

SAM ACTIVITIES

AUI PROJECT A.Y. 2018/2019

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STAKEHOLDERS AND THEIR NEEDS



Patients



Therapists

STAKEHOLDERS AND THEIR NEEDS

- **PATIENTS**



- TO BE ENTERTAINED AND RELAXED DURING ACTIVITIES
- BEING ABLE TO CARRY AN ACTIVITY AUTONOMOUSLY
- TO IMPROVE VISUAL-MOTOR COORDINATION
- TO DEVELOP TACTILE PERCEPTION
- TO ACQUIRE A BETTER SPACIAL AWARENESS
- TO AVOID ANY KIND OF PRESSURE
- TO CARRY OUT ACTIVITIES IN A PHYSICAL SAFE ENVIRONMENT

STAKEHOLDERS AND THEIR NEEDS

- **THERAPISTS**



- TO MONITOR PATIENTS DURING THE ACTIVITIES
- TO CUSTOMIZE THE ACTIVITY BASED ON THE SPECIFIC PATIENTS' CONDITIONS
- TO CONSULT ANALYTICS ABOUT THE DIFFERENT PATIENTS SESSIONS
- TO HAVE ACTIVITIES THAT CAN BE CARRIED OUT AUTONOMOUSLY BY PATIENTS WITHOUT THE CONSTANT SUPPORT OF THE EDUCATOR

CONSTRAINTS

CONTEXT-RELATED

- ROOM'S LIMITED AVAILABLE SPACE (COARSE GRAINED LIMITED MOVEMENTS)
- ROOM'S LIMITED USE OF BUBBLE MACHINE
- LIMITED USE OF SOAP PRODUCTS DUE TO SLIPPERY RISK

USER-RELATED

- IMPOSSIBILITY OF USING FREQUENT COLD LIGHT CHANGES
- LIMITED SCENE'S LEVEL OF GRAPHIC DETAILS
- LIMITED NUMBER OF INTERACTIVE OBJECTS IN A SCENE

TECHNOLOGY-RELATED

- DOLPHIN SAM'S LIMITED HARDWARE RELIABILITY
- NUMBER OF HTTP REQUESTS HANDLED BY THE MAGIC ROOM SYSTEM

GOALS

1. THE SYSTEM MUST PROVIDE MULTIPLE ACTIVITIES WITH VARIOUS LEVELS OF DIFFICULTY FOR EACH ONE.
2. THE SYSTEM MUST PROVIDE AN IMMERSIVE ENVIRONMENT TO THE PATIENT.
3. THE THERAPIST MUST BE ABLE TO CUSTOMIZE THE ACTIVITIES IN ORDER TO SUITE AT BEST THE CURRENT PATIENT.
4. THE THERAPIST MUST BE ABLE TO INSTANTANEOUSLY INTERRUPT THE ACTIVITY.
5. THE THERAPIST MUST BE ABLE TO MONITOR PATIENTS' ACTIVITY DURING ONE OR MORE SESSIONS.
6. THE SYSTEM MUST HELP TO IMPROVE PATIENT'S MOTOR COORDINATION ABILITY.
7. THE SYSTEM MUST HELP TO IMPROVE PATIENT'S FOCUS ABILITY.

STATE OF THE ART

THE SMALLAB CASE (MIXED REALITY):

- EMBODIMENT
- MULTIMODALITY
- COMPOSITION



"EMBODIMENT, MULTIMODALITY, AND COMPOSITION: CONVERGENT THEMES ACROSS HCI AND EDUCATION FOR MIXED-REALITY LEARNING ENVIRONMENTS"

DAVID BIRCHFIELD, HARVEY THORNBURG, M. COLLEEN MEGOWAN-ROMANOWICZ, SARAH HATTON,
BRANDON MECHTLEY, IGOR DOLGOV AND WINSLOW BURLESON

STATE OF THE ART

THE MEDIATE CASE (MULTISENSORY ENVIRONMENT):

- ENHANCE OF NON REPETITIVE ACTIONS
- PARTICLE SYSTEM
- SENSE OF AGENCY WITH CONTINGENT INTERACTIONS



"PROMOTION OF CREATIVE ACTIVITY IN CHILDREN WITH SEVERE AUTISM THROUGH VISUALS IN AN INTERACTIVE MULTISENSORY ENVIRONMENT"

NARCÍS PARÉS, ANNA CARRERAS, JAUME DURANY, JAUME FERRER, PERE FREIXA, DAVID GÓMEZ, ORIT KRUGLANSKI, ROC PARÉS,
J. IGNASI RIBAS, MIQUEL SOLER, ÀLEX SANJURJO

STATE OF THE ART

OTHER PROJECTS:

- ROPE REVOLUTION, A ROPE-BASED GAMING SYSTEM FOR COLLABORATIVE PLAY
- LANDS OF FOG, A FULL BODY INTERACTION SYSTEM, DESIGNED TO IMPROVE SOCIAL AND COGNITIVE SKILLS

DESIGN PROCESS

1. GOALS AND NEEDS ANALYSIS
2. CHOICE OF THE ACTIVITIES:
 - A. ONE MORE **RESTRICTED**, FOCUSED ON **PRECISION OF THE MOVEMENT**
 - B. THE OTHER WITH LESS RESTRICTION, MORE **FREEDOM AND EXPLORATION**
3. PLACED IN THE SAME VIRTUAL ENVIRONMENT TO SHOW CONTIGUITY BETWEEN THEM
4. IT WAS NECESSARY TO PROJECT A VIRTUAL DOLPHIN IN ORDER TO CREATE A CONNECTION BETWEEN THE TWO WORLDS

THE CONCEPT

- FOR THE FIRST ACTIVITY (A), WE HAVE COME UP WITH A RUN-GAME MODEL
 - NEED OF PRECISION IN THE MOVEMENTS
 - SIMPLE AND UNDERSTANDABLE CONCEPT
- FOR THE SECOND ACTIVITY (B), A "SEARCH AND FIND" MODEL IS A GOOD SOLUTION
 - FREEDOM GIVEN TO THE PLAYER
 - ELEMENT OF SURPRISE AND UNKNOWN ENGAGE THE PLAYER IN CONTINUING THE ACTIVITY
- BOTH IN AN UNDERWATER ENVIRONMENT

GOALS

1. THE SYSTEM MUST PROVIDE MULTIPLE ACTIVITIES WITH VARIOUS LEVELS OF DIFFICULTY FOR EACH ONE.
2. THE SYSTEM MUST PROVIDE AN IMMERSIVE ENVIRONMENT TO THE PATIENT.
3. THE SYSTEM MUST PUT THE PATIENT IN CONDITION TO RELAX.
4. THE PATIENT MUST BE ABLE TO CHOOSE AUTONOMOUSLY ONE OR MORE ACTIVITIES SUITED FOR HIS ABILITIES.
5. THE THERAPIST MUST BE ABLE TO CUSTOMIZE THE ACTIVITIES IN ORDER TO SUITE AT BEST THE CURRENT PATIENT.
6. THE THERAPIST MUST BE ABLE TO INSTANTANEOUSLY INTERRUPT THE ACTIVITY.
7. THE THERAPIST MUST BE ABLE TO MONITOR PATIENTS' ACTIVITY DURING ONE OR MORE SESSIONS.
8. THE SYSTEM MUST HELP TO IMPROVE PATIENT'S MOTOR COORDINATION ABILITY.
9. THE SYSTEM MUST HELP TO IMPROVE PATIENT'S FOCUS ABILITY.
10. THE SYSTEM MUST CREATE AN EMPATHY BETWEEN PATIENT AND THE DOLPHIN SAM SMART TOY.
11. THE SYSTEM MUST PROVIDE PLAYFUL ACTIVITIES IN AN IMMERSIVE ENVIRONMENT.
12. THE SYSTEM MUST LIMIT THE PHYSICAL RISKS DUE TO THE ABUSE OF DEVICES.

REQUIREMENTS

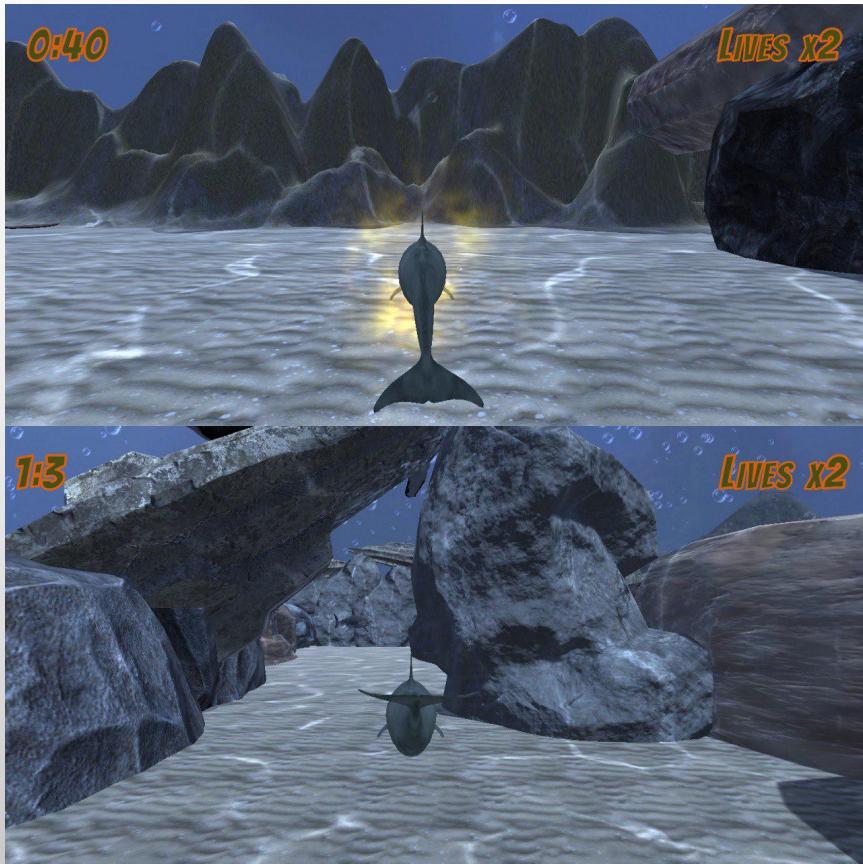
1. THE SYSTEM MUST PROVIDE ANALYTICS RELATED TO THE DIFFERENT SESSIONS OF ACTIVITIES CARRIED OUT BY A SPECIFIC PATIENT.
2. THE SYSTEM MUST INTERFACE WITH THE MAGIC ROOM'S DEVICES.
3. THE SYSTEM MUST PROVIDE AN INTUITIVE AND ACCESSIBLE INTERFACE TO PATIENTS WITHIN THE GAME.
4. THE SYSTEM MUST PROVIDE AN EFFECTIVE AND DETAILED INTERFACE FOR THE MONITORING OF THE PATIENTS.
5. THE SYSTEM MUST ENABLE THE THERAPIST TO CREATE A PROFILE FOR HIM- SELF/HERSELF AND HIS/HER PATIENTS.
6. THE SYSTEM MUST BE ABLE TO PERSIST USER'S PERFORMANCES AND ASSOCIATE THEM TO HIS/HER PROFILE.
7. THE SYSTEM MUST PROVIDE A SUMMARY DASHBOARD OF THE PATIENT'S GAME SESSIONS.
8. THE SYSTEM MUST PROVIDE A PROTECTION FOR USER'S PERSONAL DATA (DEPENDING ON THE DOMAIN AUTHORITY).
9. THE PATIENT MUST NOT BE OVERSTIMULATED BY THE ACTIVITY IN ORDER TO AVOID RESTLESSNESS AND INDISPOSITION.
10. THE SYSTEM MUST BE ABLE TO TRACK USER'S POSITION DATA WITHIN THE MAGIC ROOM VIA THE KINECT.
11. THE SYSTEM MUST GUIDE THE PATIENT DURING THE ACTIVITY BASED ON THE PREVIOUSLY CHOSEN DIFFICULTY LEVEL.
12. THE SYSTEM MUST SUPPORT THE PARAMETRIZATION OF THE ACTIVITIES' LEVELS IN ORDER TO LET THE THERAPIST SET THE MOST SUITABLE LEVEL OF DIFFICULTY FOR A PATIENT.
13. THE SYSTEM MUST USE DOLPHIN SAM AS AN INPUT INTERFACE (ACCELEROMETER, GYROSCOPE, TOUCH SENSORS, RFID READER).
14. THE SYSTEM MUST USE DOLPHIN SAM'S LIGHTS AS AN OUTPUT INTERFACE.
15. THE SYSTEM MUST USE THE MAGIC ROOM'S APPLIANCES AS AN OUTPUT INTERFACE (SMART LIGHTS, PROJECTORS, BUBBLE MACHINE).

DOLPHIN SEARCH



- USER MOVES AROUND USING THE DOLPHIN
- COLLECTS HIDDEN OBJECTS IN COLLECTABLE AREA
- PHYSICAL SEARCH OF THE COLLECTABLE ON THE GROUND USING THE DOLPHIN
- GAME COMPLETED WHEN EVERY OBJECT IS FOUND

DOLPHIN RUN



- DOLPHIN IS USED AS A CONTROLLER
- STATIC AND DYNAMIC OBSTACLES THAT CAN BE PARAMETRIZED BY THE THERAPIST
- GAME FINISH WHEN THE PLAYER AVOIDS ALL THE OBSTACLES AND REACH THE FINAL LINE

MAIN DEVICES

DOLPHIN SAM

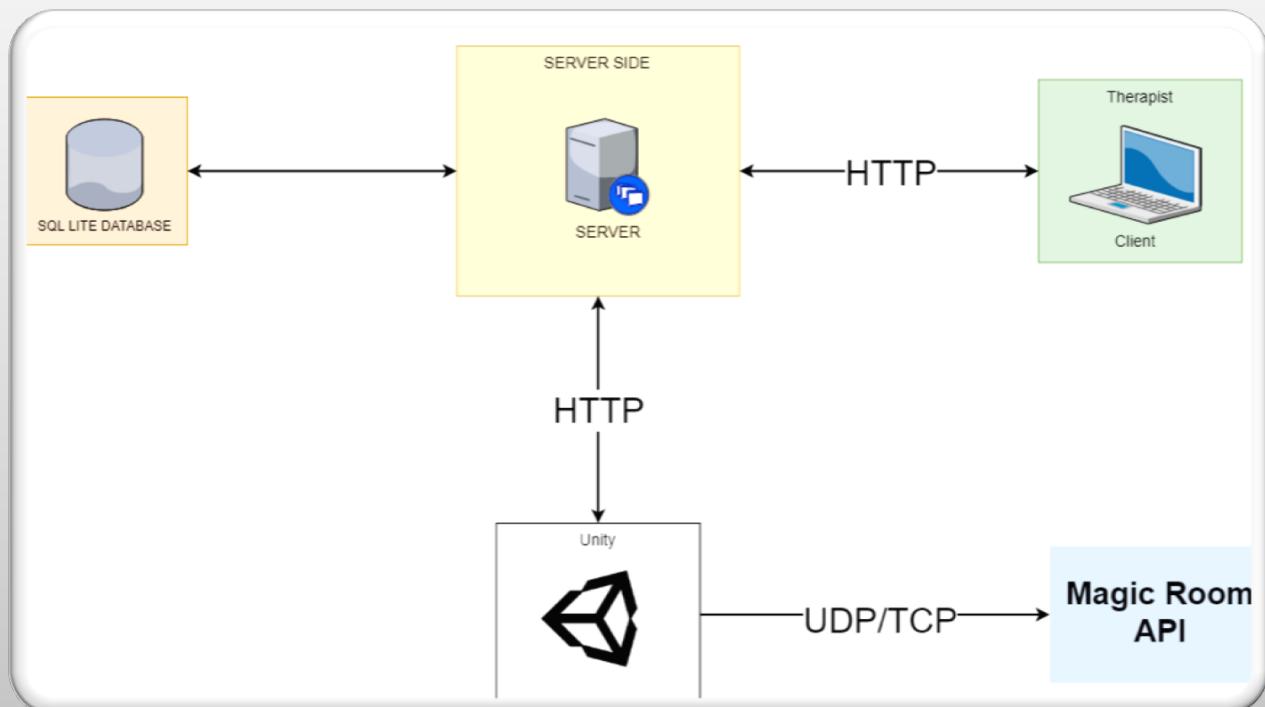


MAGIC ROOM



HW AND SW ARCHITECTURES

HW ARCHITECTURE



SW ARCHITECTURE

- MODEL

- VIEW

- CONTROLLER

VALUE PROPOSITION

IMMERSIVE ENVIRONMENT:

HELP TO IMPROVE PATIENT'S ABILITY TO FOCUS

INTERACTION WITH THE DOLPHIN:

HELP TO IMPROVE VISUAL-MOTOR COORDINATION AND TACTILE PERCEPTION

APPLICATION EXTENDIBILITY:

LEVELS STRUCTURE AND PARAMETERS GATHERING CAN BE EASILY EXTENDIBLE

FUTURE WORKS

SESSION ANALYTICS IMPROVEMENTS:

INTRODUCE MORE SPECIFIC SESSION'S PARAMETERS AND USE DATA ANALYSIS TECHNIQUES

ACTIVITIES IMPROVEMENTS:

ADD NEW AND MORE PERSONALIZED LEVELS. CREATE MORE ACTIVITIES

DEVELOPMENT IMPROVEMENT

DEPLOY THE SERVER VIRTUAL CONTAINERS TO WRAP-UP THE SOFTWARE.

UX IMPROVEMENTS