

Kuwait University
College of Architecture

Proposal
for
Kuwait University Virtual Reality Lab
(KUVRL)

Proposal by
Dr. Abdulmuttaleb Al-Ballam
Assistant Professor
Department of Architecture
College of Architecture

The following proposal is compiled by answering the following questions:

- 1- What is Kuwait University Virtual Reality Lab (KUVRL)?**
- 2- What are the goals of the KUVRL?**
- 3- What is the vision of the KUVRL?**
- 4- What are the expected physical parts of KUVRL?**
- 5- How would the KUVRL physical layout look like?**
- 6- What fields of studies would benefit from the KUVRL, and how?**
- 7- Who would benefit from KUVR Lab, and how much it will cost them to use it?**
- 8- How much it will cost to implement KUVR Lab?**
- 9- What are the available case-studies implemented similar facilities?**

1- **What is Kuwait University Virtual Reality Lab (KUVRL)?**

Initiated by the College of Architecture, the **KUVRL** is a general academic facility that allows researchers, teachers, and students of Kuwait University to visualize, interact, and test their studied simulated products in a 3D virtual reality space, created through computer based environment. This facility can also be used by people and organizations working in governmental and private sectors, outside Kuwait University allowing them to test their products before approaching the relatively costly physical production process.

2- **What are the goal of the KUVRL?**

To be specified....

3- **What is the vision of the KUVRL?**

To be specified....

4- What are the expected physical parts of KUVRL?

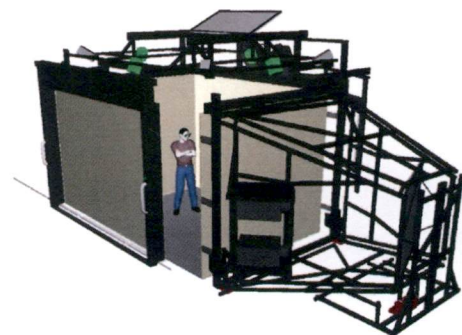
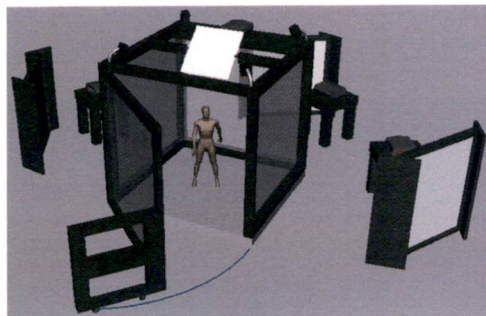
The KUVRL consists of five major physical rooms:

- 1- *The Virtual Cave.*
- 2- *The Virtual Interaction Room.*
- 3- *The Virtual Curved Theater.*
- 4- *The Construction Room.*
- 5- *The Control Room.*

The following are detail description of each space:

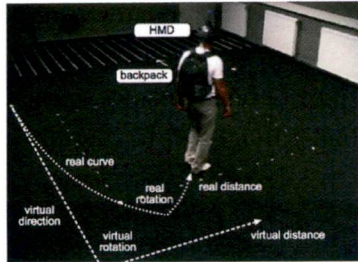
1- *The Virtual Cave:*

- Approximately 125 cubic meters space where the visitors are engulfed within its six physical sides. Their studied virtual spaces and materials are projected from inside through all six sides of the cube. This facility allows the total immersion of approximately 15 people in the virtual environment. Usually the users would wear special 3D glasses to feel the total immersion (see examples of this facility and how it is used in the figures below).



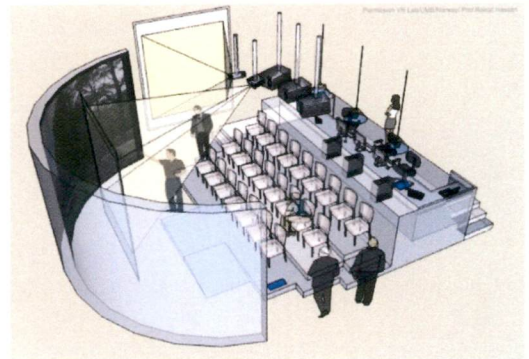
2- *The Virtual Interaction Room:*

- Approximately 100 square meters room area that allows maximum of two users to walk and interact in specific virtual reality. Usually, the users are equipped with helmet, sensors, and virtual wands for interactions with the studied materials (See examples of this facility and how it is used in the figures below).



3- *The Virtual Curved Theater:*

- Approximately a 180 degree curved screen that engulfs approximately 30 seats for viewing a virtual environments and products simultaneously. The users would visualize the virtual environment directly through their eyes without helmets to immerse them (he 3D glasses are optional). Usually, these kinds of facilities are used to make communal decisions or discussions (see examples of this facility and how it is used in the figures below).



4- *The Construction Room:*

- Approximately, 30 square meters room that contains 15 high in performance computer machines, and miniature virtual reality glasses. In this facility, permanent and temporary workers in the lab can generate virtual realities and virtual products, pre-test them in their disks, before implementing and experience them in the other three previous mentioned facilities. See examples of this facility in the figures below.



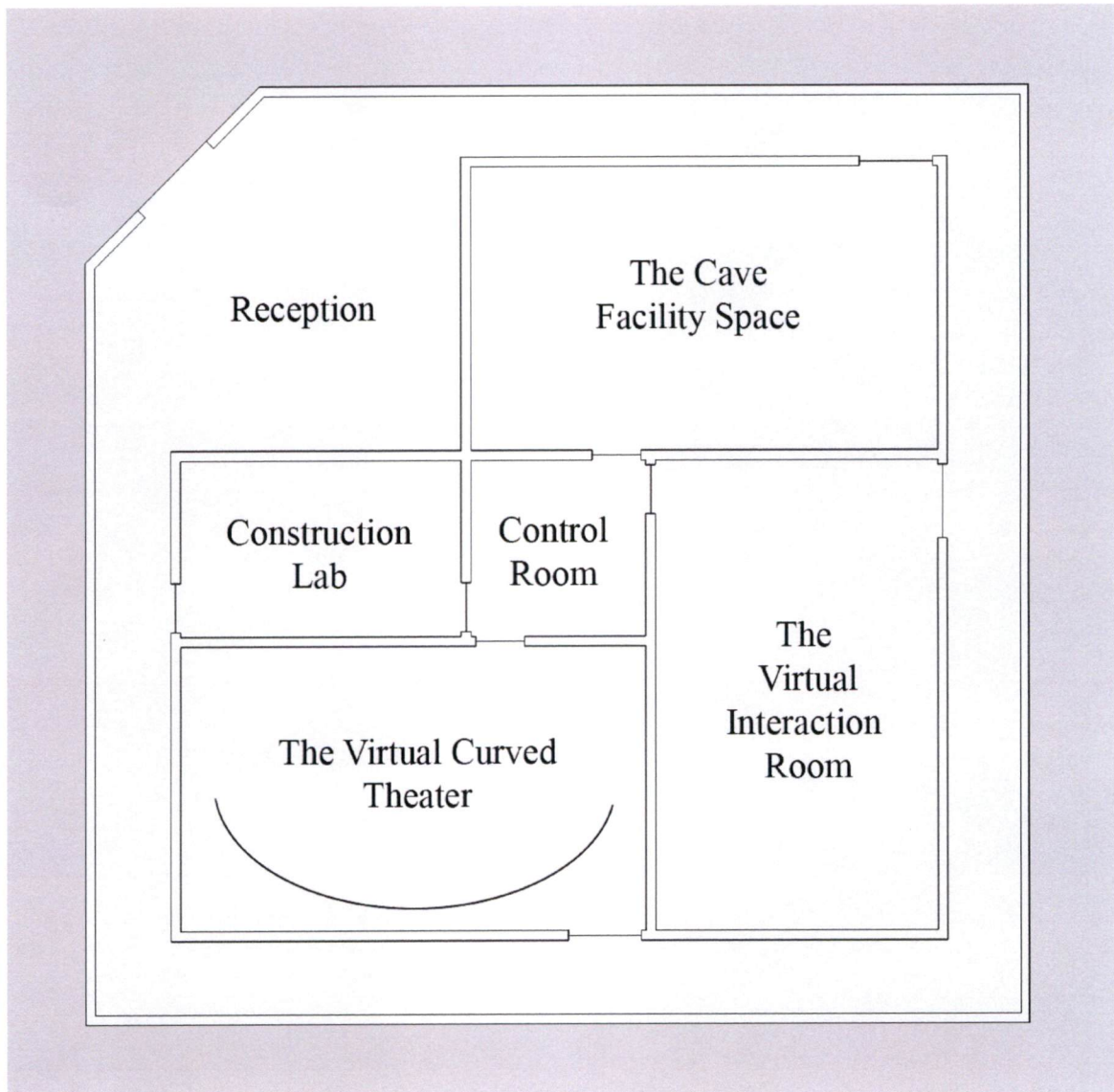
5- *The Control Room:*

- Approximately, 20 square meters room that contains the main equipment to control the facilities within the four previous sections of the lab. In this room, the main server and control buttons are operated.



5- How would the KUVRL layout look like?

The following plan represents an approximate layout for the KUVRL:



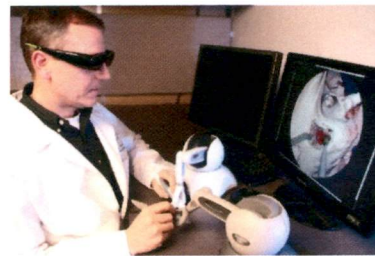
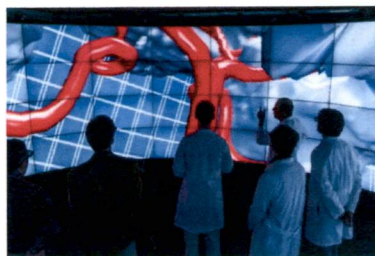
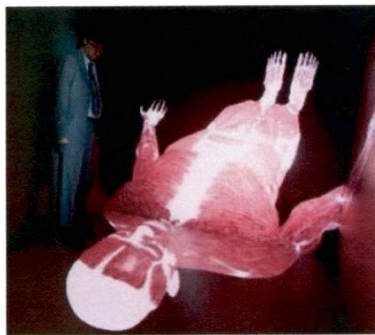
$15 \times 15 = 200 \text{ m}^2 \rightarrow 150^2$

6- What are the fields of studies and industries that would benefit from the KUVRL, and how this would be achieved?

The benefits of KUVRL for the fields of studies are endless. The following are some examples for the use of Virtual reality facilities on different fields of studies:

1- *Medicine and Dentistry:*

- Virtual-reality simulation in medicine and dentistry is designed to improve outcomes and reduce complications in patients undergoing brain surgery. For example, doctors of medicine could operate on virtual bodies, travel inside hard to reach human organs and parts. Dentists as well could operate on virtual teeth and mouths for training and research. The figures below are some examples of researchers in medicine and dentistry using similar facilities proposed in the KUVRL.



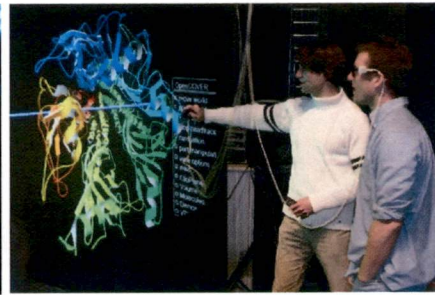
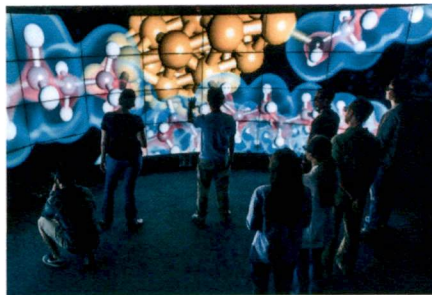
2- *Architecture, Interior Design, Urban Design, and Urban Planning:*

- Architects, Interior design and urban designers can examine their created spaces and environments for functionality, psychological impacts, and aesthetical values. The figures below are some examples of researchers in Architecture, Interior Design, and Urban Design using similar facility to the proposed KUVRL.



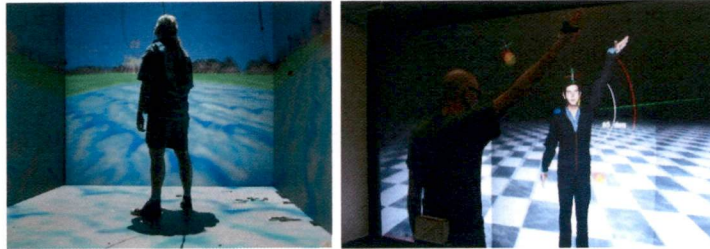
3- *Chemistry and Biology:*

- For research and learning purposes, chemists and biologists can visualize relations between hard to see atom parts, chemical components, and organic materials. The figures below are some examples of researchers in Chemistry and Biology using similar facility to the proposed KUVRL.



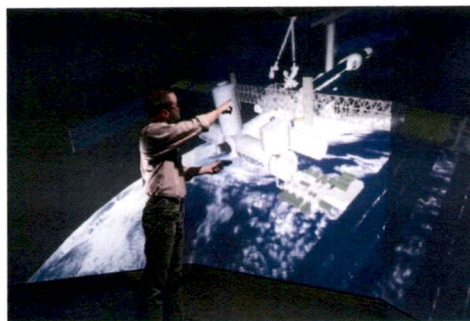
4- *Psychology and Sociology:*

- For research and learning purposes, psychologist can place users in virtual situations to test their reactions on certain situations. The figures below are some examples of researchers in Psychology and Sociology using similar facility to the proposed KUVRL.



5- *Physics and Astronomy:*

- Physicists, Astronomers, and their students can travel into space virtually, visualize and, examine unreachable universal situations. The figures below are some examples of researchers in Physics and Astronomy using similar facility to the proposed KUVRL.



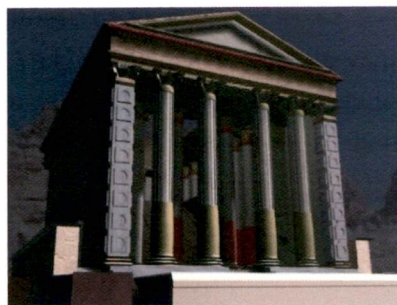
6- Engineers:

- Engineers could test and operate their designs virtually. The figures below are some examples of researchers in Engineering using similar facility to the proposed KUVRL.



7- Archaeology:

- Archeologists can recreate vanished ancient environments, experience and test it accordingly. The figures below are some examples of researchers in Archaeology using similar facility to the proposed KUVRL.



8- *Military and Defense:*

- Military and law enforcement personals can be immersed in virtual hostile environments, to gain experience of similar real situations in the future. The figures below are some examples of military and law enforcement personals using similar facility to the proposed KUVRL.



7- **Who would benefit from the KUVR Lab, and how much it will cost to use it?**

type	Cost
Kuwait University's faculty members	Free
Kuwait University's graduate students	Free
Kuwait University's ungraduated students	Free
Individuals from governmental and private sectors outside the university	Charged

8- How much it will cost to implement the KUVRL?

The following is a table that specifies the cost breakdown for establishing the KUVRL:

The Prices of Parts and Items For constructing the proposed Kuwait University Virtual reality Lab				
أسعار أجزاء وعناصر مختبر الواقع الافتراضية في كلية العمارة				
#	Lab part and items in English	أجزاء وعناصر المختبر بالعربية	الكمية Quantity	التكلفة التقريبية Approximate Cost
1	Walking in VR Room System	نظام غرفة مشي في واقع افتراضي	1	\$60,000 ½
2	Multi-Screen Projection System	نظام غرفة ذات حوائط مسلاطة متعددة	1	\$100,000 ½
3	Curved screen Virtual Reality theatre	مسرح واقع افتراضي ذو شاشة مقوسة	1	\$75,000 ½
4	Ten High performance PCs. For the digital construction lab	جهاز كمبيوتر ذو أداء قوي لمختبر البناء الحاسوبي	10	\$75,000 ½
5	Five miniture VR system (Oculus)	نظام واقع افتراضي مصغر	5	\$25,000 ½
6	Interaction Wand for virtual reality	عصا تفاعلية لواقع الافتراضي	5	\$25,000 ½
7	Lightweight Stereo Glasses Motion Tracker	نظارة خفيفة متحسسه لحركة المستخدم	5	\$5,000
8	Control room and Lab Construction cost	تكلفة بناء المختبر	1	\$100,000 ½
9	Furnature	أثاث	1	\$25,000 ½
Approximate total cost in US Dollar الإجمالي التقريبي بالدولار				\$490,000
Kuwaiti Dinar الإجمالي التقريبي بالدينار				KWD 150,000 70,000

9- What are the available case-studies implemented similar facilities?

- Qatar University.
 - Department of Architecture:
 - Research Field: General.
- University of Lausanne
 - Department of Organizational Behavior
 - Research Field: General Human Behavior.
- Stanford University:
 - Communications Department:
 - Research Field: General Human Interaction.
- Premursa Theme Park, S.A.:
 - Theme Park Development:
 - Research Field: General Design Review and Marketing.
- UC Santa Barbara:
 - Psychology Department:
 - Research Field: General Human Behavior.
- UC San Diego:
 - Institute for Neural Computation:
 - Research Field: General Human Sensorimotor Control and Learning.
- Vanderbilt University:
 - Electrical Engineering and Computer Science Department:
 - Research Field: General Computer Graphics and Animation.
- Miami University:
 - Psychology and Computer Science Departments:
 - Research Field: General Human Spatial Cognition.
- University of Utah:
 - School of Computing:
 - Research Field: General Computational Vision.
- University of Waterloo:
 - Psychology Department:
 - Research Field: General Behavioral Neuroscience.
- ETH Zurich University:
 - Department of Behavioral Sciences:
 - Research Field: General Applied Cognitive Science.

...The End...