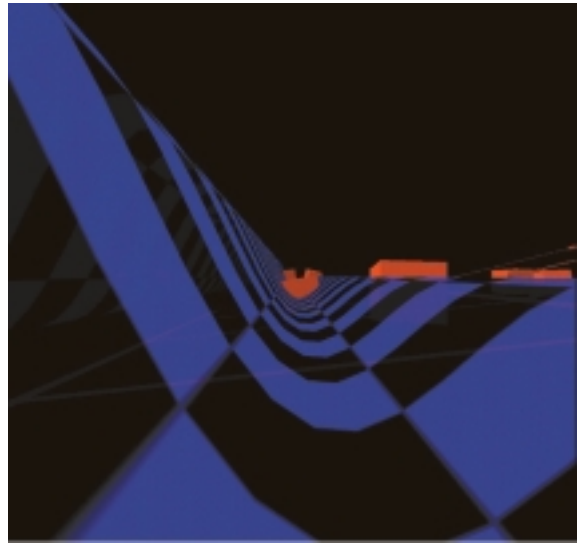


BodySpin - The Spaces

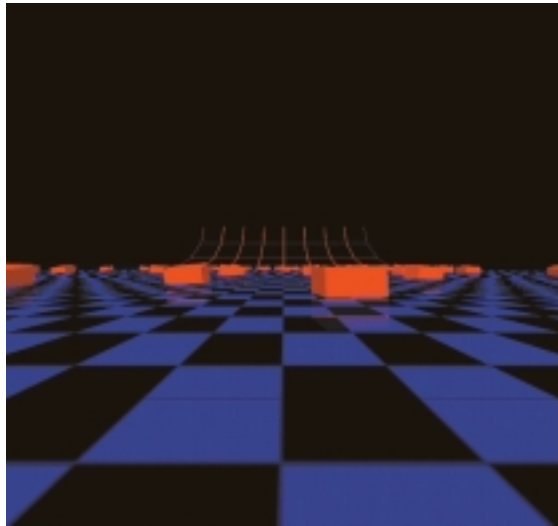
Breath Surf

Breath Surf deals with one of the most easily consciously controlled of the bodily functions, the breathing reflex. The client has a large degree of control over their breathing profile, which allows them to control this environment in subtle ways.

The profile of the breathing controls waves that emanate from the area of ocean in which the client finds themselves. At one end the beach, at the other the vista of the ocean, trimmed to fit the requirements of computer modelling - finitude.



Riding the wave - a side view shows the client on the face.



Facing the beach, the end of the ride for all surfers.

With an appropriate breath, the client generates a wave. Running to generate enough motion, if they get the balance right, they will be taken on the wave, manoeuvring through the floating boxes, to reach the beach.

Surfing classic songs were used in the environment to carry the pleasure of the surfing moment.



BodySpin - The Spaces

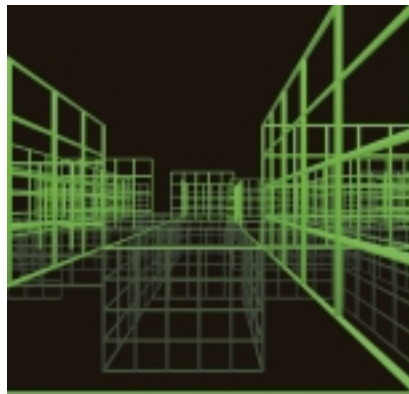
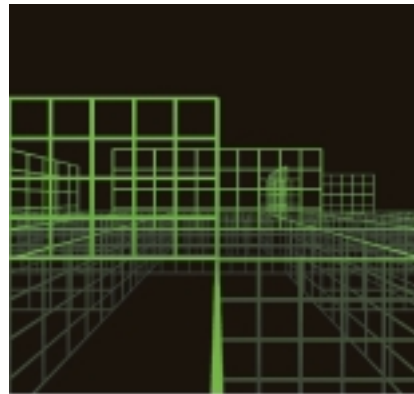
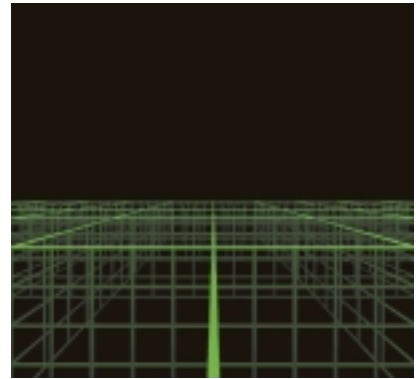
Brain Maze

The client finds themselves on a plane, hanging in the blackness of nonspace. Beneath their feet lie a collection of wall segments. According to the levels of stress and excitement that they demonstrate, the walls rise from the floor, forming a labyrinth, a maze.

The objective of the environment is to escape the platform - thus the client is required to keep their stress-level low, to continue to move and act in a relaxed fashion, to achieve the much desired "alert but calm" state of awareness in order to keep the maze simple.

Other clients took the opposite tack, maximum speed was the solution, speeding through the labyrinth, getting out of it both due to and in spite of their increased stress level.

The labyrinth plays well upon the subjective position of the client inside the space; if they were to have a bird's eye view the solution would be obvious, but trapped in their physicality the appropriateness of the surround view becomes apparent.



Moving through the space as the complexity increases.



BodySpin - The Spaces

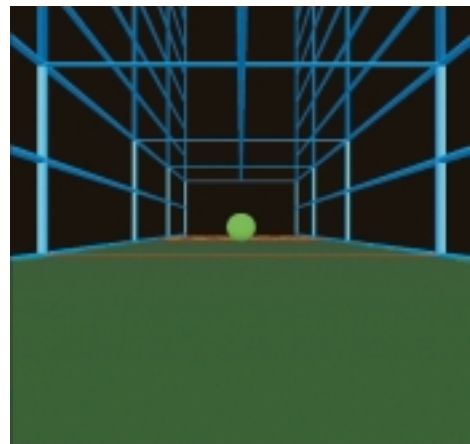
Pulse Fall

Pulse Fall is an environment and situation meant to put the visitor in direct confrontation with one of the more apparent yet quite uncontrollable unconscious bodily functions, the heart rate.

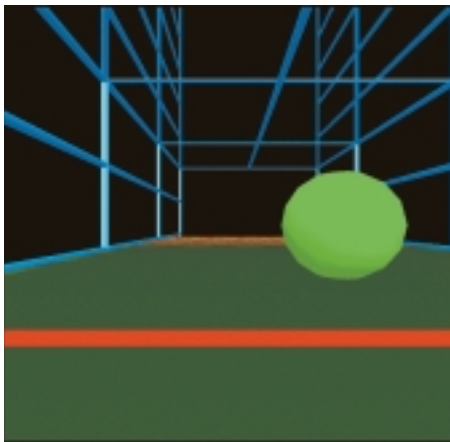
The scale for measuring heartrate is a panel that is simultaneously a balance. The heartrate of the client is represented by a ball on this scale. The client must move to a position opposite the heartrate ball so as to balance it. But of course, in the process of moving into position,

the client has to exert themselves, and raises their heartrate, thus upsetting the balance.

Once this dynamic interplay reaches an equilibrium, the client rests - and thus their heartrate falls once again and movement is required to maintain the balance. Caught in this interplay, the game of balancing takes on a new dynamics.

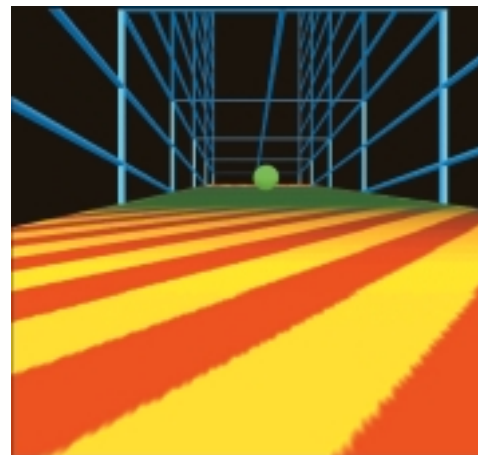


The heartrate marker viewed from the far end of the balance.



Closing in on the gauge.

Possibly too far from the balance point: the client is about to fall from the (marked) end of the balance-scale.





BodySpin - The BodyGear

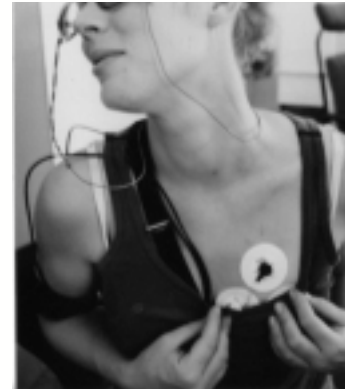
Linking to the Biomechanical State of the Client

BodySpin deals primarily with the interrelations of the biomechanical function of the public individual and the ways in which their control can be made apparent through the representation of their influences upon the dynamics of virtual worlds.

We took as our technological basis the BodySynth developed by Ed Severinghaus. Adding some custom electronics designed by Conrad Drake, we were able to construct a simple system to monitor various aspects of the biomechanical state and to transfer that information wirelessly to the central control area for the SPIN visualisations.

The worn parts of the gear - bands to hold electrodes to the skin, the pressure sensors and their mounts, were designed to be easily fitted to BodySpin visitors, to allow maximal freedom of movement and to be readily explained by the assistants. The emergency switch - to be pressed in case of an accident or (for instance) an outbreak of claustrophobia - was mounted centrally and brightly coloured for simple location.

The visitor remained continuously in verbal contact with the assistant outside the SPIN, which not only acts as a safety measure but also reassures the user and acts as a simple help system.





BodySpin - The Waiting Room

SubCity

As a matter of practicality, it is not possible to get people into and out of the SPIN environment as quickly as they might want to experience it all. Even more so with the BodySpin project, where the visitors were required to be briefed on the details of what they were to experience, and had to be outfitted with a not insignificant amount of BodyGear that needed to be adjusted for each individual.

SubCity, the variant on the waiting room that would be necessary, was a space enjoyed by a number of people outside its basic function as a place to wait until one's number came up for a stroll in SPIN.



The entrance was via an incrementally rising ramp of scaffolding, a stream of sound focussed its length. The receptionist and coordinator of usage times, an avatar of the agent, sat in a small alcove near the entrance, from him one was able to obtain information about the possible times for a stroll, as well as general information about the project.

The space was furnished with some places to wait, the evenings were filled with the sounds of visiting DJs for the nights of the installation. It became a place for visitors to the festival to wait out, far from the encroaching technological overload of the sales show.

From the SubCity space it was possible to watch the SPIN participants from a viewing box, or via a



BodySpin - The Waiting Room

SubCity

collection of cameras mounted at strategic positions in the SPIN space displayed upon hung monitors in the SubCity space. Integrating the spaces and involving one in the other was an important step in making SubCity a part of the BodySpin environment. The agent that acts as a guide in the BodySpin environments was first encountered in the standard rendering as the number caller outside in SubCity.



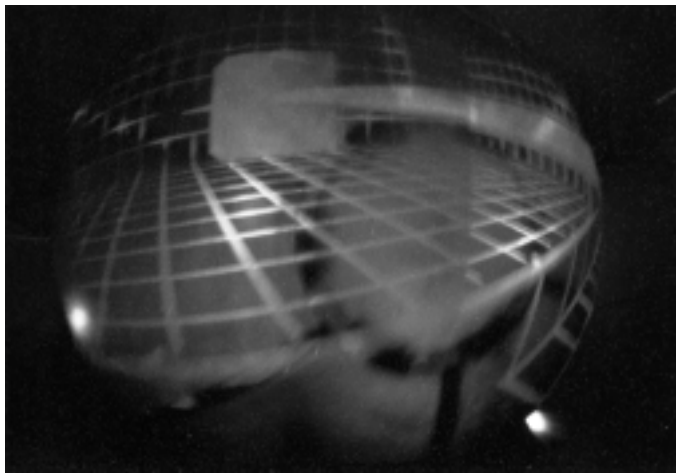
Hung monitors offered a glimpse into the SPIN space - announcements were also made via the Agent over this screen system in the SubCity space.



Spin - The Tests

The human perceptual system is more flexible than imagined

In June we carried out a series of tests of the interface in its complete configuration with all four radial projectors. We were pleasantly surprised by the lack of



major technical or conceptual problems in the SPIN system.

Moving away from purely navigational exercises, and beginning to add physics rules like collisions with walls, we were surprised at the effectiveness of the bodies ability to perceive through a glass darkly.

Similarly, small tolerances in the roundness of the sphere lead

The first collision detecting experients

to movements in the projection and in particular in the joining of projections.

Results for the laboratory book include the ability of the human perception system to work over these problems and to create a consistent world view from the available (flawed) data. Such capabilities in the human perceptual system were also noted when dealing with the seams between the parts of the SPIN sphere; the small defects in the image are fully compensated for by the human perceptual system once the motion effect comes into play.



Getting to know SPIN



BodySpin - The Future

BodySpin, as the first public project involving SPIN, has garnered a lot of attention for itself as a project and for SPIN as an object, an interface, a possibility. The interplay between the protoscientific experiments made with the sensory equipment and the representation of these biomechanical values in the virtual world depicted through the walls of SPIN, has given rise to a flood of interest from medical as well as interface practitioners, computer graphics professionals as well as several festivals.

One project that awaits us and that we are continuing to plan is MultiBodySpin, a multiuser environment for several SPINs. The biomechanical functions of several clients interplay with the environments and the clients can all interact with their collective virtual space. This is a project distantly planned - we are primarily in need of the requisite funding to build more SPINs.

Spin - The Future

The innovative interface SPIN has met with acclaim from many sides and a great deal of interest has been expressed in using the interface in many other contexts; museums, research institutes and training centers being just some.

The basic technologies behind SPIN are remarkably simple, and the fact that the graphics processing for such a system can be adequately carried out on standard consumer grade computer hardware makes the system usable for more diverse institutions.

We hope to work with some institutions on further collaborations, as SPIN has proved itself to be a remarkably versatile and effective whole body interface. We envisage various institutions purchasing SPIN systems for their own purposes and look forward to seeing and experiencing the innovative environments they prepare.



Spin - The Video

Propaganda and Documentary



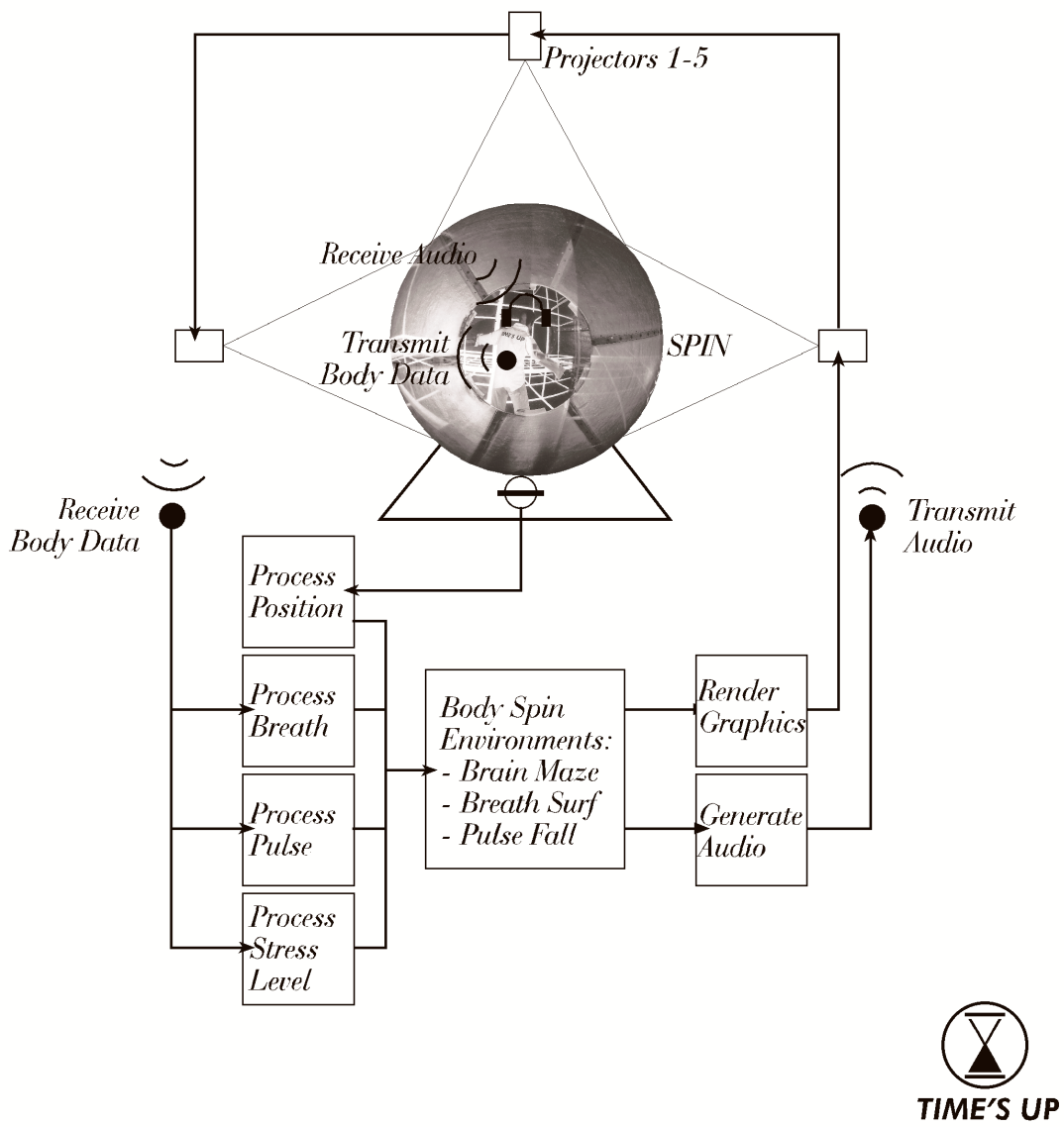
In July we made a video to explain the SPIN to potential clients of all sorts. Following the structure of previous Time's Up videos, the video follows whys, wherefores and the ideas behind and around SPIN.

Using a mixture of situations, both in the test site and at the Time's Up harbourside laboratories, the video introduces SPIN and compares it to previous immersive interfaces.

Simultaneously a sales pitch and a protoscientific documentary, the video aims to elucidate the aims and successes of SPIN within the context of contemporary interface technology and the dreams of the cyberelite.



BodySpin - TheTech

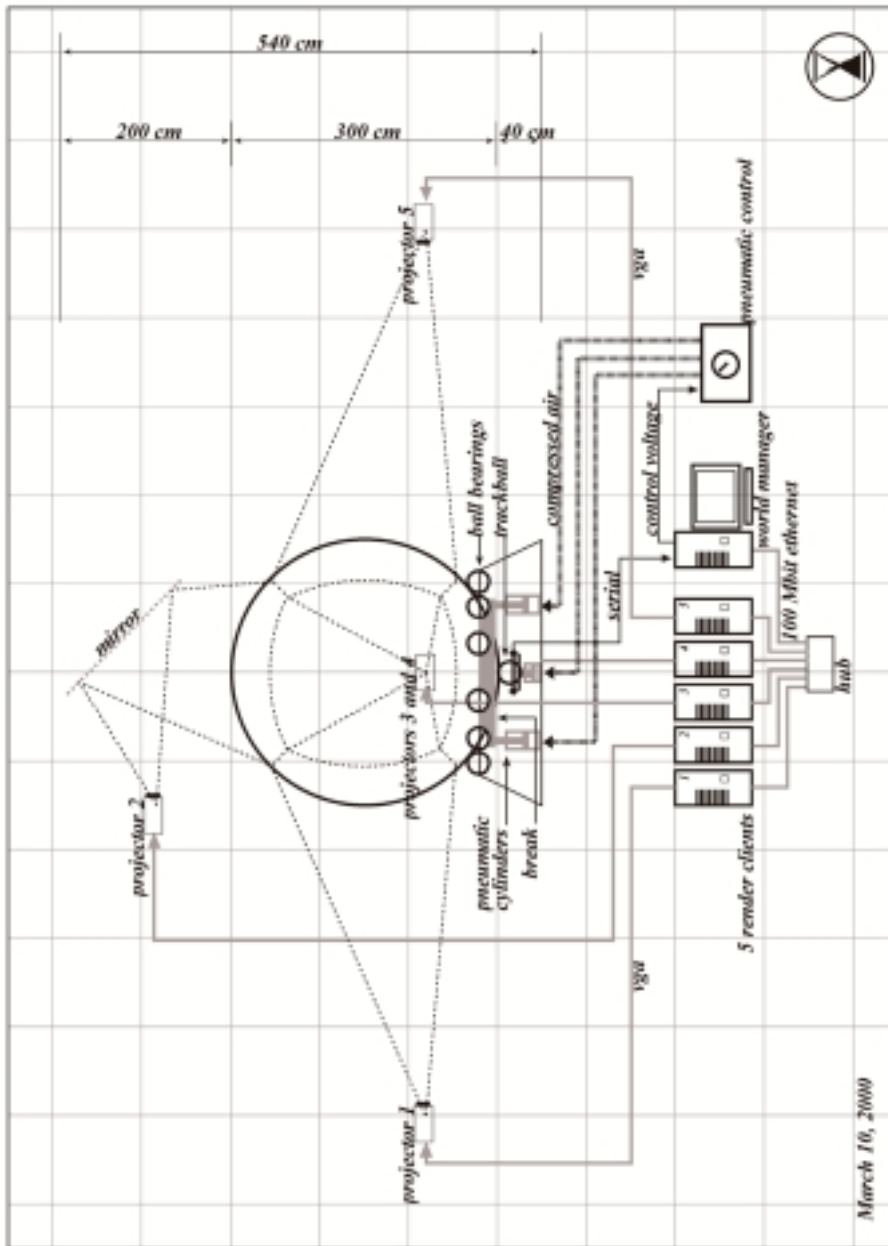


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Spherical Projection Interface (SPIN) as in use for Body Spin Environments.



Spin - TheTech





BodySpin - The People

Many people helped in the carrying out of the BodySpin project in September 2000. The following is a list of many of them and our heartfelt thanks go out to everyone who helped and made this possible:

Tina Auer
 Alexander Barth
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 Martin (Marv) Honzik

Julian Jaksch
 Wodo Gratt
 Tanja Lattner
 Just Merit
 Bronwynn Leigh Mertz
 Gerald Priewasser
 Gerd Trautner
 Victoria Seebacher
 Kati Siegl



as well as various helping hands and the technical crew of the Ars Electronica Center.

BodySpin - The Support

BodySpin was a coproduction of Time's Up with the Ars Electronica Center Linz

