PLANNING FOR VIRTUAL REALITY

AN INTRODUCTORY GUIDE

FROM THE VIRTUAL ENVIRONMENTS STUDIO
UNIVERSITY LIBRARIES AT VIRGINA TECH

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Virtual Reality

WELCOME TO PLANNING FOR VIRTUAL REALITY

This document is intended to help users who are interested in setting up a virtual reality service for a school, library, museum, or other space understand the resources needed and better plan for the challenges of running a VR service for the public.

WHAT WILL BE IN THIS GUIDE

This guide will include space requirements, projected costs, needed equipment, maintenance, and possible service models for operating a Virtual Reality service.

NEED MORE INFORMATION?

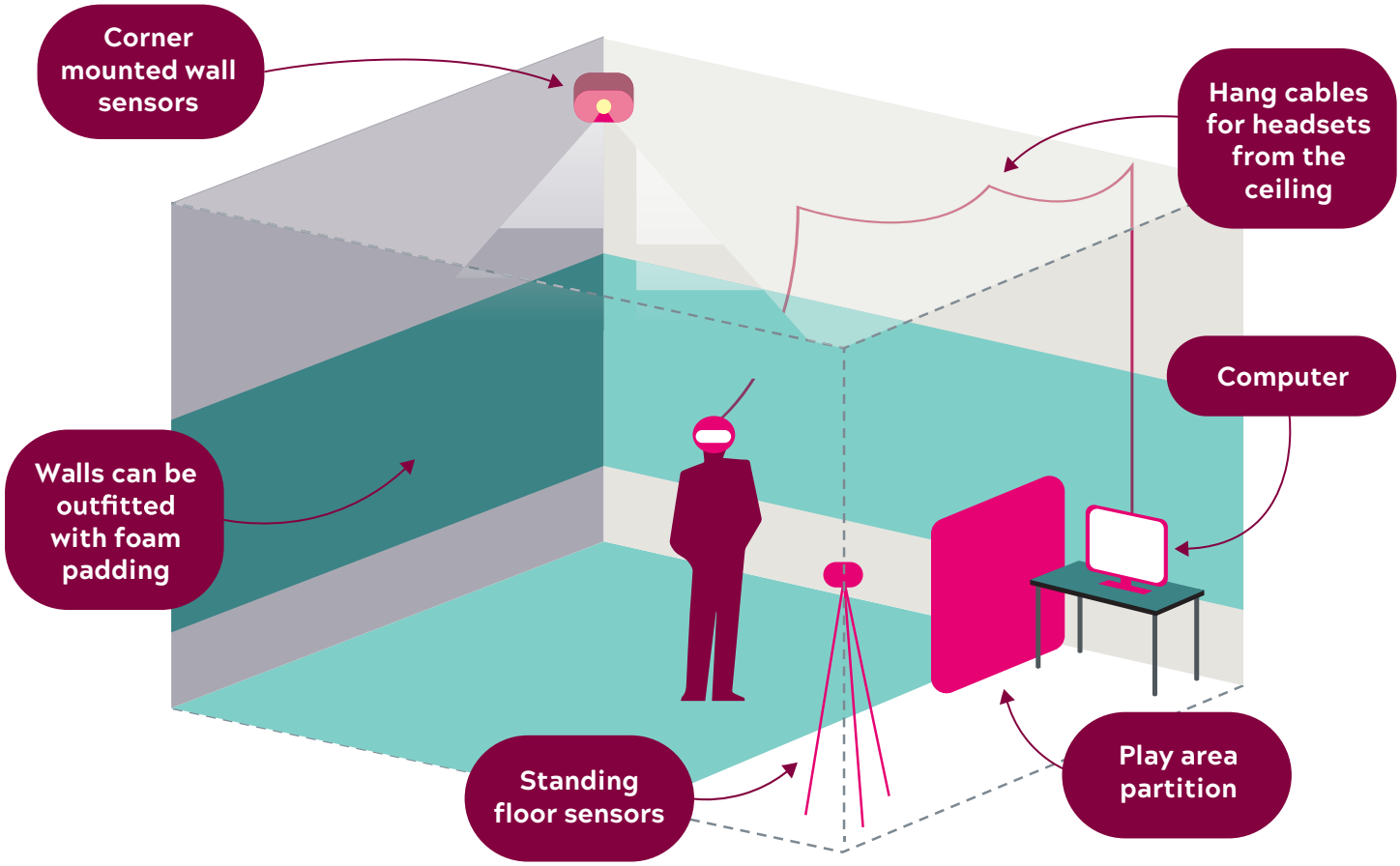
Everything you need to know about VR set up may not be covered in this guide. If you have questions beyond what is addressed or want to provide feedback, contact **virtualstudio@vt.edu**.

Virtual Reality

INTRODUCTION

WHAT DOES A VIRTUAL REALITY SPACE LOOK LIKE?

Designing a space for virtual reality can be challenging; a VR space can be standing-room-only all the way up to unlimited space depending on the hardware, so figuring out the best way to setup the space you have to be safe and enjoyable takes some forethought in design.



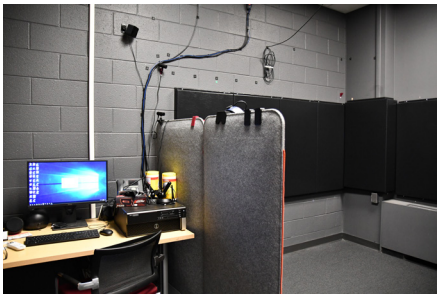
Cable management, wall padding, and barriers should all exist in some form in your space. Wireless systems can be used to remove cables from the space if they fit within the budget but do add a level of maintenance in the form of batteries that need to be kept charged.

Virtual Reality

INTRODUCTION

WHAT DOES VIRGINIA TECH'S VIRTUAL REALITY SPACE LOOK LIKE?

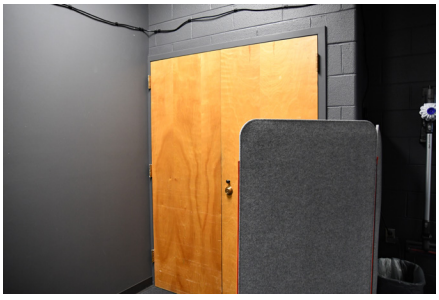
Below we've provided example photos of a functioning VR space to provide some context on what a service like this may look like. Keep in mind that your space will likely look and be laid out differently than what is pictured here. This is only intended to help you visualize these sorts of spaces and get your imagination churning as you take the next steps into planning your own.



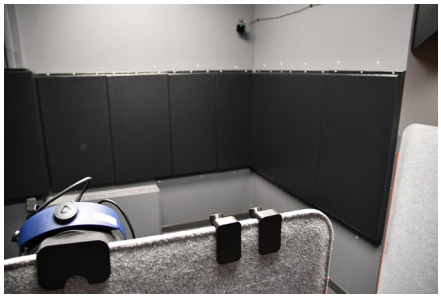
Partition separates play area from computer to ensure safety.

Headsets and controllers hang on wall for easy access and to prevent clutter.

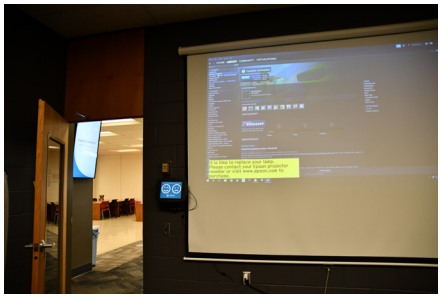
Cables for wired headsets run along ceiling to prevent tripping.



Storage space keeps additional equipment away from play area.



Walls of play area are padded to prevent participant injury.



Displays screen allows supervisor and audience to view the participant's experience.

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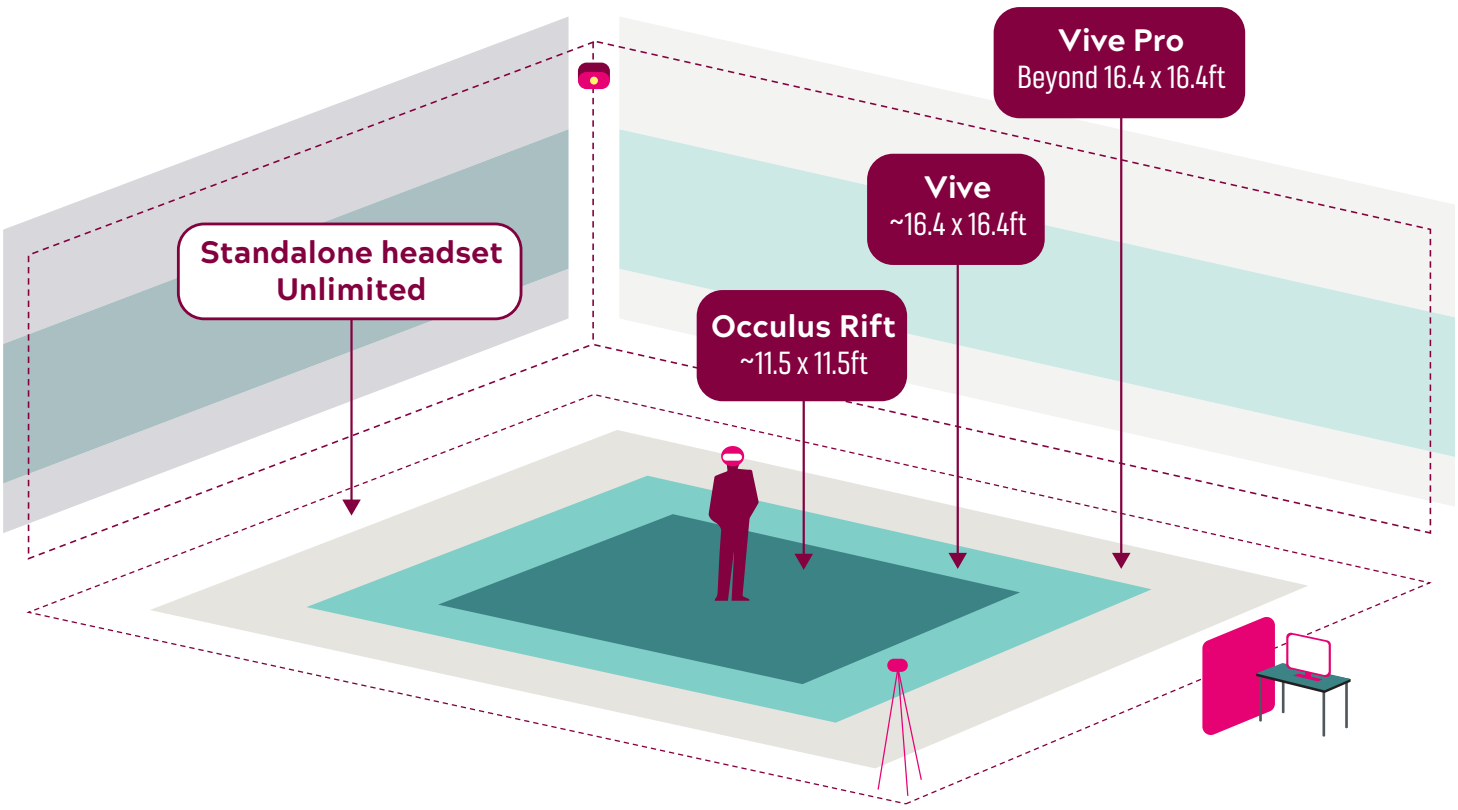
SPACE DESIGN

1. KNOW THE DIMENSIONS OF YOUR SPACE

Different VR headsets have different sized play areas. These can range from standing-room-only all the way up to technically unlimited space. The more room you can offer, the safer and more enjoyable the experience is for users.



Measure out potential spaces and write their dimensions below. Include floor dimensions and wall height:

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SPACE DESIGN

2. PLAN YOUR SPACE

There are many things to consider when planning. We've listed some of most common items. Some items may be optional depending on your headset, budget, space, or service model.

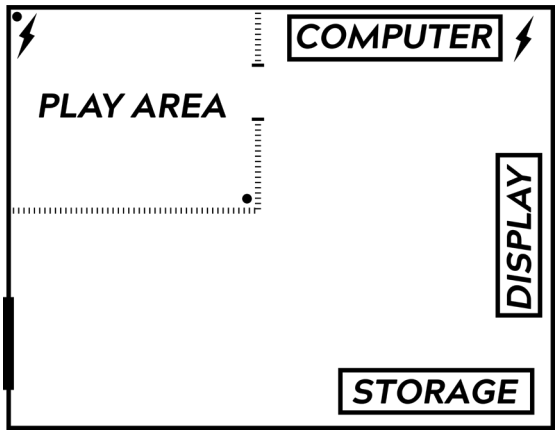
Read through the list and check off items you already have and items you want.

	HAVE	*WANT*
SPACE		
Play Area		
HARDWARE		
Computer		
Display		
FURNITURE		
Desk for Computer		
Seating		
SAFETY		
Wall Padding		
Partition(s)		
STORAGE		
Hardware		
Accessories/Supplies		
SENSORS		
Wall-mounted		
Tripod		
OTHER		

3. DRAW YOUR SPACE

Sketch out potential set ups based on assets. Remember to include things like doors, power, and storage.

EXAMPLE:



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COST ANALYSIS

WHAT TYPE OF VIRTUAL REALITY EXPERIENCE SHOULD I BUY?

If funds are short or you need to deploy a large number of headsets, mobile is the best option. If you want to provide users with a solid experience without a high cost, the Stand Alone headsets are a good choice. Finally, if your audience will use the system for research or development and you have the money, PC VR generally provides the best experience.

	MOBILE *Oculus Go*	STAND ALONE *Oculus Quest* *HTC Focus Plus*	PC VR *Oculus Rift S* *HTC Vive*
COST	$10-300	$300-500	$2000+
BENEFITS	Low cost. Can be deployed en-mass. Easily portable.	No PC required. Easily portable. Full world/ controller tracking.	Highest fidelity. Advanced object tracking. More engaging. experiences.
DRAWBACKS	Low fidelity experiences Minimal user interaction. Less open distribution platforms.	Medium fidelity experiences. Less open distribution platforms.	Higher cost. Less portable. More work to setup.
REQUIREMENTS	Phone to setup account Wifi access.	Phone to setup account Wifi access.	Internet connection Sensor mounting.

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TECHNOLOGY CONSIDERATIONS

MOBILE HEADSET

These headsets use smartphone technology for rendering and have limited forms of interactivity. They can't track movement through space and are generally better for 360 images and video then true VR.

STAND ALONE

These headsets use higher-end smartphone technology, providing a more realistic experience, and use on-board cameras to track movement through space and add full controller interactivity to the experience.

PC VR

These headsets have the most realistic VR experiences and have highly accurate movement and controller tracking through space. They can be tethered to a PC or include a wireless adapter that handles communication between the headset and PC.

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TECHNOLOGY CONSIDERATIONS

MOBILE HEADSET

NEEDS	CONSIDERATIONS
POWER	A way to charge the internal battery. Access to batteries for controllers, generally AA.
STORAGE	Should be stored in a soft case and out of the direct sunlight. Controller batteries should be removed prior to long-term storage.
SOFTWARE	Uses mobile apps. Will require an admin email account to setup and in some cases, a separate phone to manage the headset.

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TECHNOLOGY CONSIDERATIONS

STAND ALONE

NEEDS	CONSIDERATIONS
POWER	A way to charge the internal battery. Access to batteries for controllers, generally AA.
STORAGE	Should be stored in a soft case and out of the direct sunlight. Controller batteries should be removed prior to long-term storage.
SOFTWARE	Uses mobile apps. Will require an admin email account to setup and in some cases, a separate phone to manage the headset.

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TECHNOLOGY CONSIDERATIONS

PC VR

NEEDS	CONSIDERATIONS
POWER	PC requires normal wall power. Headset draws power from the PC unless a wireless adapter is being used, in which case, battery packs will be needed along with a way to charge them.
STORAGE	Headset should generally be hung somewhere in the play area along with controllers, out of direct sunlight.
SOFTWARE	An admin account will be needed along with installation permission on the PC attached to the headset. Generally, requires an account with Steam or Oculus, and many higher-end experiences cost between $10 - $60.

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TECHNOLOGY CONSIDERATIONS

PC VR (CONT)

NEEDS	CONSIDERATIONS
 FURNITURE	Tracked-area should be clear of obstacles, such as furniture, and some form of barrier should be used to demarcate the area.
 CPU	The computer should have at least a quad-core CPU, 16GB of RAM, and a mid-tier graphics card, (ex. NVIDIA RTX 2070 or AMD RX Vega 56) in order to ensure a smooth experience.
 SENSORS	Sensors should be wall mounted if possible but placing them on tripods is a less-desirable but workable option. Each sensor also needs access to either power or the PC itself depending on the headset.
 DISPLAY	It is best to offer a screen to mirror the headset to. This can be either a TV or projector. Doing so helps audiences feel more engaged, improves instruction, and can help guide the participant through the experience. The screen should NOT be in the tracked area but instead adjacent to it.
 ACCESORIES	Wireless adapters and more comfortable head-straps can be beneficial to have but are not required. It is, however, a good idea to keep antibacterial wipes and/or one-time use VR sanitation masks on hand for the space.

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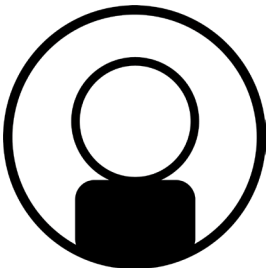
RULES AND ROLES

WHO'S IN THE ROOM? WHAT SHOULD EACH PERSON BE DOING?

For the most part, VR is a safe activity to take on. However, there are some safety considerations to take into account as the space is setup.

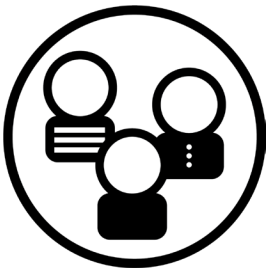


THE SUPERVISOR

The supervisor should be keeping an eye on the participant to make sure they are not tangled in any cords or getting too close to a wall. They should also guide the participant through the experience by giving instructions. The supervisor should generally stay out of the tracked-area, except to help put on or remove the headset.

THE PARTICIPANT

The participant should be mindful of cables near them and the VR grid that lets them know when they are approaching a physical wall so as to not collide or trip during their time in VR. They should also be communicating any concerns with the supervisor and listen to any instructions they receive.



THE AUDIENCE

The audience should watch the screen or the participant but should not enter the tracked area if the participant is wearing the headset. The audience should also be quiet enough to hear instructions from the supervisor and not prevent the participant from hearing instructions as well.

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SAFETY CONSIDERATIONS

ENVIRONMENT

WALLS

Add padding on walls to protect hardware and participants

FLOOR

Keep clear of obstacles and cabling and ensure good traction

CEILING

Mount equipment safely on the ceiling to prevent tripping and related injuries

DIMENSIONS

Define dimensions for the play area to keep non-participants at a safe distance

EQUIPMENT

CABLES

Use wireless adapters or attach cabling to ceilings and walls when possible

HEADSET

Wear headsets properly and adjust to fit comfortably

CONTROLLER

Wear safety wrist straps to prevent controller from being dropped or thrown

SENSORS

Place sensors outside play barriers whenever possible for safety

HEALTH

STRAIN

Take breaks during long play periods to prevent strain on the eyes and muscles

NAUSEA

Inform supervisor if experiencing discomfort from visuals and movements

INJURY

Avoid colliding with walls, equipment, and other persons or sitting/leaning on virtual objects

CLEANING

Sanitize controllers, clean lenses properly, and replace headset foam regularly

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NEXT STEPS

WHAT SHOULD I DO NEXT?

Here are some resources that you might want to look at as you move forward with building your own space. We've also included some recommendations regarding choosing a type of headset and contact information if you have any follow-up questions.

TRAINING

Odyssey:
odyssey.lib.vt.edu

Unity3D Training:
unity.com/learn

SteamVR Documentation:
developer.valvesoftware.com/wiki/SteamVR

Lynda:
lynda.com (paid service)

EXPERIENCES

Steam:
store.steampowered.com

Oculus Store:
oculus.com/experiences

Google Play Store:
play.google.com/store

HEADSET BASICS

Stand Alone:
Work well for the majority of users

PC VR:
Best for research or development of new experiences

Mobile headsets:
Recommended if funds are limited or many headsets are needed for the service

CONTACT INFO

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virtualstudio@vt.edu

Physical Location:
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University Libraries
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Blacksburg, VA 24061