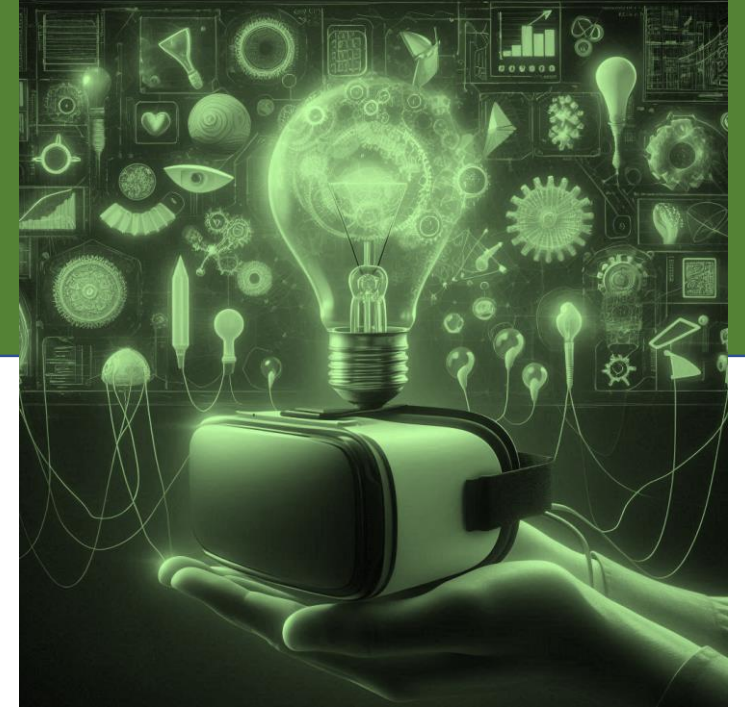


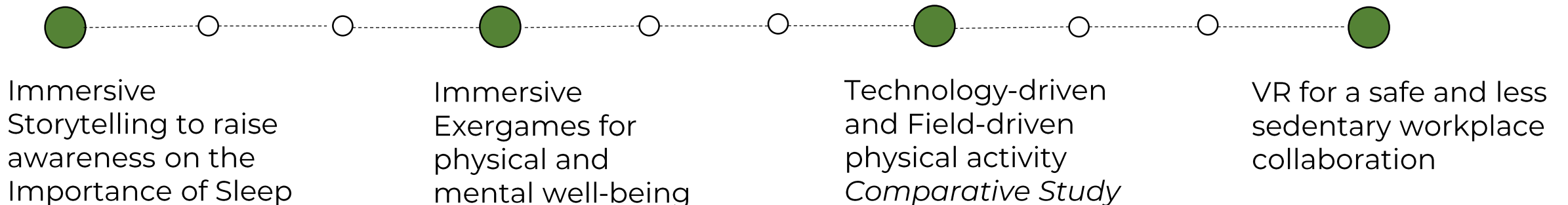
Immersive Technologies to improve Health and Wellness

MRIC/SISM-HW-21

Developed under the Innovation Boost Grant (MRIC)



Research Project



Team Composition

Project Leader

- Dr Nassirah Laloo, Immersive Media Lab, University of Technology, Mauritius (Email: n.laloo@utm.ac.mu)

Project Collaborator

- Dr Mohammad Sameer Sunhaloo, Immersive Media Lab, University of Technology, Mauritius (Email: ssunhaloo@utm.ac.mu)

Research Assistants

- Mr Viksii Gomedhanand Ritlall
- Ms Neetusha Gheenah

Industry Collaborator

- Mr Irshad Kurmally, Director Development, Dayforce

The project leader and the project collaborator are founding members of the UTM Immersive Media Lab (Email: iml@utm.ac.mu)

World Health Organisation Extracts



World Health
Organization

Nearly 1.8 billion adults at risk of disease from not doing enough ...

www.who.int › News › item



26 Jun 2024 ... **Physical inactivity** puts adults at greater risk of cardiovascular **diseases** such as heart attacks and strokes, type 2 **diabetes**, dementia and ...

Physical inactivity a leading **cause** of disease and disability, warns ...

www.who.int › News › item



4 Apr 2002 ... **Sedentary lifestyles** increase all causes of mortality, double the risk of cardiovascular **diseases**, **diabetes**, and **obesity**, and increase the **risks** ...

Stress - World Health Organization (WHO)

www.who.int › Newsroom › Questions and answers › item



21 Feb 2023 ... Getting enough **sleep is important** for both body and mind. **Sleep** ...
Good **sleep** habits (also known as **sleep** hygiene) include: Be ...

Background and Context

FIGURE 69 - FIELDS IDENTIFIED FOR HEALTH AND WELLNESS INNOVATION SECTOR

Fields	Existing Framework	Particular Challenges	Comments
Developing a Sports Innovation Ecosystem	- Already in the vision of the National Sport and Physical activity policy (2018-2028) - Cote d'Or National Sport Complex - a State of the Art fully integrated Sports Complex	- Lack of physical exercise by youngsters - The culture and mindset to practice sports "as a play" does not exist - Sport Innovation Center in National Sport and Physical Activity Policy still need to be implemented - Lack of awareness in nutrition by Mauritian - National Sport and Physical activity policy mentions a Mauritian sport innovation centre, a multi-sectoral and multi-institutional approach required for set up - Lack of human resources at Cote d'Or Sports Complex	- Collaboration with Sport Innovation Center to develop an informed nutrition plan for athletes "Possibilities of developing a high performance kitchen" - to teach athletes proper way of eating - Formulate a roadmap to make Mauritius an "Active Sport Island" as per the National Sport and Physical Activity Policy – 2018 -2028 - Exercise prescription/ referral to fight

IDENTIFIED CHALLENGES



Reference:
National Roadmap for Research and Innovation 2023-2027
Health and Wellness (Pg 212)

Fields/ Challenges identified for Health and Wellness Innovation Sector

CHALLENGES that this Research will address

- Lack of Physical Exercise by youngsters**
- The culture and mindset to practice sports "as a play" does not exist**
- Lack of awareness in nutrition by Mauritian**

Lancet Regional Health – Europe (2023), **sleep health must be treated as a public health priority**

THE LANCET
Public Health

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VIEWPOINT · [Volume 8, Issue 10](#), E820-E826, October 2023 · [Open Access](#)

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The need to promote sleep health in public health agendas across the globe

[Diane C Lim, MD](#) ^{a,b,*} · [Arezu Najafi, MD](#) ^{c,d,*} · [Lamia Afifi, MD](#) ^e · [Claudio LA Bassetti, MD](#) ^f · [Daniel J Buysse, MD](#) ^g · [Fang Han, MD](#) ^h · et al. [Show more](#)

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>> Summary

Show Outline

Healthy sleep is essential for physical and mental health, and social wellbeing; however, across the globe, and particularly in developing countries, national public health agendas rarely consider sleep health. Sleep should be promoted as an essential pillar of health, equivalent to nutrition and physical activity. To improve sleep health across the globe, a focus on education and awareness, research, and targeted public health policies are needed. We recommend developing sleep health educational programmes and awareness campaigns; increasing, standardising, and centralising data on sleep quantity and quality in every country across the globe;

Quality sleep is essential for physical and mental health, yet often overlooked in modern lifestyles. Chronic sleep deprivation contributes to obesity, heart disease, and poor cognitive performance. As highlighted in The **Lancet Regional Health – Europe (2023), sleep health must be treated as a public health priority, with awareness and sensitisation programs promoting healthy sleep habits** through engaging tools like immersive storytelling and augmented reality.

Research **Motivation**

Problem Statement	<i>Good Sleep for Health</i> A lack of awareness about the importance of quality sleep negatively affects overall health, highlighting the need for interactive tools to encourage better sleep habits. <i>Sedentary lifestyle and lack of physical activities</i> University staff and students often lead sedentary lifestyles due to long hours of desk work and study, creating a need for engaging solutions that motivate regular physical activity.
Research Gap	Lack of engaging, tech-driven methods to promote physical and mental well-being.
Vision	Use immersive technologies (AR/VR) to motivate, educate, and engage individuals for healthier habits.

Project **Objectives**

- 1 Develop immersive AR storytelling to raise awareness on the importance of sleep
- 2 Develop Immersive Exergames for physical and mental well-being
- 3 Compare technology-driven vs. field-driven physical activities
- 4 Explore VR-based workplace collaboration promoting less sedentary behaviour.

Immersive **AR** Experience

- Immersive Storytelling for sleep importance sensitisation
- Immersive AR game to promote physical activities

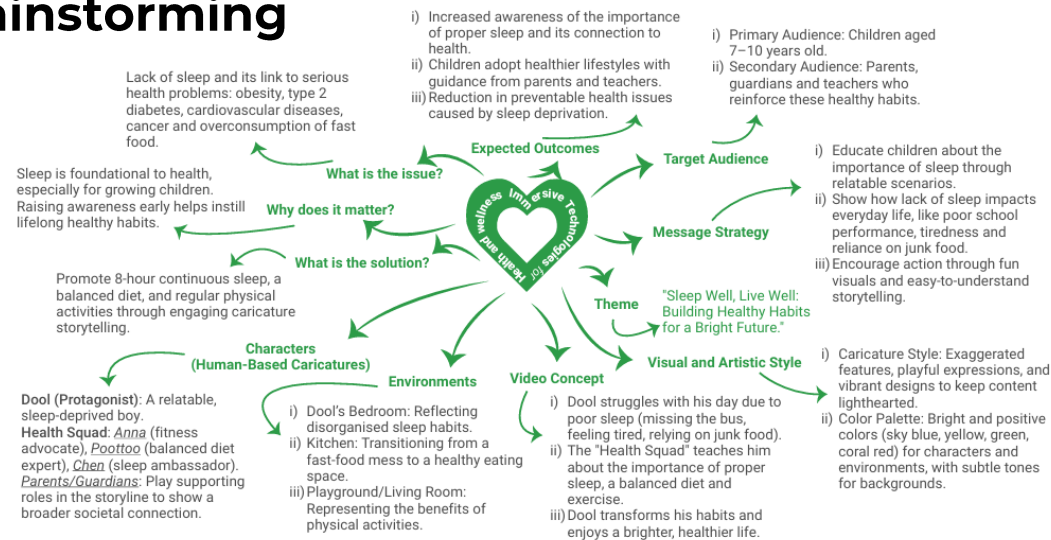


Methodology

Importance of Sleep

1. Brainstorming and Concept Development

Brainstorming



This phase involved ideation sessions with designers, educators, and health professionals to ensure that the storytelling approach effectively communicated key sleep and wellness concepts.

Story Script

FADE IN

INT. DINNING HALL - DAY 2

INT. DOOL'S BEDROOM - DAY 1

Opening Scene: The Problem (30 seconds)

Dool, a droopy-eyed, messy-haired boy, stumbles around his room. His mismatched socks and undone homework add to the chaos.

Junk Food Overload (30 seconds)

Dool is surrounded by a mountain of fast food. Burgers, fries, and soda are scattered everywhere. He tries to balance a double burger on his hand.

Narrator (Voiceover)

"When Dool doesn't sleep, his body craves junk food such as burgers, french fries, soft drinks and more burgers!"

Poottoo

"Dool, are you planning to open a burger museum?!"

Dool

"No way! These are all mine. I need energy!"

Poottoo

"Energy? More like a one-way ticket to a fatty liver! Fast food isn't fuel; it's type 2 diabetes."

Chen

"And French fries don't count as veggies, Dool. Let's swap them for real food. You need a rainbow diet, like a 5-colour diet!"

Chen

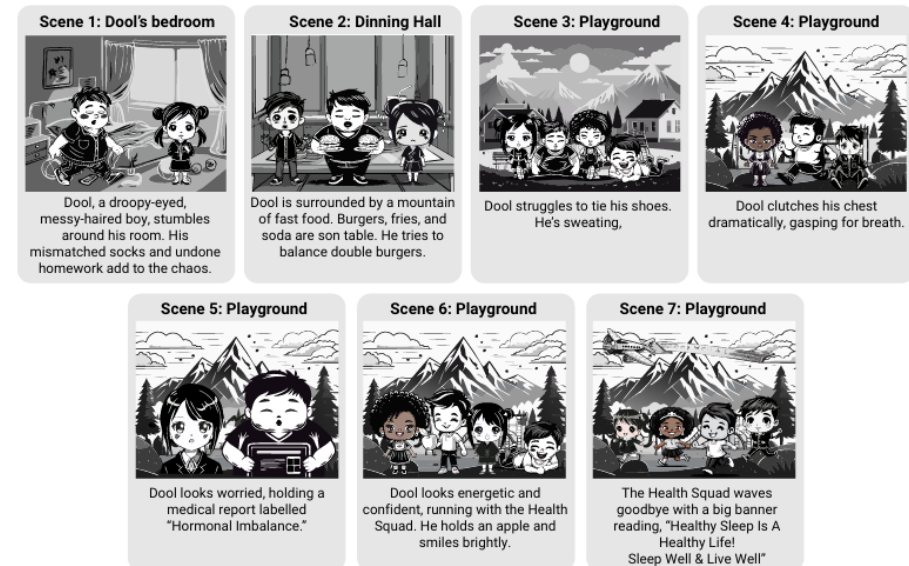
"I'm fine! Who needs sleep when you've got snacks and Games?"

Chen

"Oh, Dool... your brain needs sleep more than it needs snacks. Let's fix this!"

CUT TO

Storyboard

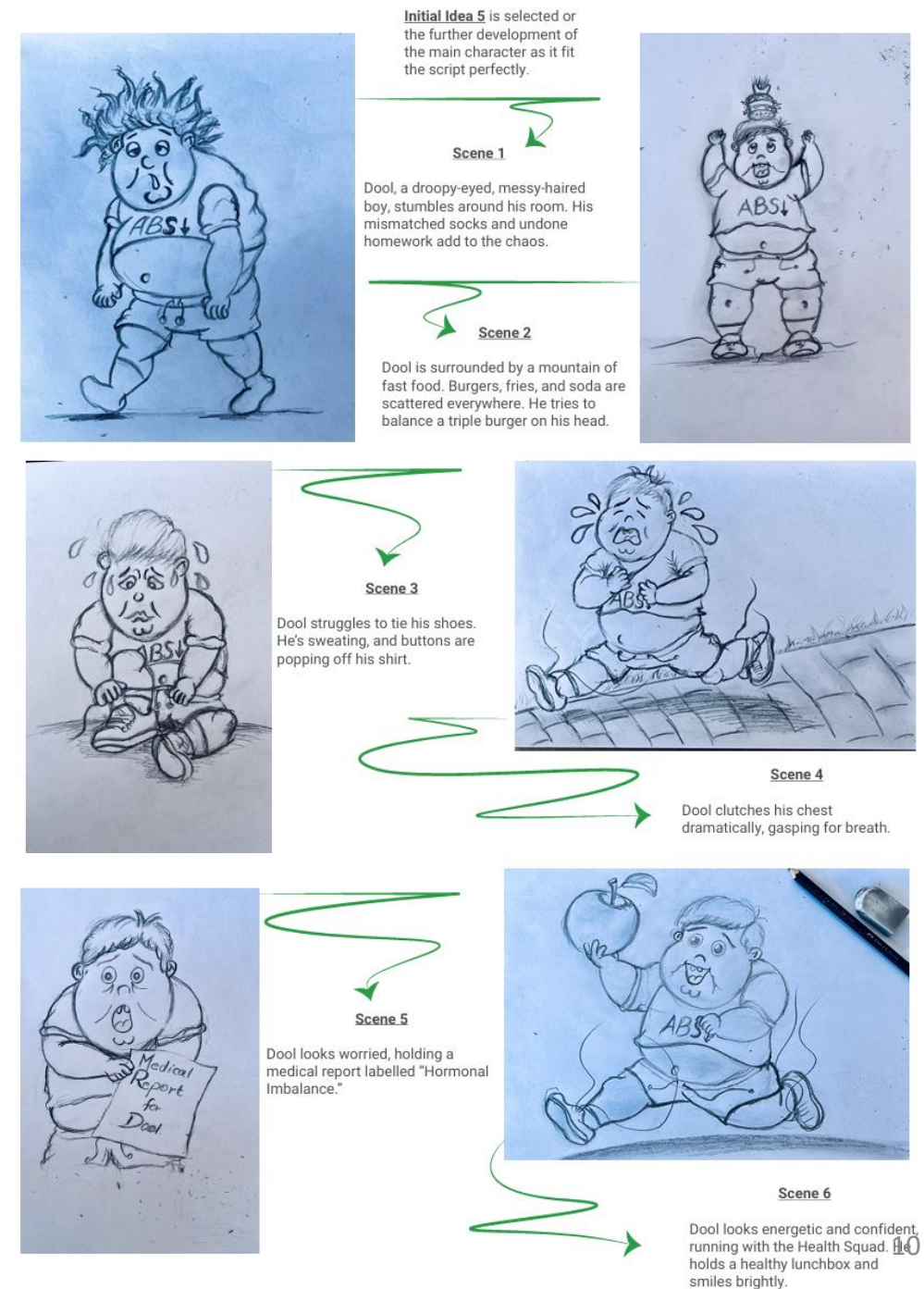
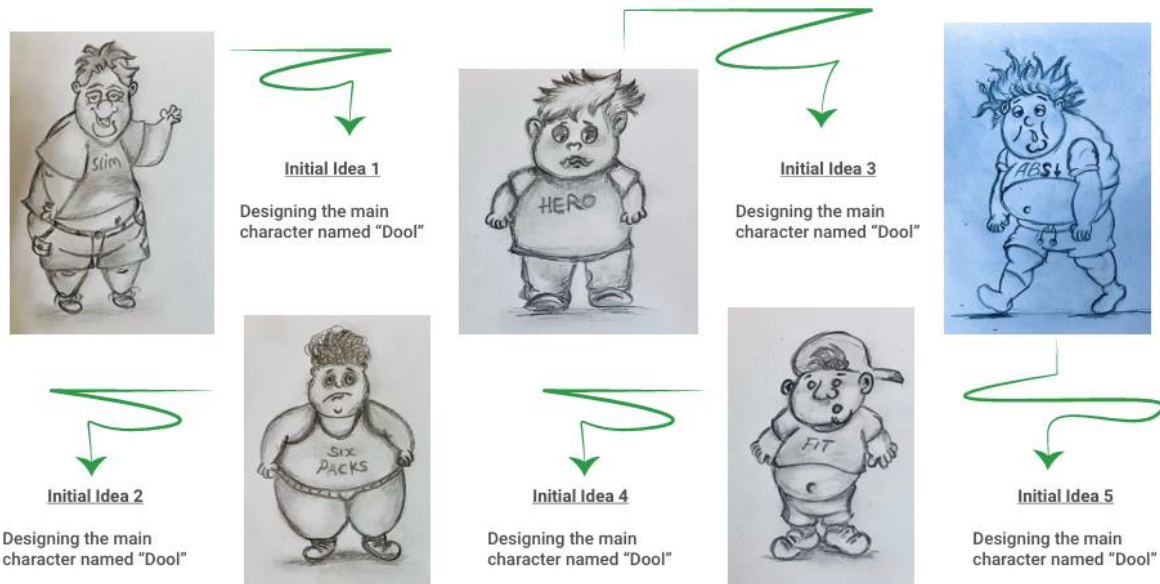


Methodology

Importance of Sleep

2. Character Design and Development

Character Prototype

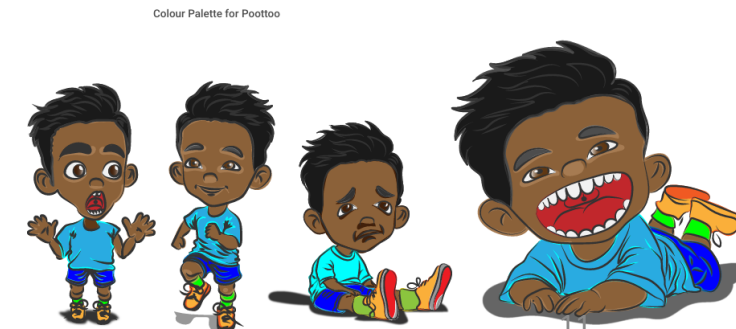
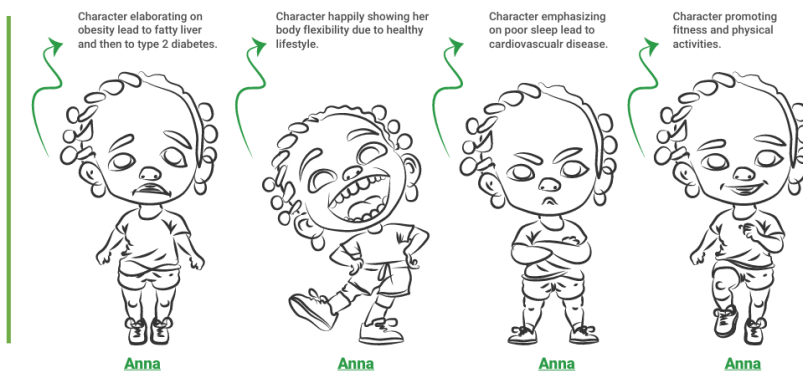
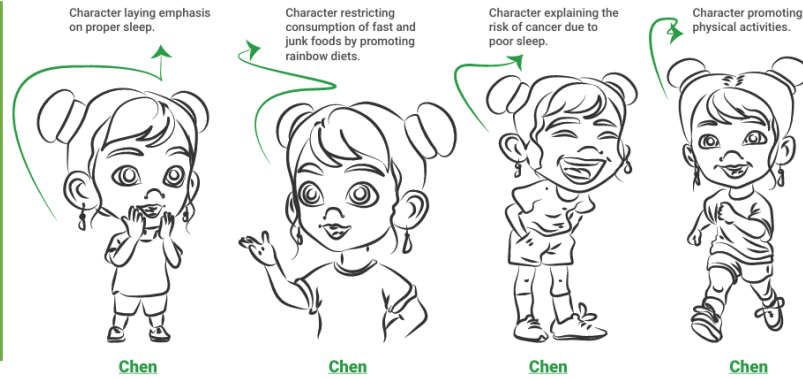
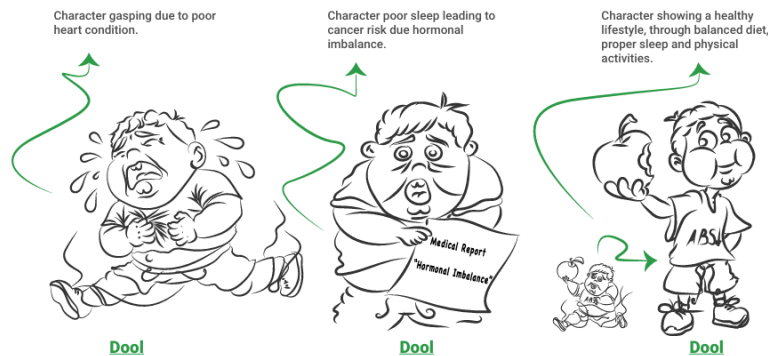
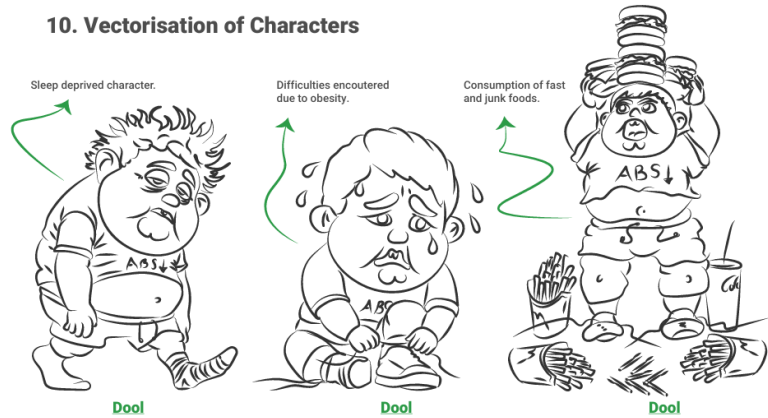


Methodology

Importance of Sleep

2. Character Design and Development (Continue..)

10. Vectorisation of Characters

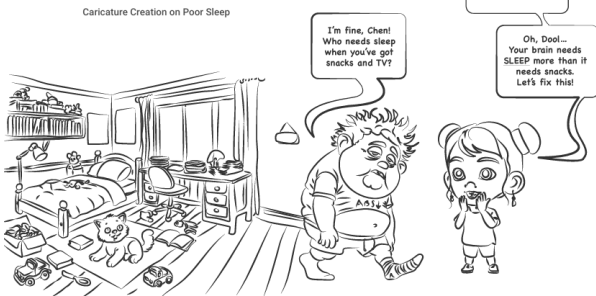


Methodology

Importance of Sleep

3. Development of Visual Narrative and Collaterals

10. Development of Assets



Development of Assets



Caricature Creation on Cardio



Caricature Creation on Hormones



AR Storytelling

Importance of Sleep

- 1 Interactive Booklet
- 2 Animated Posters
- 3 QR Code Posters
- 4 AR Ambassador Experience



Interactive Booklet



QR code posters

(Note: This QR version is encrypted and will not render)



Animated Poster



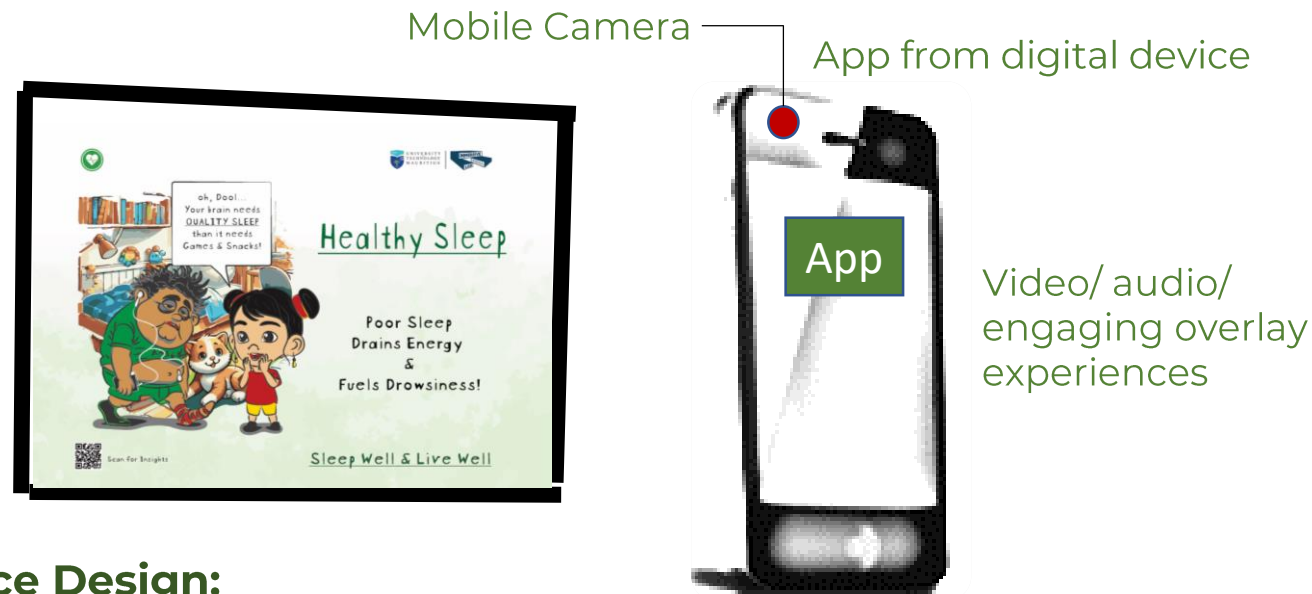
AR Health Ambassador

The ambassadors image are taken from the internet for demonstration purposes

Immersive Storytelling (STRATEGY)

Interactive Experience and Engagement: Sensitisation on Importance of Sleep

PROTOTYPE 1



Experience Design:

- AR storytelling through interactive cards, posters, booklets or digital format.
- Scan/ Tap to see animations, hear stories, and view short clips.
- Fun characters guide users through good sleep habits
- Designed for diverse audiences

Target Audience:

All age groups

Outcome and Purpose:

- Create awareness on healthy sleep habits
- Make learning about sleep fun and engaging
- Encourage better focus, rest, and wellbeing
- Show how immersive media supports health education



Future work: Consolidate for complete gamification experience

Experimental Analysis

Immersive Storytelling on Importance of Sleep

PROTOTYPE 1

50 Participants		Children/ Youngs (7–17 years) 25 participants	Parents/ Carers 15 participants		Educators/ Healthcare Professional 10 participants	
		12 Males	13 Females	8 Males	7 Females	4 Males 6 Females
AR Experiences		60% had experienced AR through games or social media filters		30% had limited knowledge of AR technology		70% were familiar with AR but had never used it for health education
Attitudes toward Sleep Wellness		72% understood the importance of sleep but only 45% maintained regular sleep schedules		88% acknowledged their role in promoting healthy sleep habits but found it challenging due to digital distractions		90% agreed that sleep wellness is a critical but under-addressed topic in school curricula
Experiences	Interactive Booklet	96% found the characters and storyline engaging		80% found it interesting.		89% saw the potential for classroom use
	Animated Posters	85% enjoyed the animations but suggested adding interactive quizzes		80% found it interesting		89% saw the potential for classroom use
	QR Code Posters	90% doubled the experience.		82% appreciated the quick access to resources via QR codes but requested content tailored for parents		89% saw the potential for classroom use
	AR Ambassador Experience	96% were happy with the experience and keen to sleep early and post a photo to share it.		75% enjoyed participating with their children and sharing photos online.		80% found it useful for group activities but recommended adding more educational prompts

Immersive Exergames (STRATEGY)

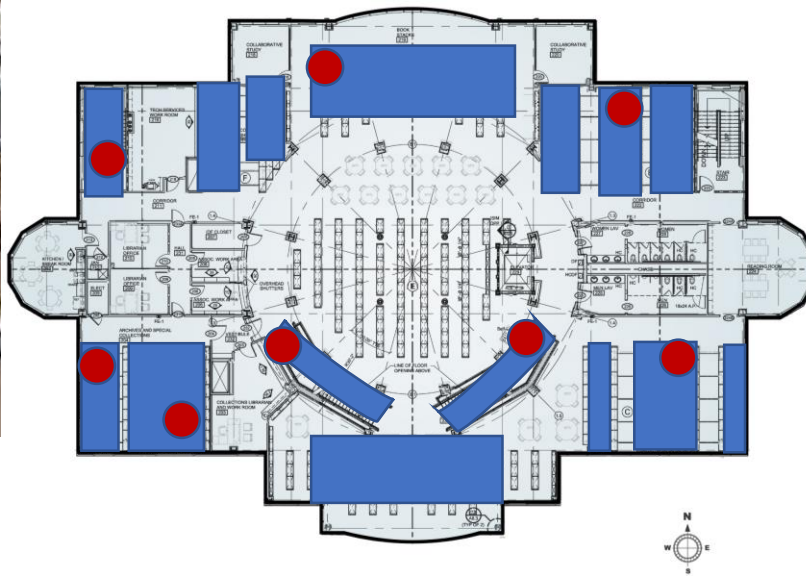
Physical Well-Being



UTM Campus

3 in 1 APP: Exploration/ Exercising/ Learning

PROTOTYPE 2



Target Audience:

University staff and students

Outcome and Purpose:

Experience Design:

- Virtual objects are anchored at different physical locations within the environment.
- Participants move through real space to interact with these location-based virtual elements using digital device.
- The setup blends digital gameplay with real-world physical movement, enhancing engagement and exploration.

- Promotes physical activity through walking, reaching, and spatial awareness.
- Fosters mental focus and stress relief by combining light exercise with gamified tasks.
- Demonstrates how immersive technologies can turn ordinary physical spaces into interactive wellness zones.
- Encourages collaboration and enjoyment among staff and students in a fun, low-intensity fitness activity.

Experimental Analysis

Immersive AR Exergame – Physical Well-Being

PROTOTYPE 2

10 Participants	Students		Staffs	
	3 Males	2 Females	2 Males	3 Females
AR Experiences	100% had experienced AR through games or social media filters		50% had limited knowledge of AR technology	
Attitudes toward Sedentary Lifestyle	60% mentioned that though in theory they know physical activities and keeping fit are a must, they find it difficult with the mode of study.		80% mentioned that after working hours and weekends, it is difficult for them to find the time. 20% mentioned that they try to catch up on weekends in gym.	



The complete experience App is currently being refined and is expected to be deployed for a larger set of participants.

VR for Less Sedentary Lifestyle



Immersive Experience (STRATEGY)

Physical Well-Being

PROTOTYPE 3



UTM Volleyball field



UTM Football Field



UTM Basketball Field

Target Audience: University staff and students

Experience Design:

- Recreates football, volleyball, and basketball environments in Virtual Reality.
- Participants engage in active movement within the virtual space.

Outcome and Purpose:

- Encourages physical activity and reduces sedentary behaviour on campus.
- Promotes mental refreshment, team spirit, and social interaction.

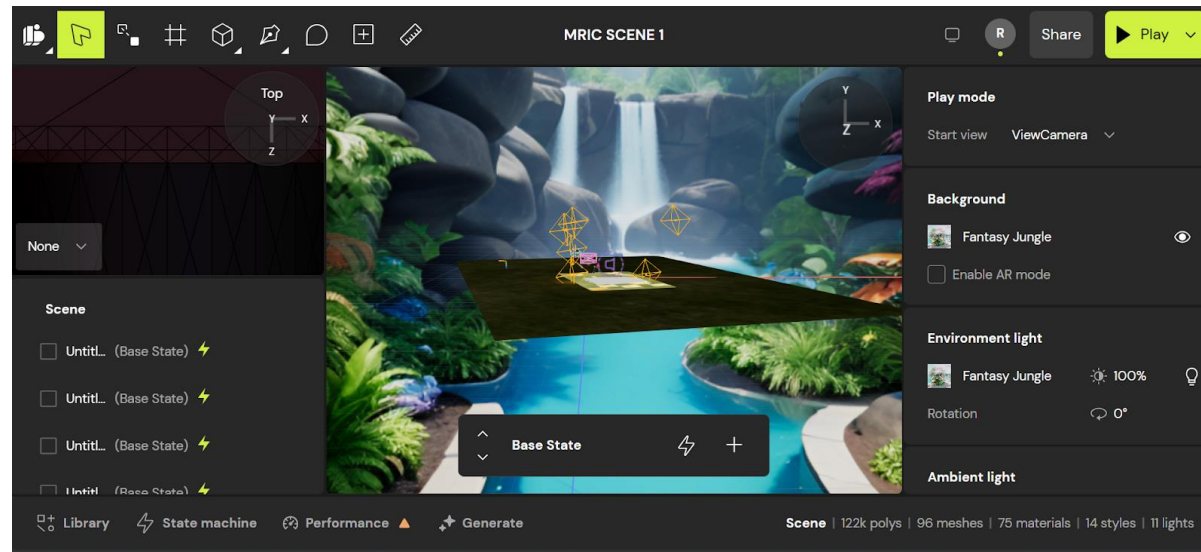


Future work: Extend for multiplayer experience

Immersive Exergames (STRATEGY)

Mental Well-Being

PROTOTYPE 4



Experience Design

Participants were immersed in a virtual environment featuring soothing natural sounds and calming landscape/s. They were required to walk within the virtual space, collect puzzle pieces, and assemble the puzzle.

The experiment were conducted in the university conference room, enhanced with wind effects (fan) and water droplets (spray mist) to simulate multi-sensory immersion.

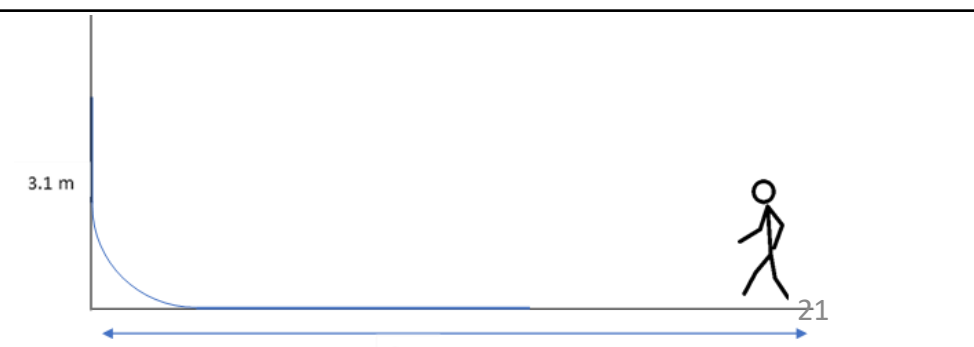
Outcome and Purpose:

- Designed to detach participants from their daily working environment.
- Promotes mental well-being and physical activity.
- Designed as a stress-relieving, interactive break from academic or office routines.
- Demonstrates how immersive technologies can transform wellness initiatives.

Experimental Set-Up

Immersive VR Exergame & Immersive Fields Experiences

PROTOTYPE 3 & 4

60 Participants	30 Students		30 Staff	
	15 Males	15 Females	15 Males	15 Females
Inclusion Factor	Participants in the age range of 18 to 60 with a willingness to engage in VR-based physical activities and bearing no constraints on physical activity.			
Exclusion Factor	Exclude participation of individuals who are not physically fit. Individuals with cardiovascular disease, musculoskeletal disorders or motion sickness were considered physically unfit for the VR experiences			
Experiment	VR exergaming activity that participants were expected to engage on during their free period three times a week over six weeks. The VR exergaming sessions were to be delivered using VR headsets, with VR puzzle games specifically designed to promote walking as a physical activity. The games were meant to encourage participants to walk to fetch the puzzle pieces and walk back and forth to construct the puzzle. A variety in the puzzles and VR environment settings were explored to render the experience engaging and fun and at the same time to sustain participation over the weeks.			
Environment Setup	Minimum expected space for the activity was considered to be 3m by 7m.			

Experimental Set-Up

Immersive VR Exergame & Immersive Fields Experiences

PROTOTYPE 3 & 4

Pre-intervention included baseline measurements, which were to be collected prior to the start of the VR exergaming programme.		Post-intervention included assessments to be conducted after six weeks of VR exergaming.	
Parameters	Details	Parameters	Details
Physical activity assessment	Participants are expected to complete a self-reported physical activity questionnaire (based on the International Physical Activity Questionnaire - IPAQ) to assess their typical physical activity levels before starting the intervention.	Physical activity assessment	The same self-reported physical activity questionnaire (IPAQ) was expected to be completed to assess changes in physical activity levels.
Mental well-being assessment	This exercise is based on the Generalised Anxiety Disorder 7 (GAD-7) and Patient Health Questionnaire 9 (PHQ-9), which were to be administered to measure baseline levels of anxiety and depression.	Mental well-being assessment	The GAD-7 and PHQ-9 questionnaires were to be re-administered to evaluate changes in anxiety and depression levels.
Demographics	Basic demographic data (age, gender, university department) was to be collected for context.		

Working **Papers**

1. Interactive Storytelling and Augmented Reality: A Comic-Based Approach for Sleep and Wellness Education
2. Design and Evaluation of a Augmented Reality Game for Physical Activity and Wellbeing in University Campuses
3. Exploring Virtual Reality as a Tool for Physical Activity and Mental Well-being in the University: A Study on Students and Staff
4. Virtual Reality (VR) for a safe and less sedentary workplace collaboration

Acknowledgment

- Mauritius Research and Innovation Council (MRIC)
- The University of Technology, Mauritius
- The Dayforce

Thank you