

PROXIMITY TOOLKIT

Rob Diaz-Marino, Interactions Lab

rob.diazmarino@gmail.com

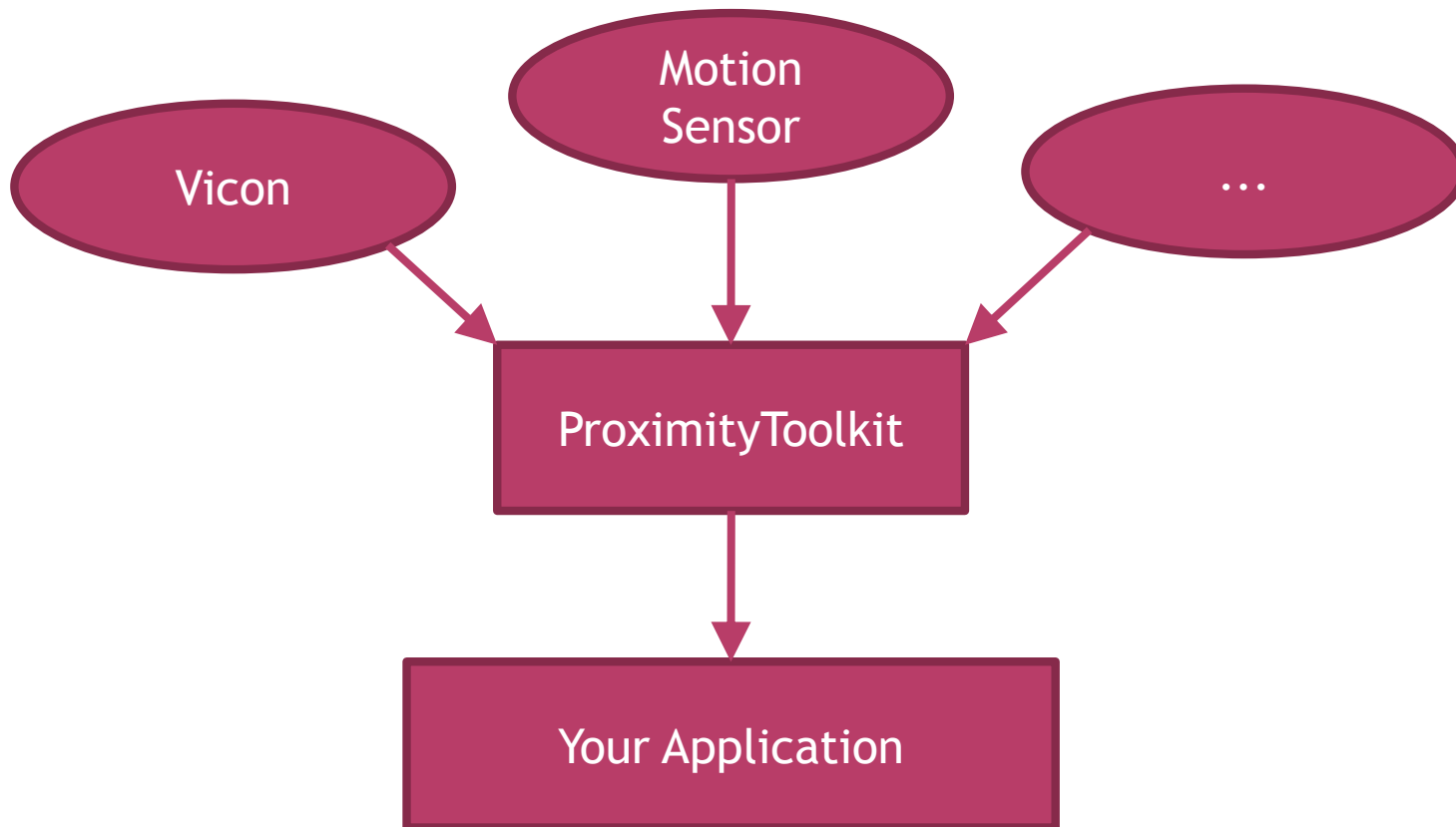
OVERVIEW

- ◉ Premise of Proximity Toolkit
- ◉ The Home Space
 - Intro to Vicon System
 - Intro to Proximity Server
- ◉ Proximity Data Model
 - Presence Properties
 - Relation Properties
- ◉ Using the Toolkit
 - Controls
- ◉ Help & Resources
- ◉ Demo

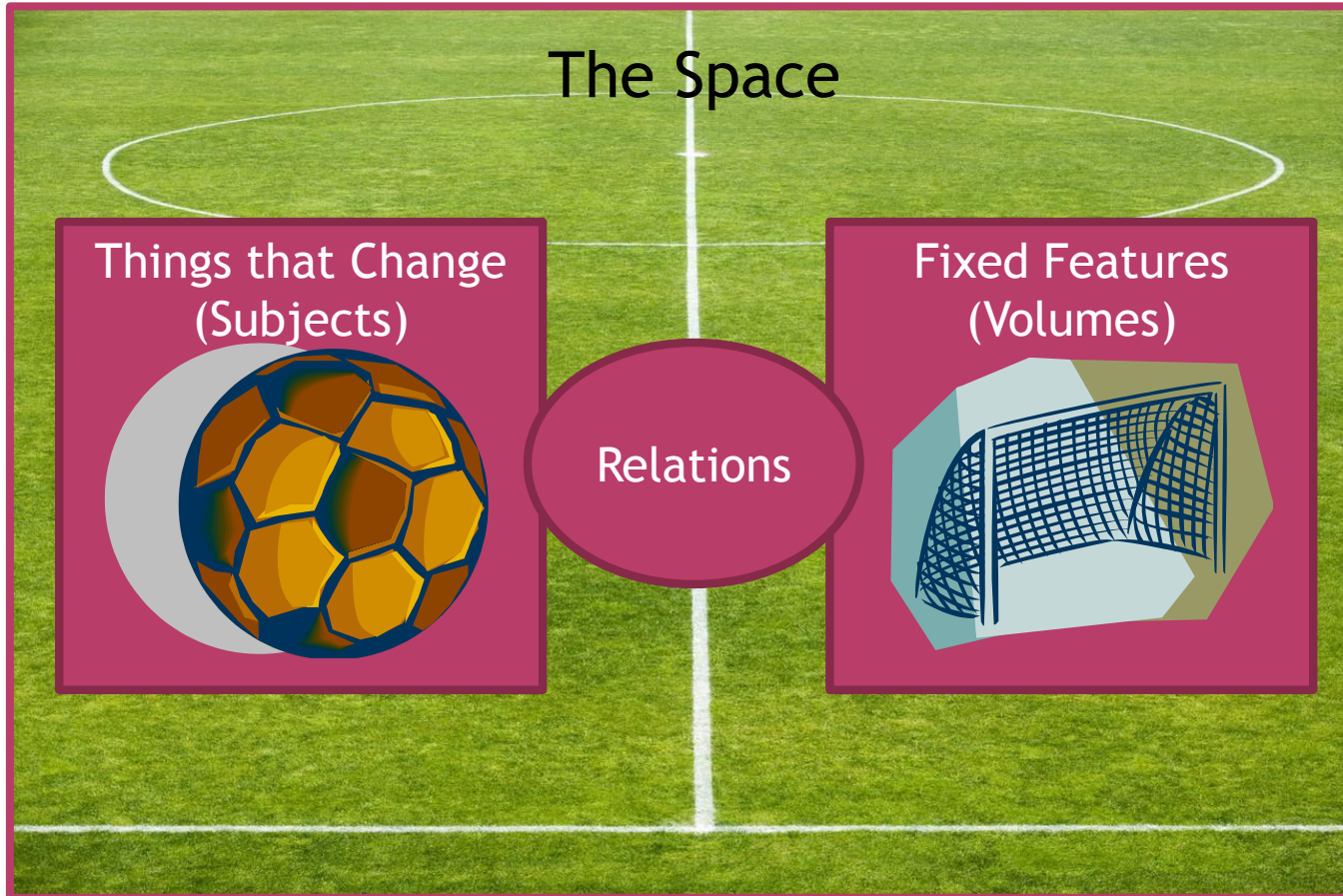
PREMISE OF PROXIMITY TOOLKIT

HARDWARE GENERALITY

- Any potential proximity input hardware

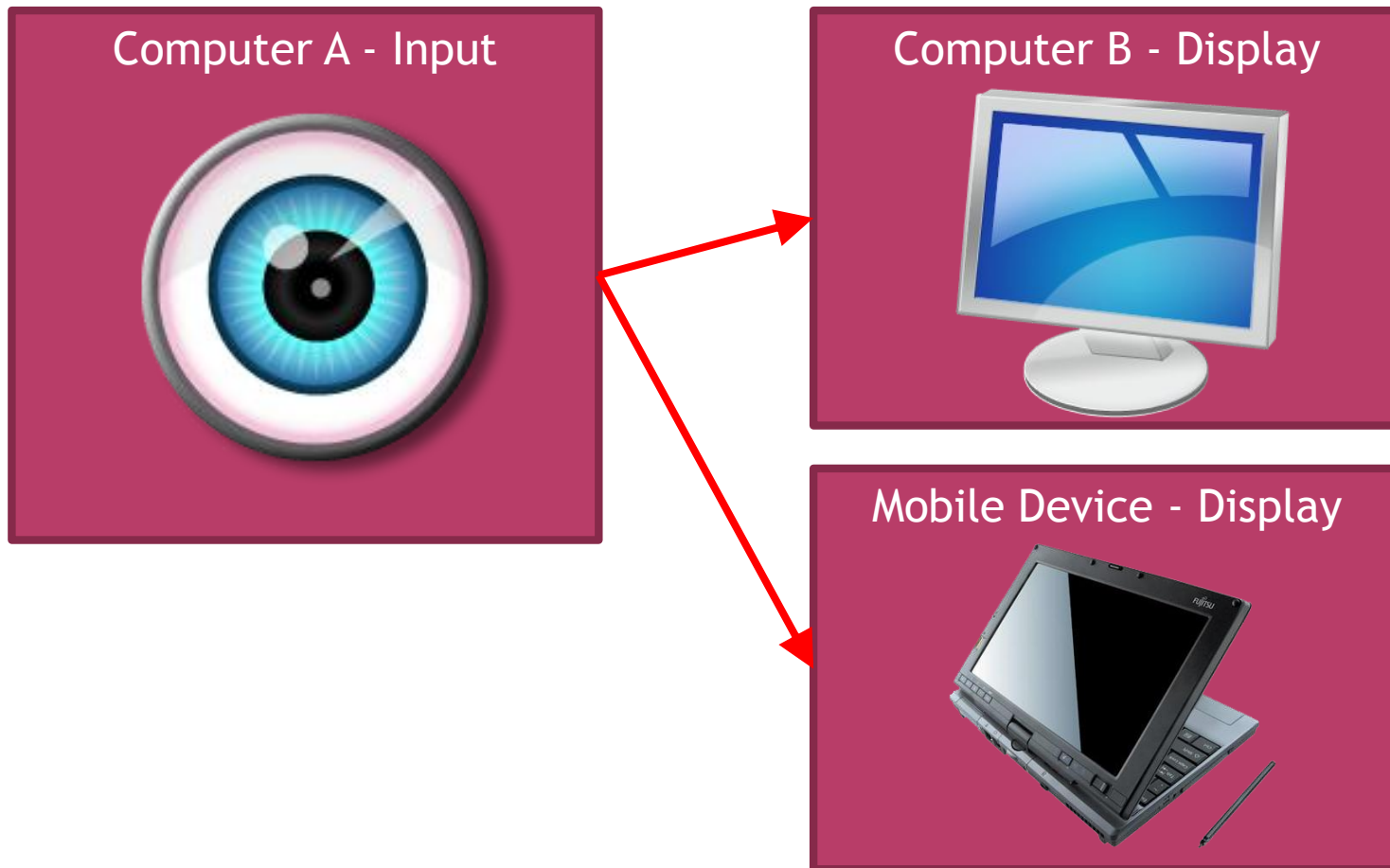


UNIFIED DATA MODEL



ACCESSIBILITY

- Potentially distributed applications

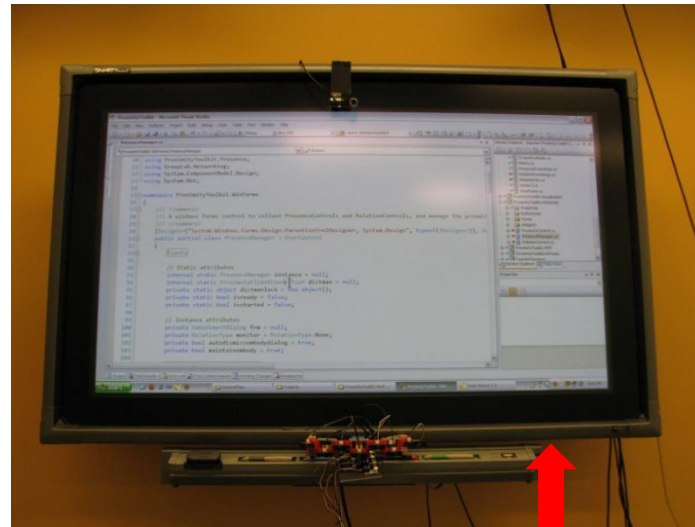




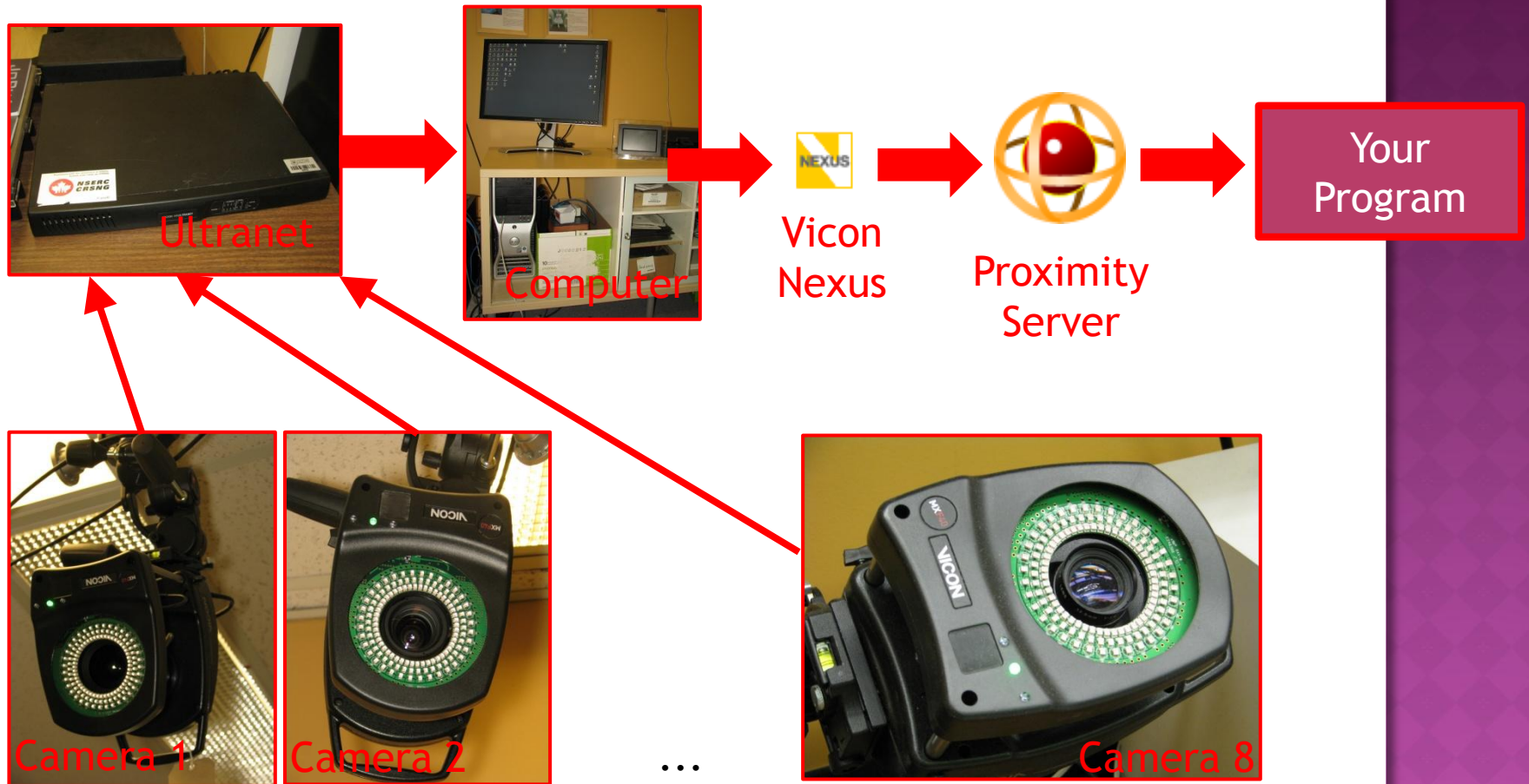
USING THE HOME SPACE

GENERAL MACHINE USE

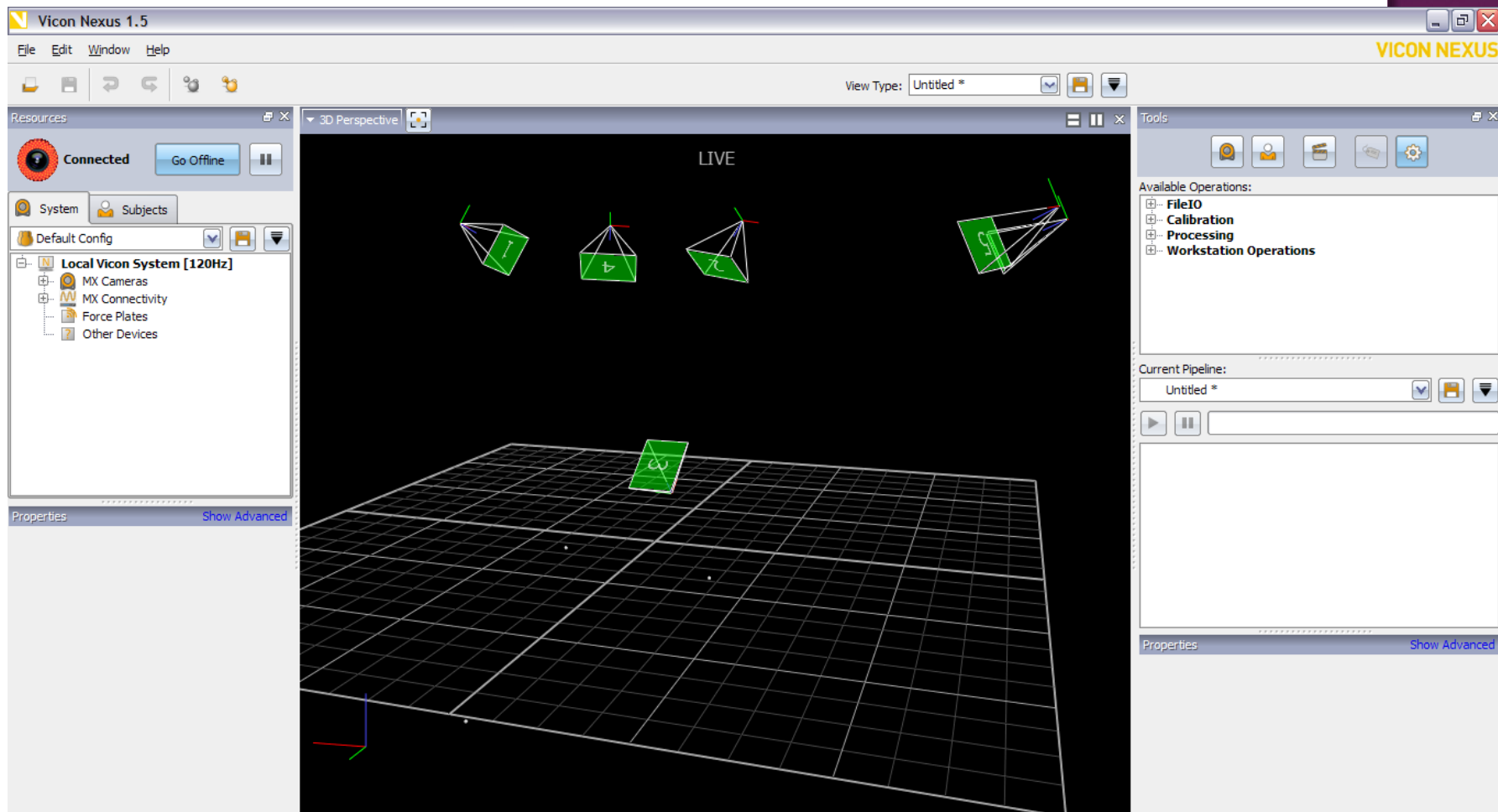
- SmartBoard
 - Switch off after use
- 2nd Monitor
 - Input: DVI-D 2
- Computer
 - Always on
 - Leave logged in
 - Ignore updates



INTRODUCTION TO VICONS



VICON NEXUS APPLICATION



SUBJECTS

Pencil



WhiteHat

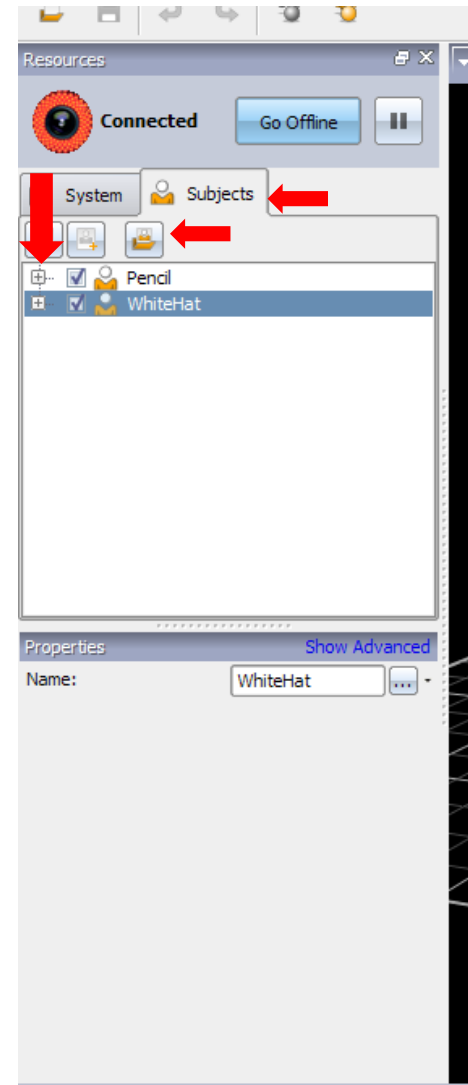


BlackHat

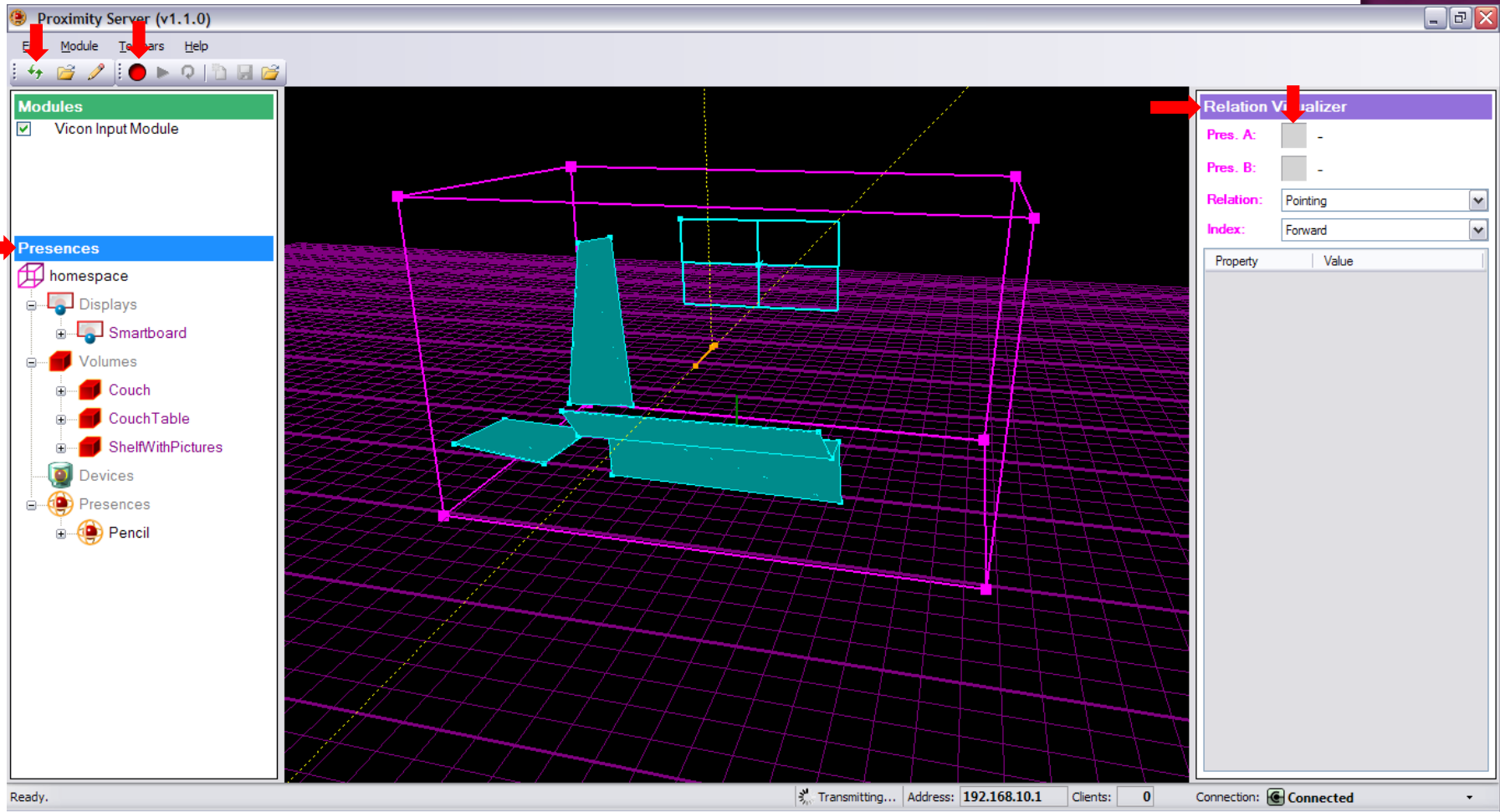


LOADING SUBJECTS

- ⦿ Subjects Tab
- ⦿ Load Subject button
- ⦿ Check/Uncheck
- ⦿ DO NOT TOUCH ANY OTHER SETTINGS!



INTRO TO PROXIMITY SERVER



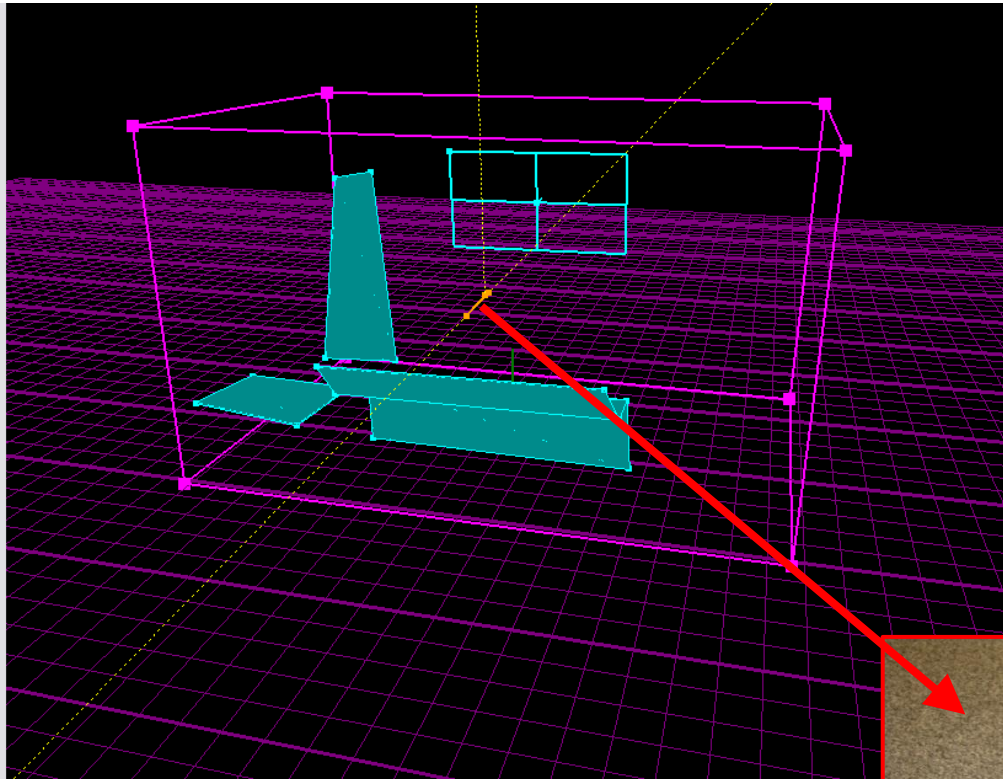
TRACKED SUBJECTS

Modules

- Vicon Input Module

Presences

- homespace
 - Displays
 - Smartboard
 - Volumes
 - Couch
 - CouchTable
 - ShelfWithPictures
 - Devices
 - Presences
 - Pencil



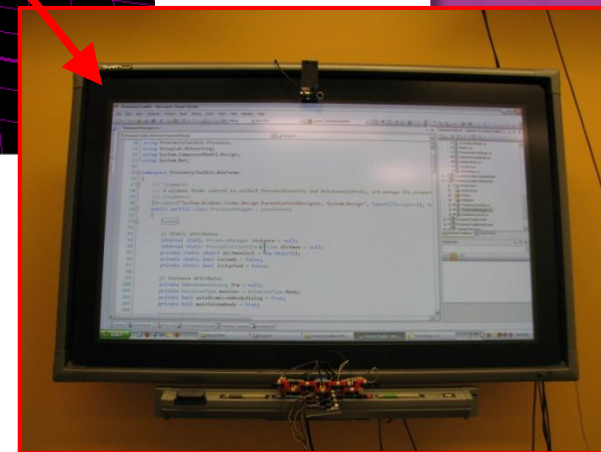
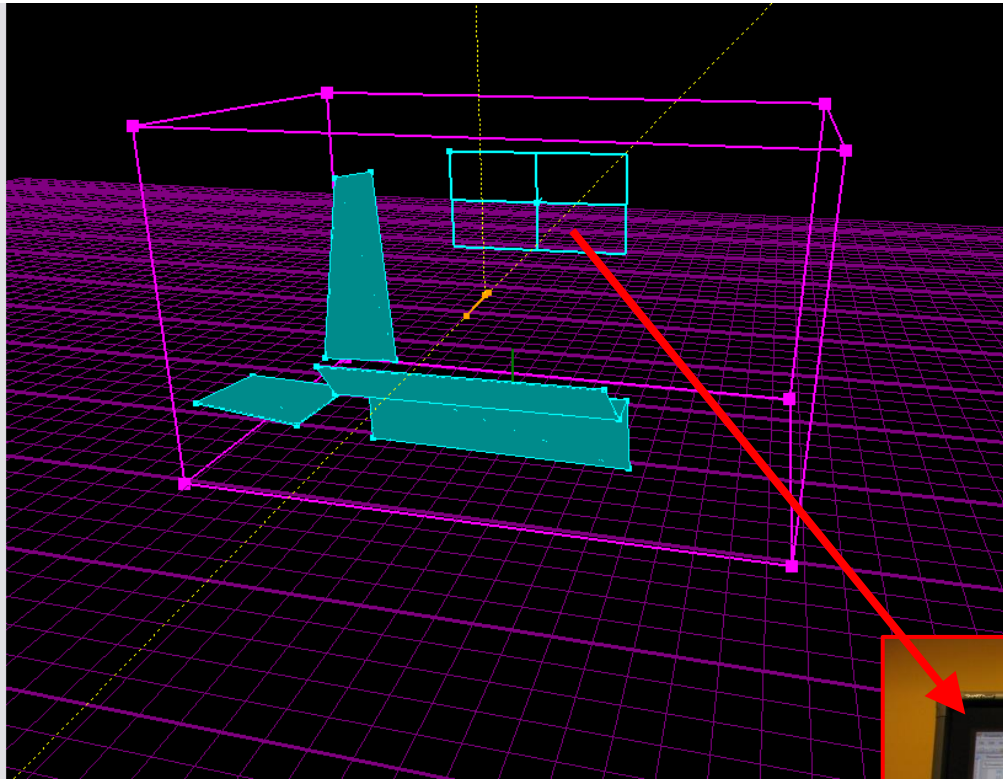
DISPLAYS

Modules

- Vicon Input Module

Presences

- homespace
 - Displays
 - Smartboard
 - Volumes
 - Couch
 - CouchTable
 - ShelfWithPictures
 - Devices
 - Presences
 - Pencil



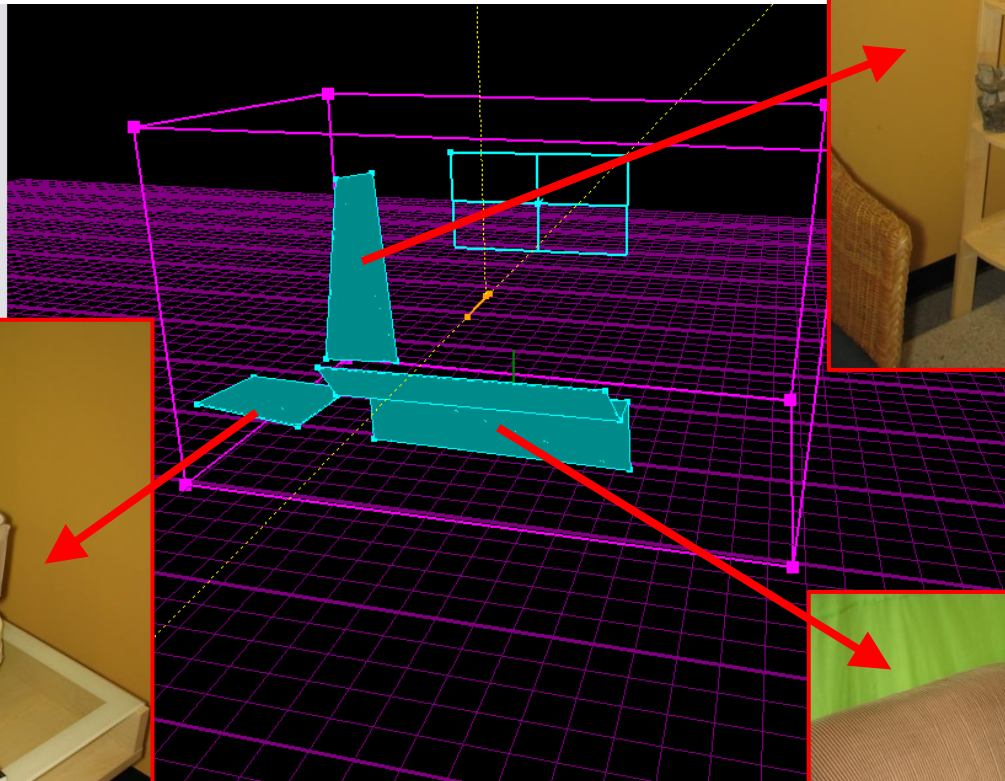
VOLUMES

Modules

- Vicon Input Module

Presences

- homespace
 - Displays
 - Smartboard
 - Volumes



EXPLORING THE SPACE

Modules

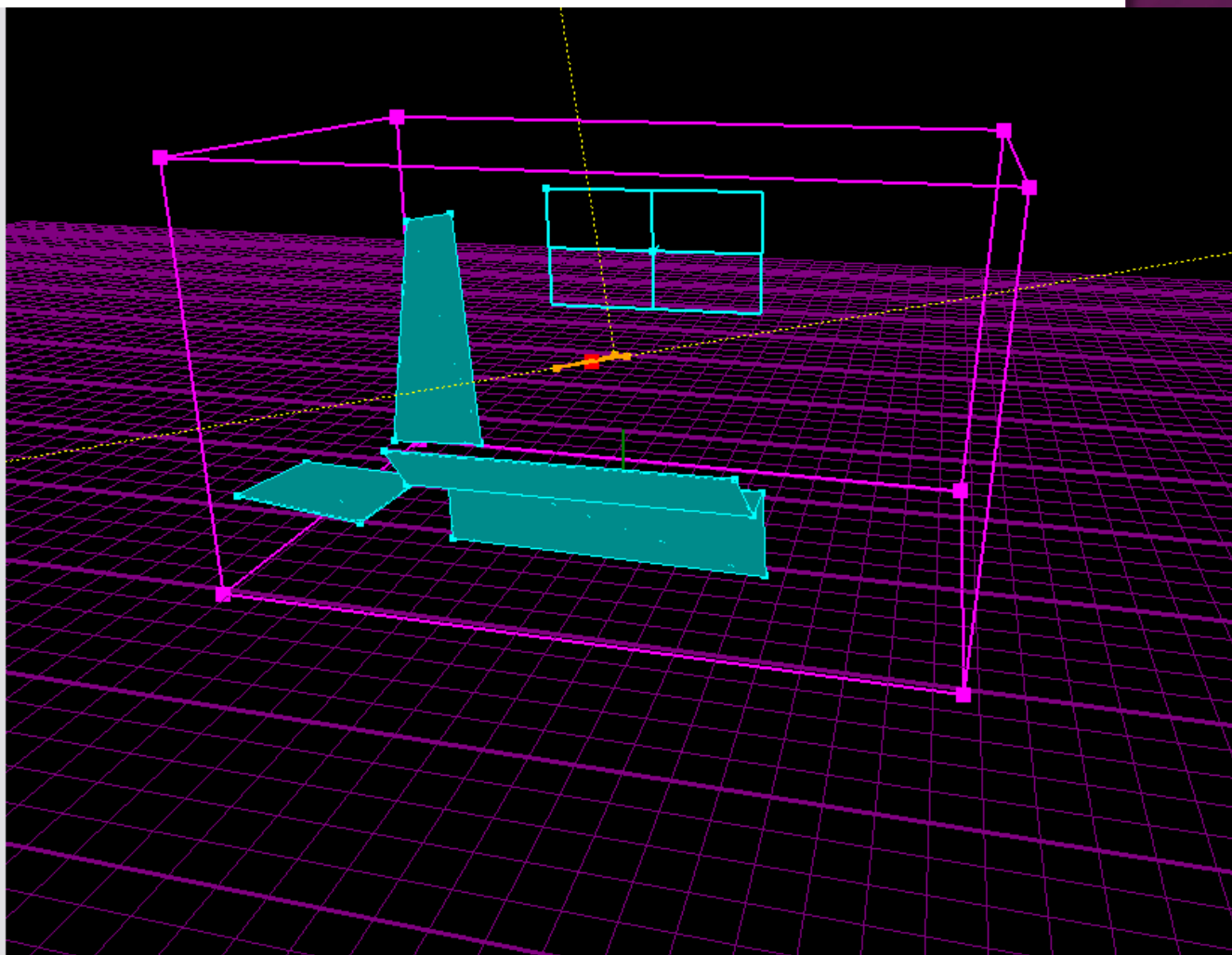
- Vicon Input Module

Presences

- Presences
 - Pencil
 - IsVisible
 - Confidence
 - LastUpdate
 - Location
 - IsVisible
 - Confidence
 - LastUpdate
 - Location
 - Velocity
 - Acceleration
 - Motion

Data Value

homespace.Pencil.Location.Location
Vector3
X: 1,521.49 Y: 1,128.33 Z: -113.06



VISUALIZING RELATIONS

The image shows a 3D visualization environment with a red wireframe bounding box and a yellow pencil object. A red arrow points from the pencil to the 'Relation Visualizer' panel on the right.

Modules

- Vicon Input Module

Presences

- homespace
 - Displays
 - Smartboard
 - Volumes
 - Couch
 - CouchTable
 - ShelfWithPictures
 - Devices
 - Presences
 - Pencil

Relation Visualizer

Pres. A: Pencil

Pres. B: Smartboard

Relation: Pointing

Index: Forward

Property	Value
PointsAt	True
PointsToward	True
Distance	1,796.40
IsTouching	False
Intersection	-392.95, 1,606.91, 266.64
Intersect.Angle	83.20 Degrees
DisplayCoordinates	{X=336,Y=212}
LocalCoordinates	0.25, 0.28, 0.00

HOMESPACE SUMMARY

○ Startup Procedure

- Turn on Machine + Display(s)
- Turn on Ultranet (switch on back)
- Run Vicon Nexus
- Load Subjects
- Run ProximityServer
- Connect ProximityServer to Nexus

○ Shutdown Procedure

- Turn off Ultranet
- Turn off Display(s)

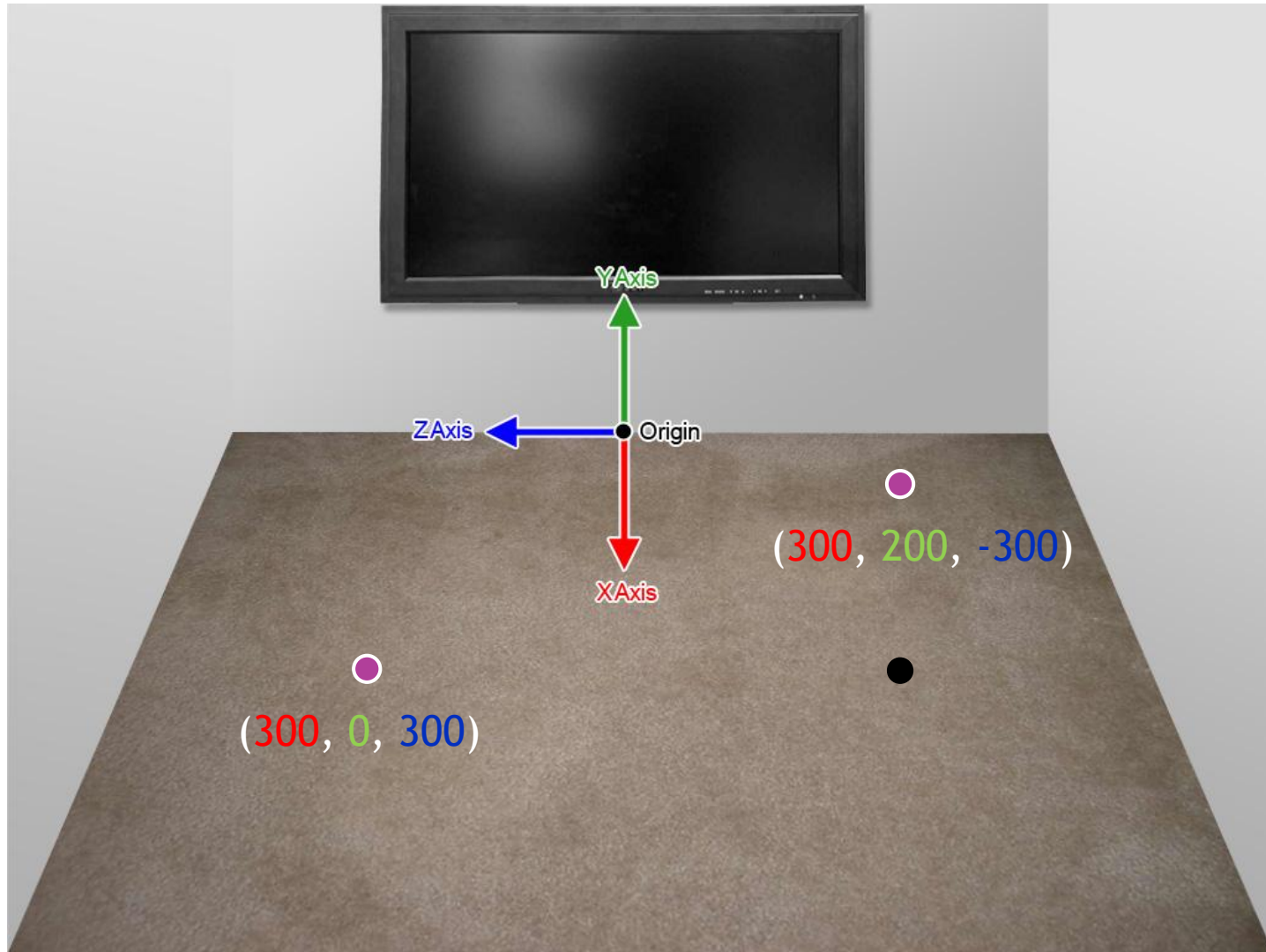


PROXEMIC DATA

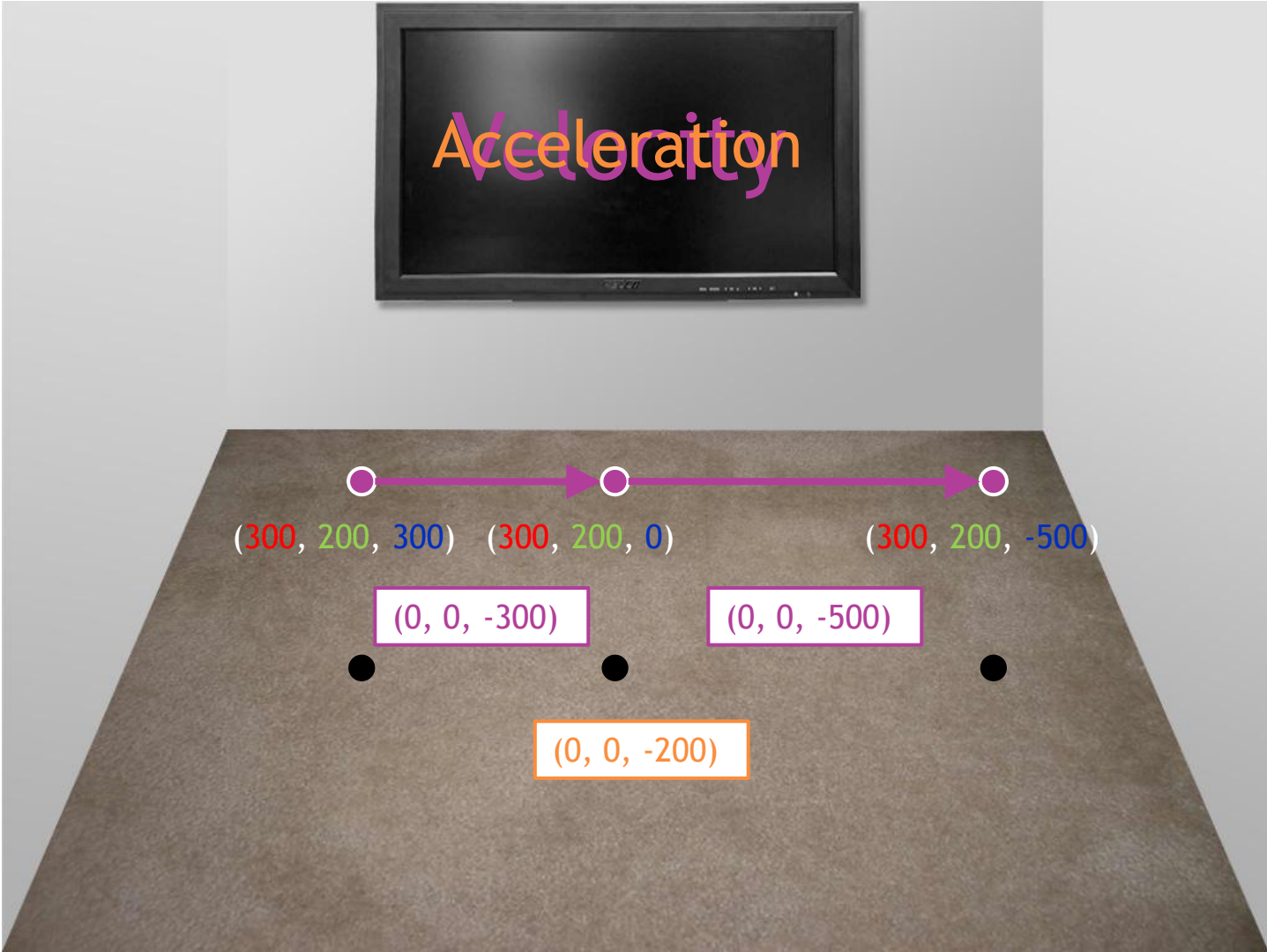
PROXEMIC DATA

- ◉ Identity Base
- ◉ Decorator Data Model
 - Different Inputs = Different Data
- ◉ Optional Groups of Data
 - Location
 - Motion
 - Orientation
 - Direction
 - Rotation
- ◉ Certainty

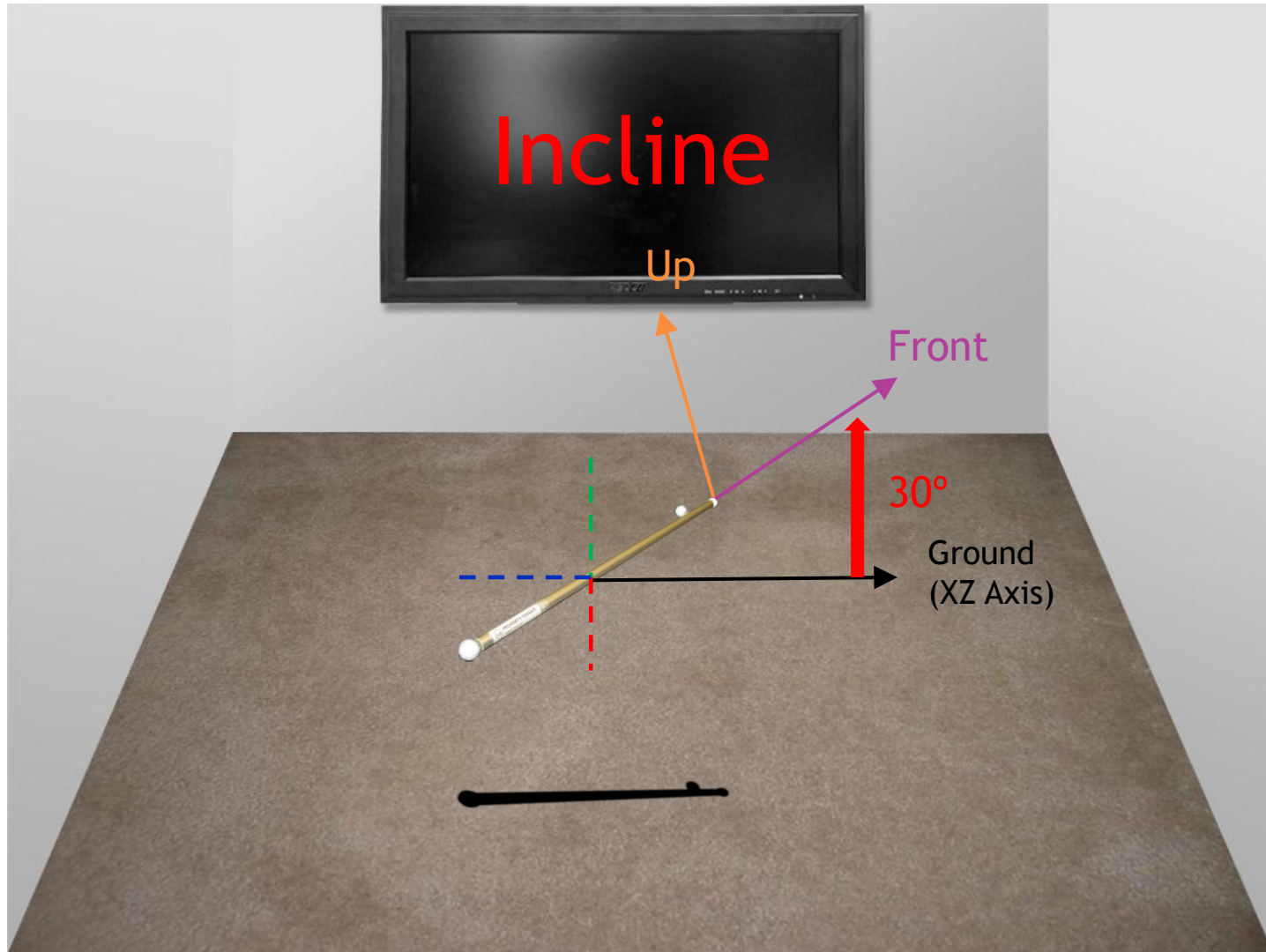
LOCATION



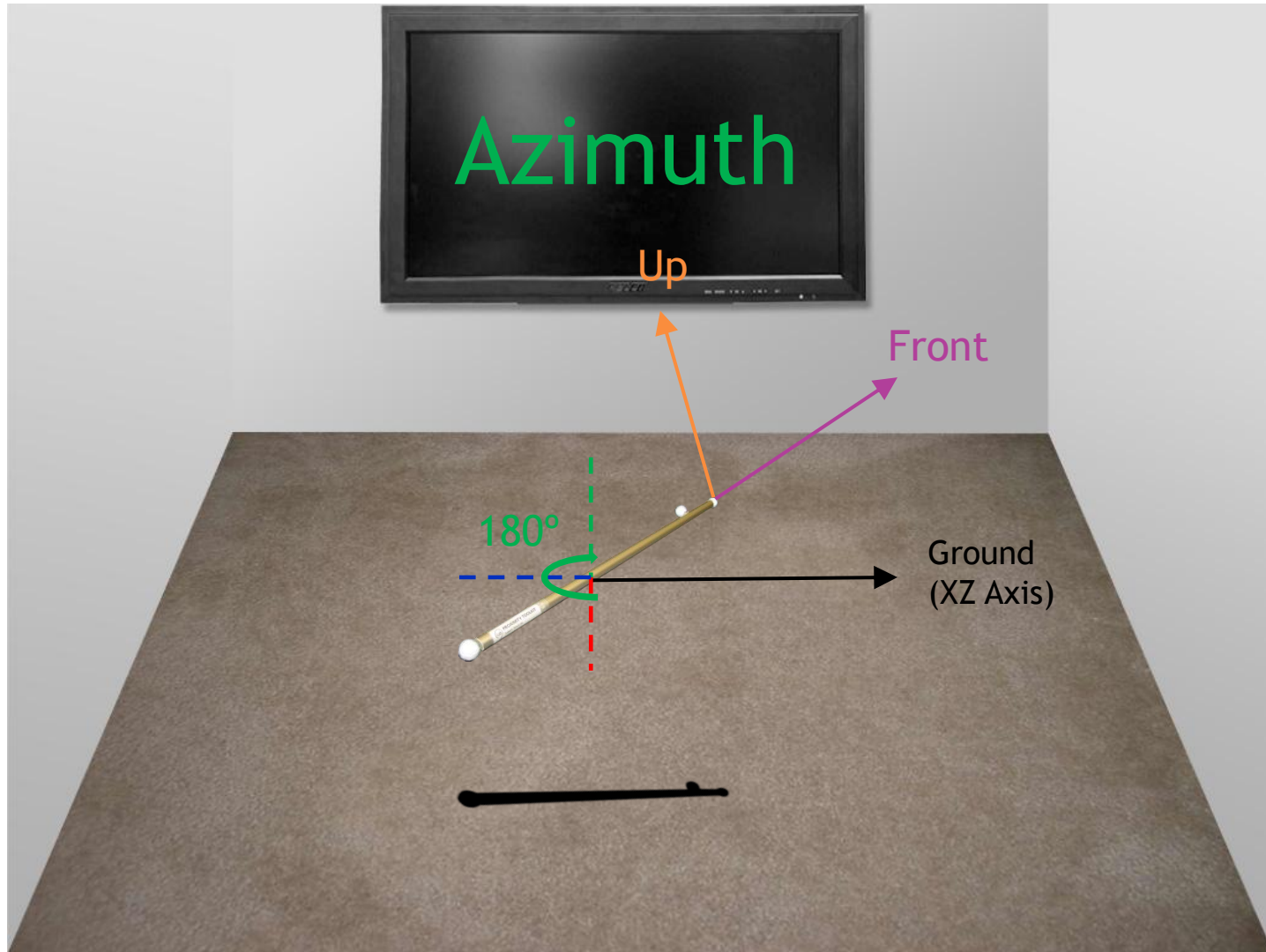
MOTION



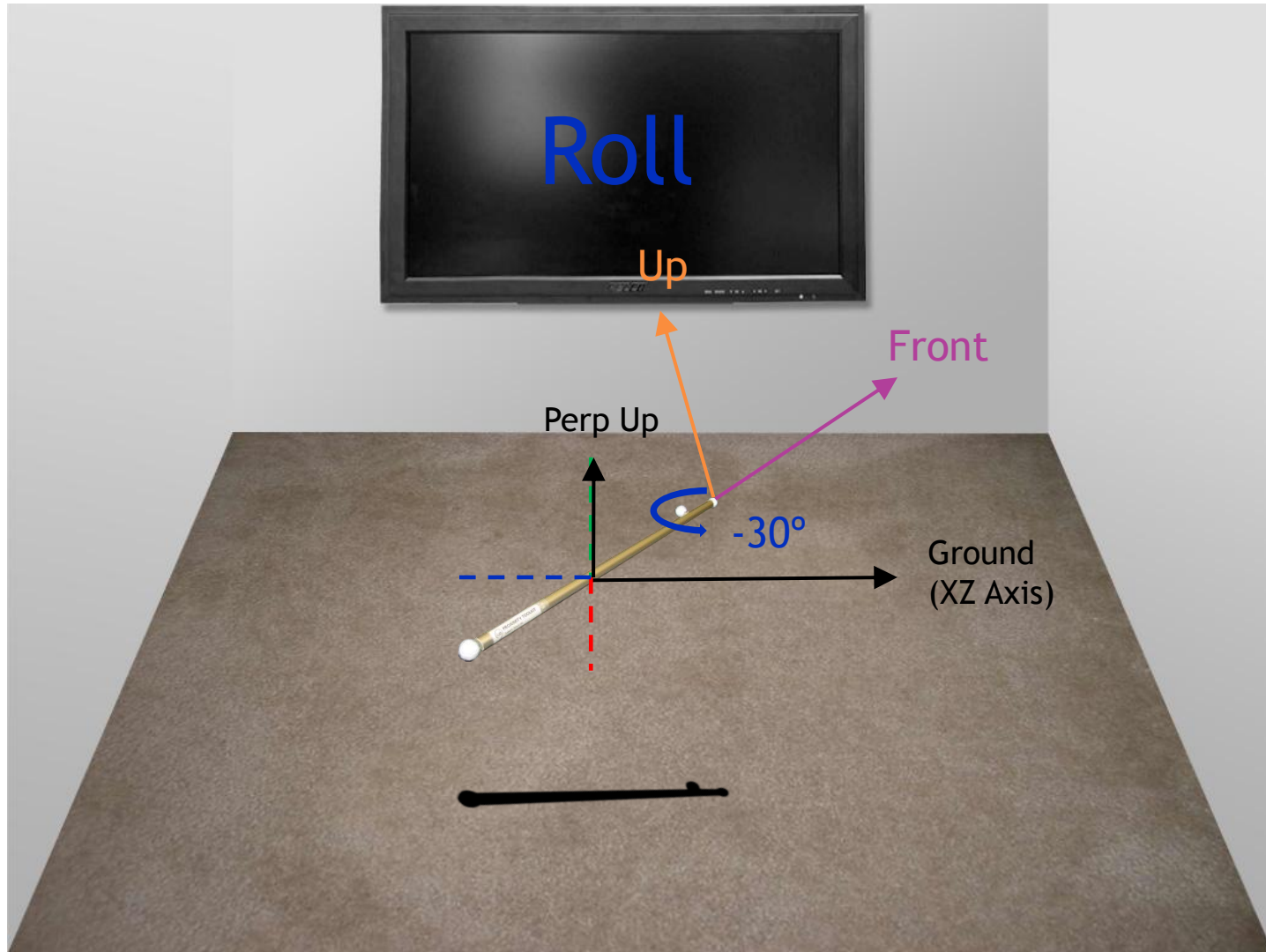
ORIENTATION



ORIENTATION



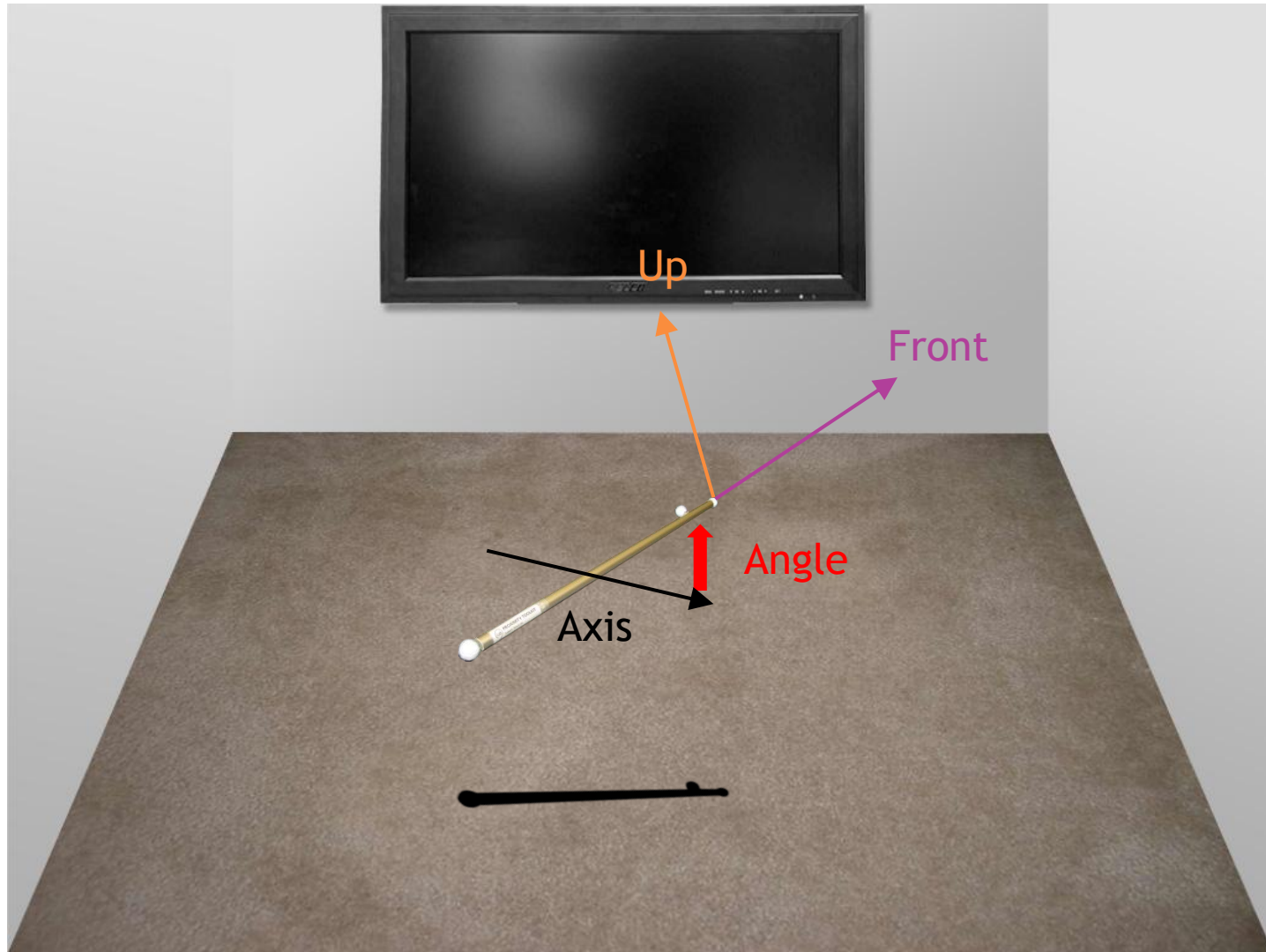
ORIENTATION



DIRECTION

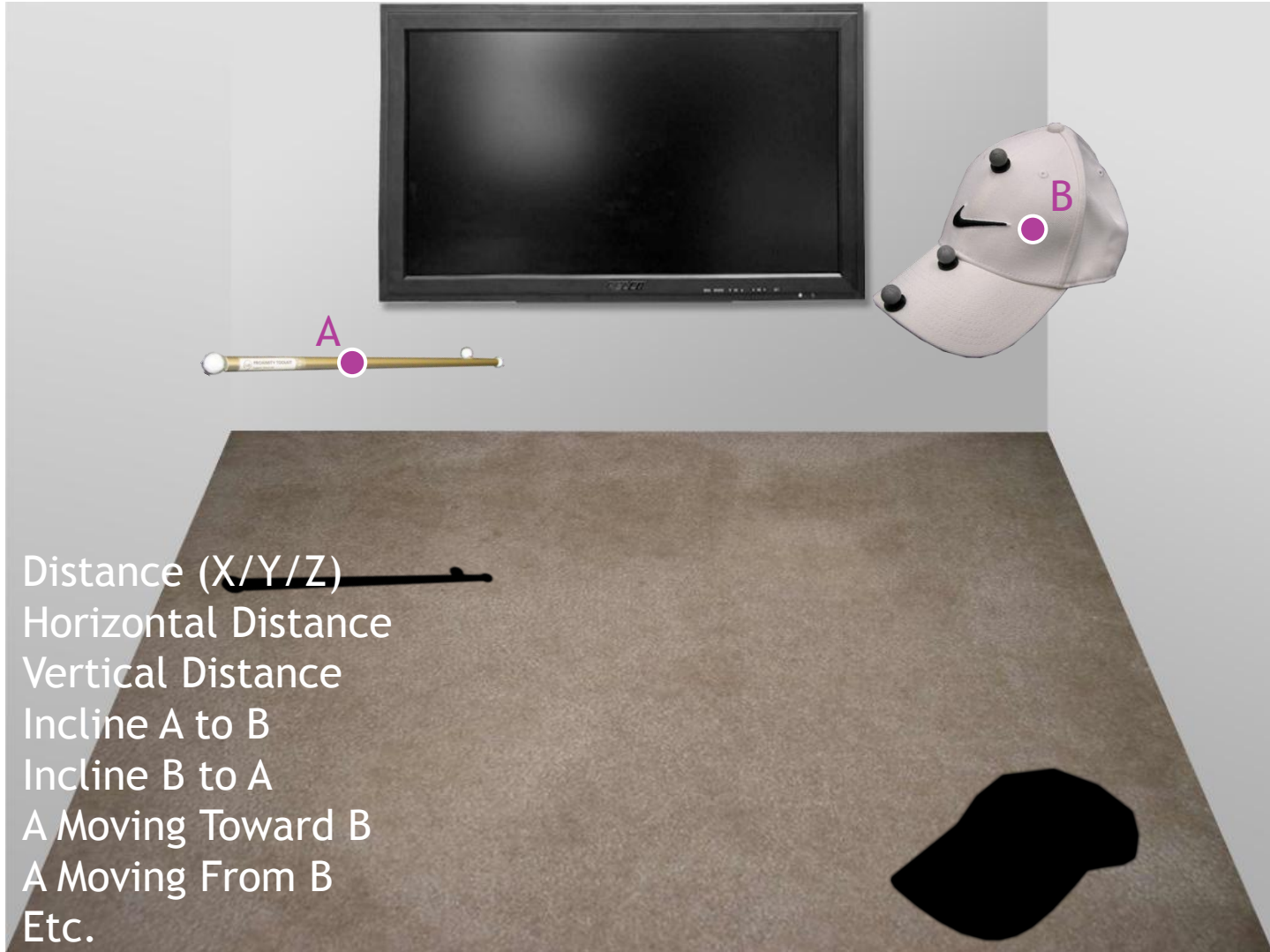
- ⦿ Simplification of Orientation
 - Incline
 - Azimuth
 - NO Roll
- ⦿ Anything Orientable is Directable
- ⦿ Used for Pointers

ROTATION



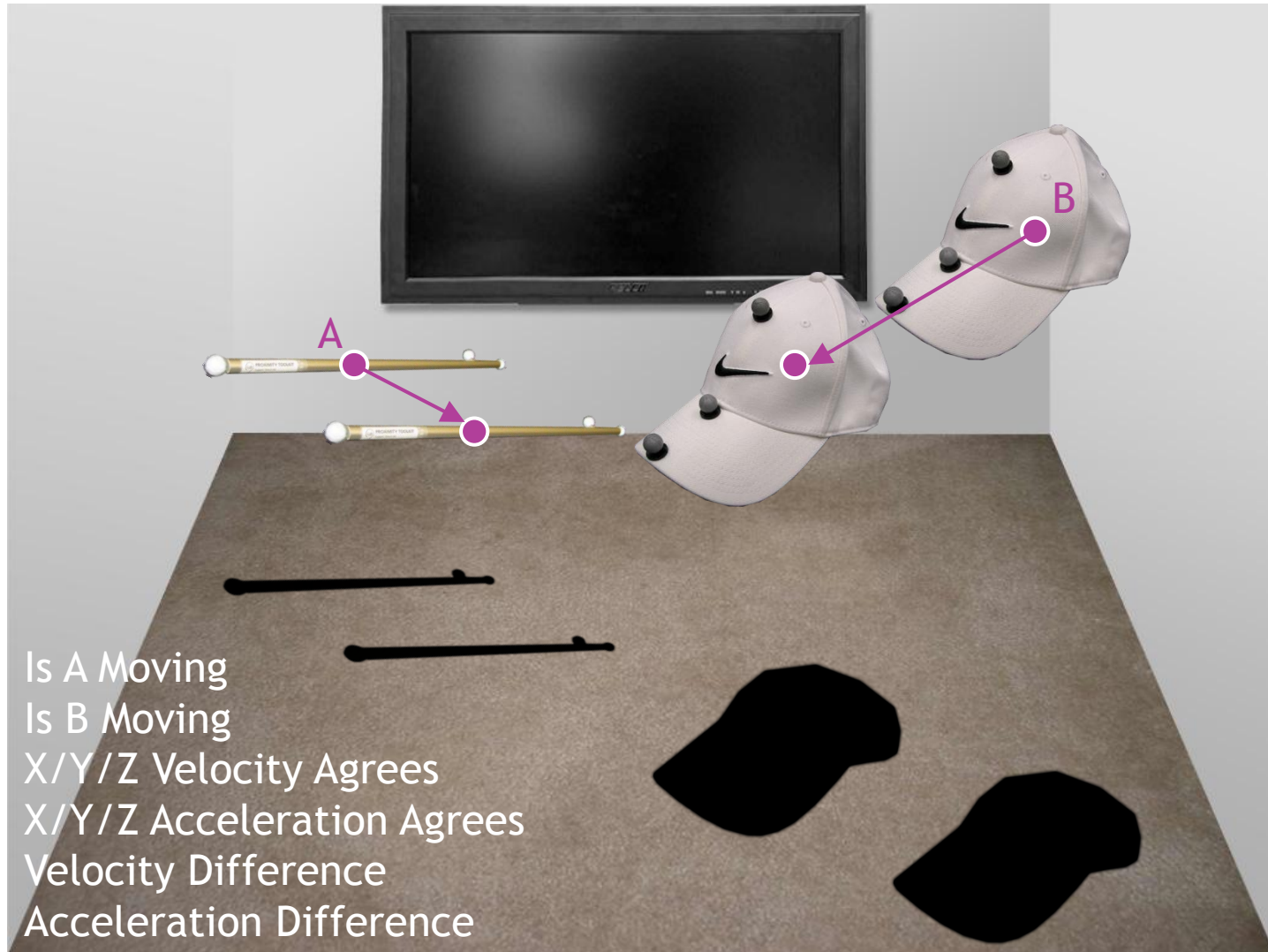
PROXEMIC RELATION DATA

- Client-Side Calculation on Request
- Relation Types
 - Location
 - Motion
 - Orientation
 - Direction
 - Rotation
 - Pointing
 - Collision

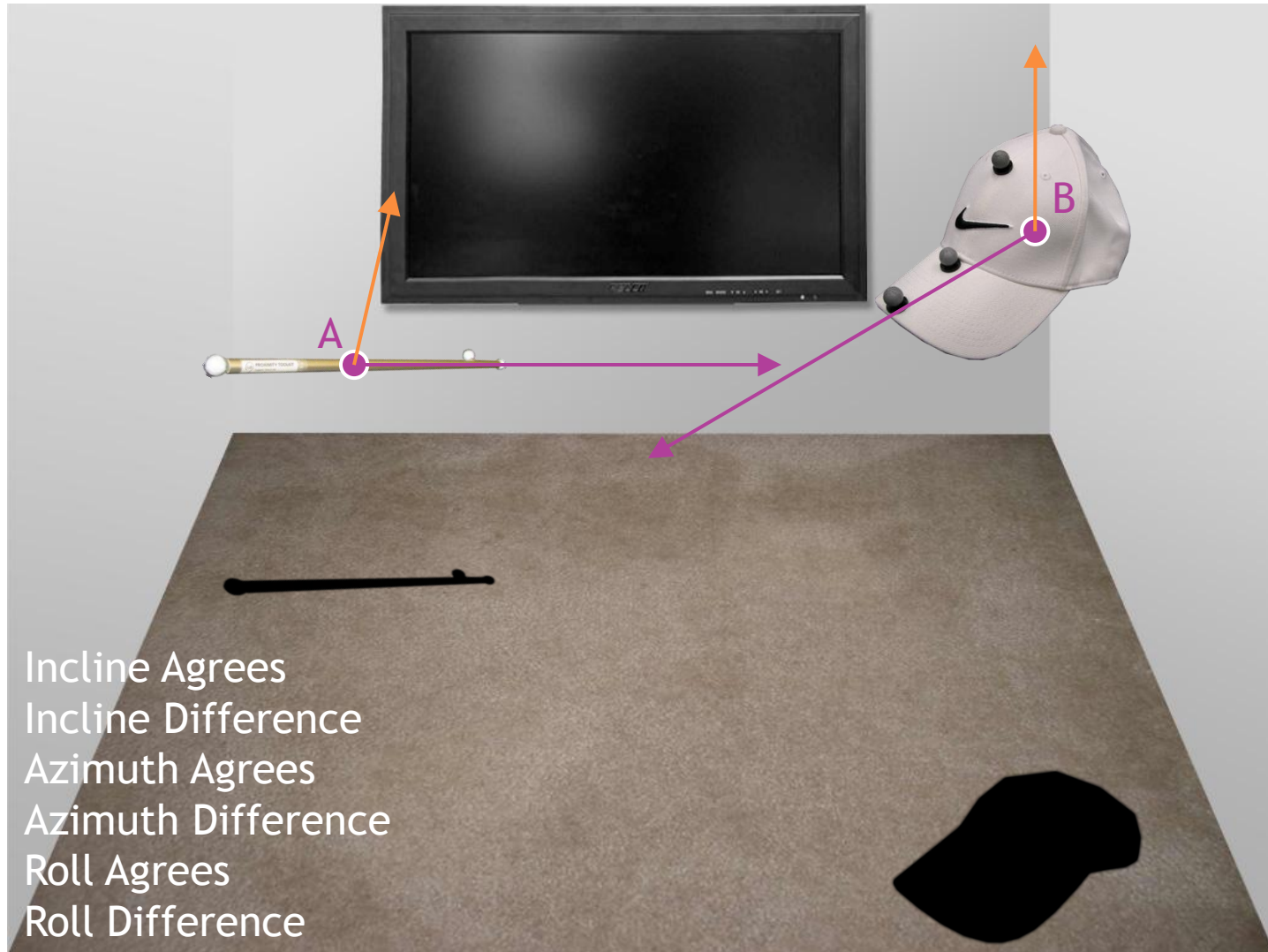


Distance (X/Y/Z)
Horizontal Distance
Vertical Distance
Incline A to B
Incline B to A
A Moving Toward B
A Moving From B
Etc.

MOTION RELATION

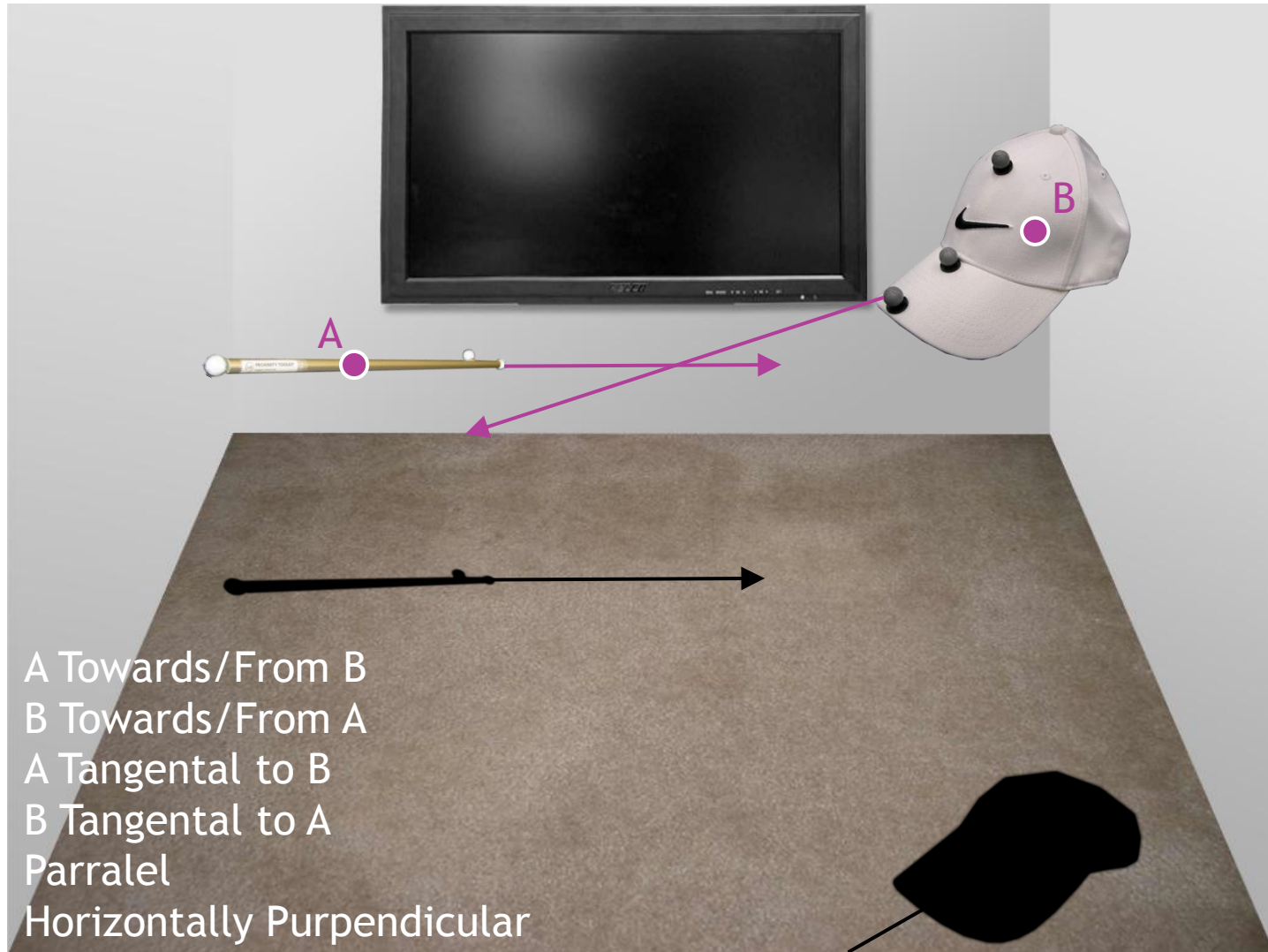


ORIENTATION RELATION



Incline Agrees
Incline Difference
Azimuth Agrees
Azimuth Difference
Roll Agrees
Roll Difference

DIRECTION RELATION



A Towards/From B

B Towards/From A

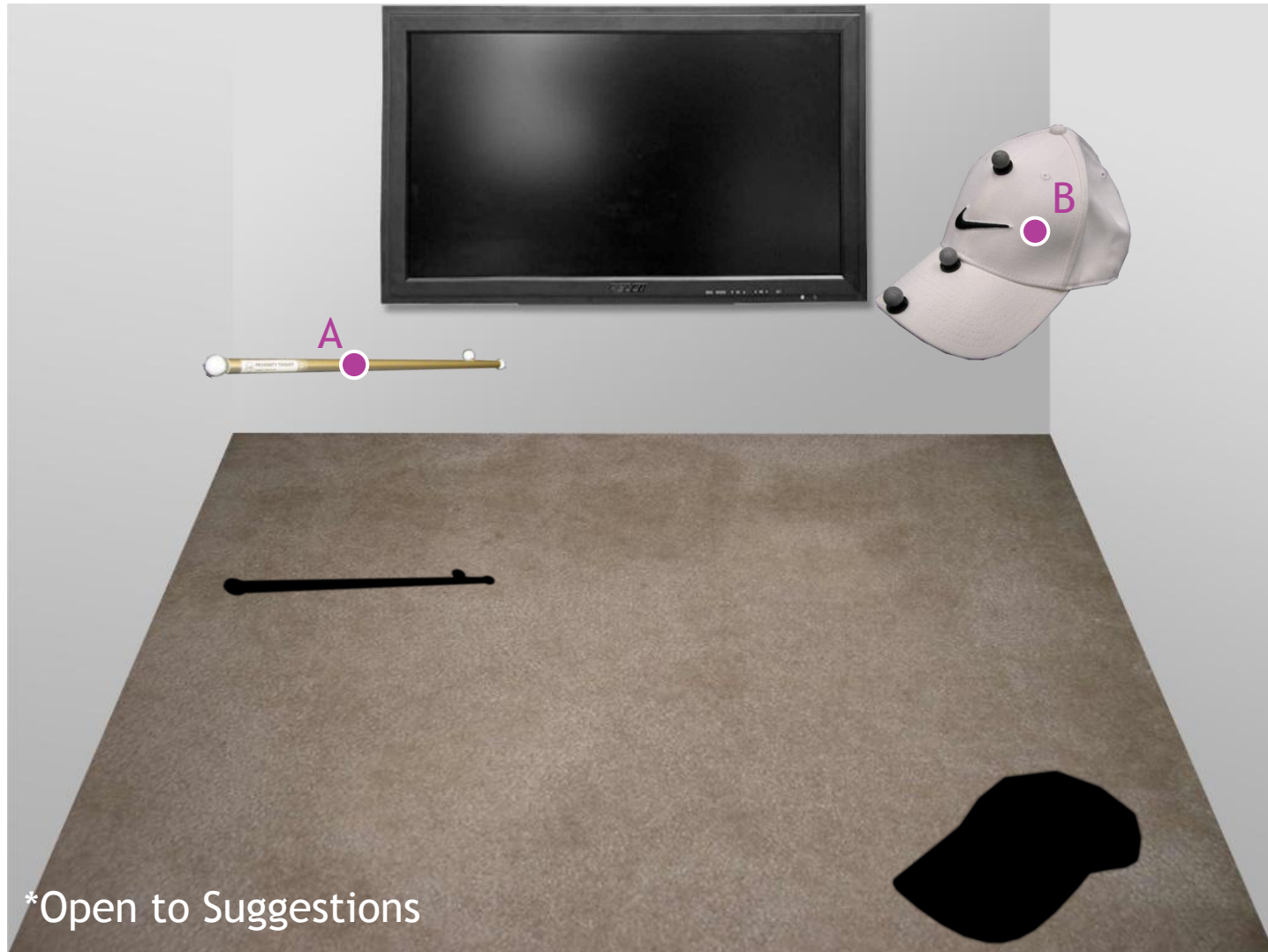
A Tangental to B

B Tangental to A

Parralel

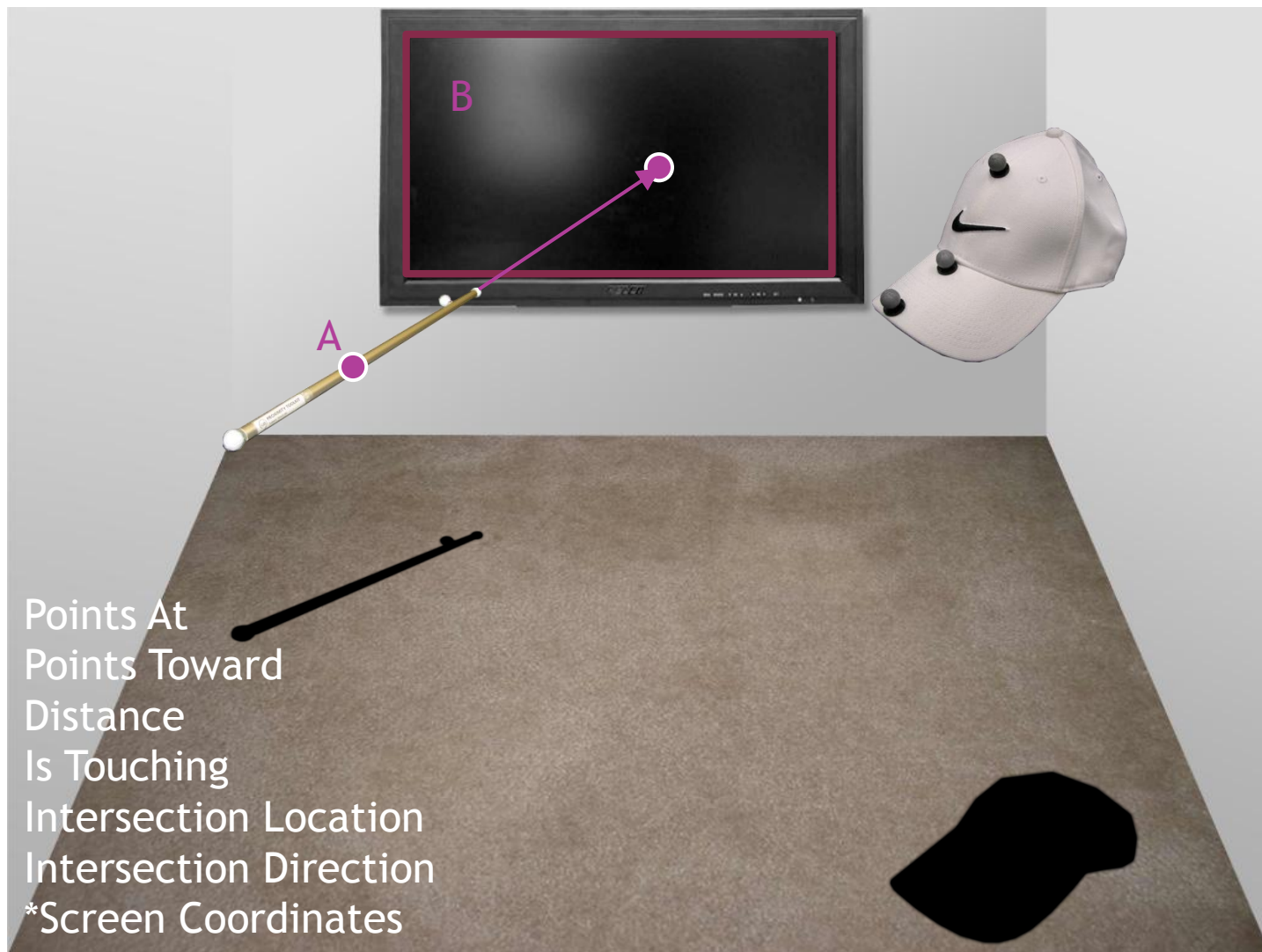
Horizontally Purpendicular

ROTATION RELATION

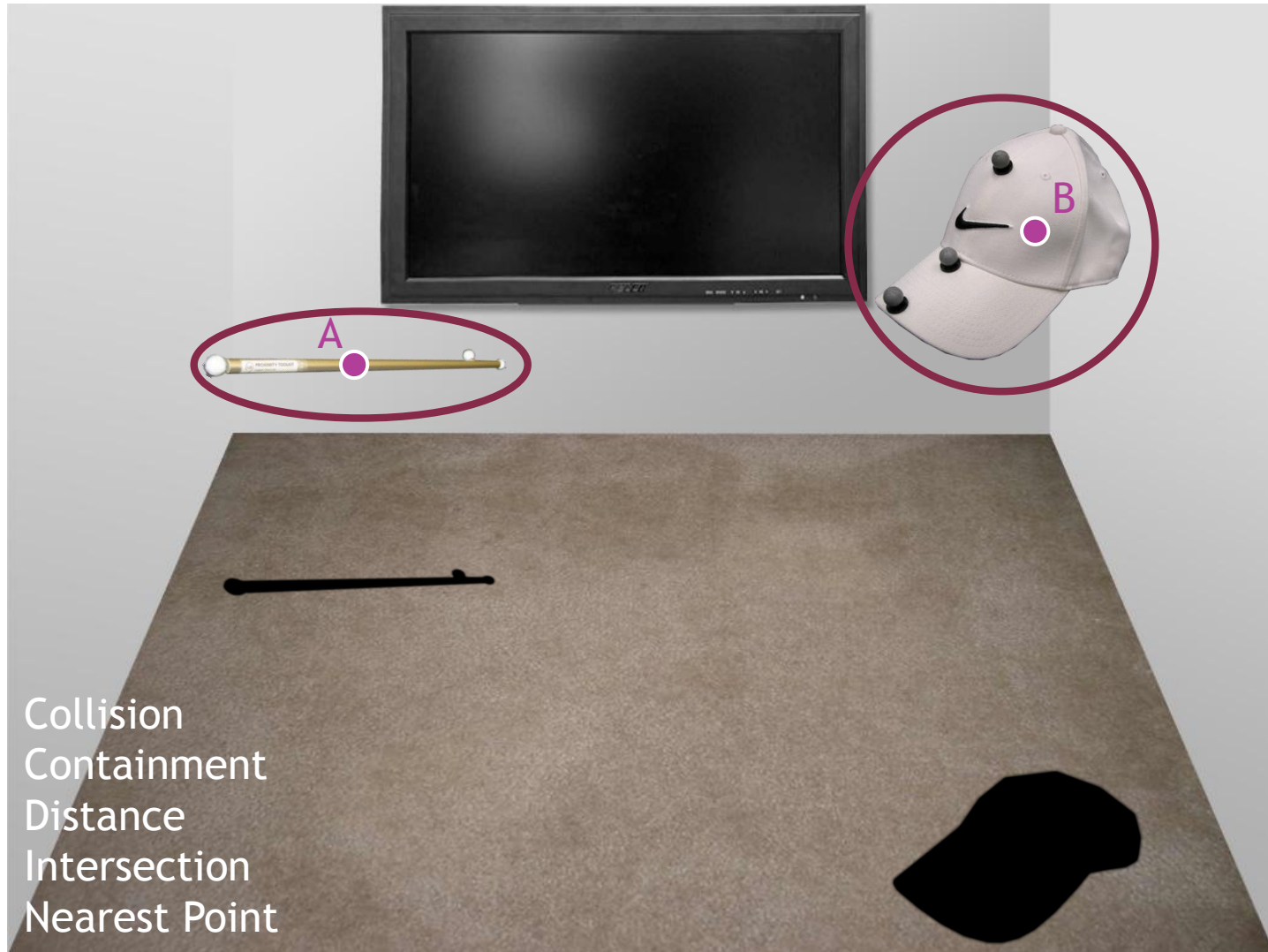


*Open to Suggestions

POINTING RELATION



COLLISION RELATION



USING THE TOOLKIT

ADDING REFERENCES

- Proximity Toolkit Installation
 - C:/Program Files/ProximityToolkit
- Windows Forms
 - ProximityToolkit.dll
 - ProximityToolkit.WinForms.dll
- WPF
 - ProximityToolkit.dll
 - ProximityToolkit.WPF.dll
 - System.Drawing

ADDING TOOLBAR ITEMS

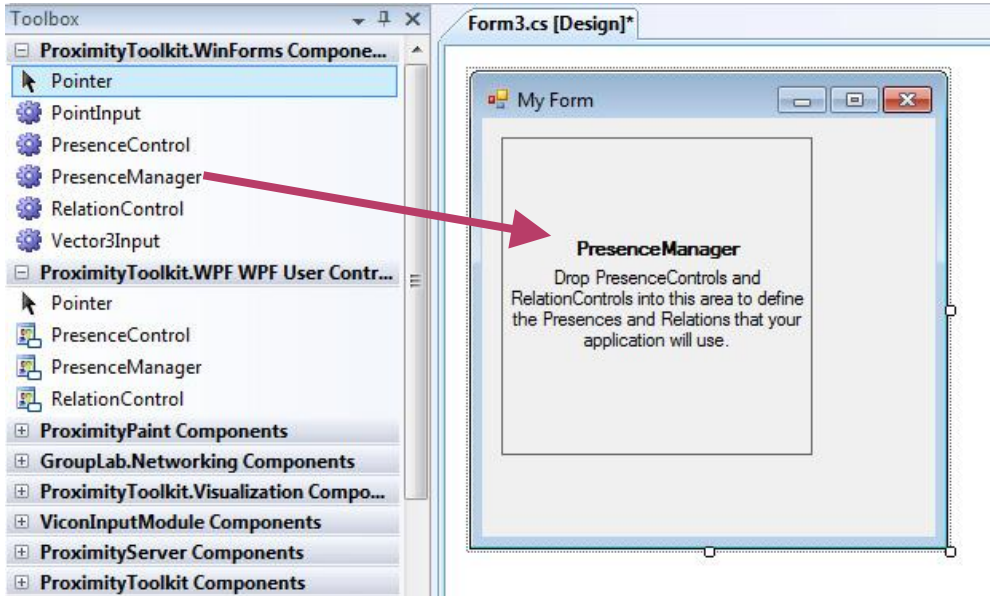
○ Add a Tab

- Right click on Toolbox
- Choose “Add Tab”
- Give Tab a name like “ProximityToolkit”

○ Add Items

- Right click on Toolbox in new tab
- Choose “Choose Items...”
- Browse for .NET components & select libraries
- Ensure the following are checked
 - PresenceManager
 - PresenceControl
 - RelationControl

WINFORMS PRESENCE MANAGER



Properties:

- IP
- Port
- AutoDismissEmbodyDialog
- MaintainEmbodiment

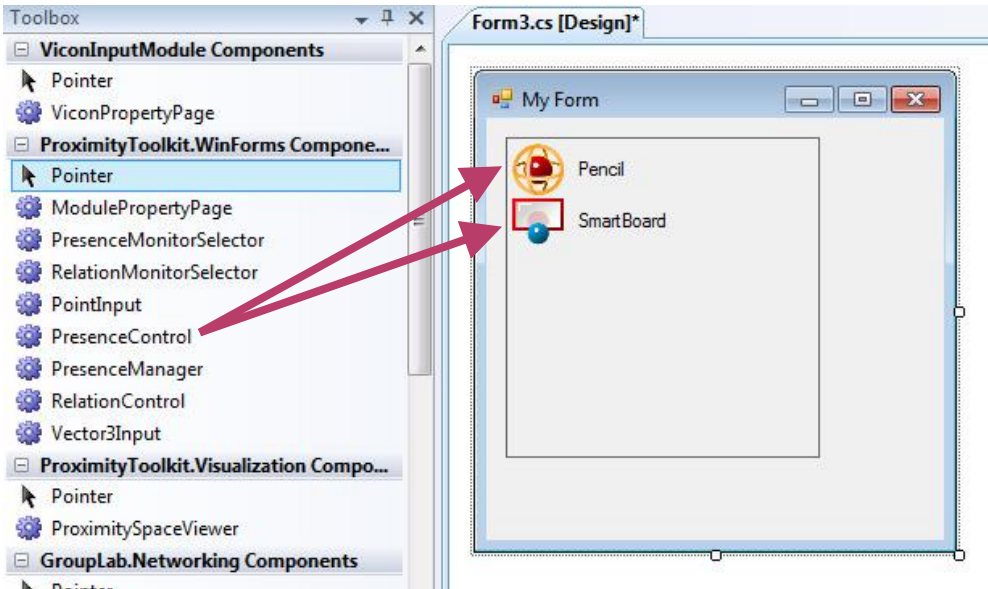
Events:

- OnConnectionDropped(Asynch)
- OnStarted(Asynch)
- OnStopped(Asynch)
- OnReadyChanged(Asynch)
- OnUpdating(Asynch)
- OnDataUpdated(Asynch)
- OnUpdated(Asynch)

```
public Form3 ()
{
    InitializeComponent ();
    presenceManager1.Start ();
}

private void Form3_Load(object sender, EventArgs e)
{
    if (!presenceManager1.IsStarted)
    {
        Application.Exit ();
        return;
    }
}
```

WINFORMS PRESENCE CONTROLS



Properties:

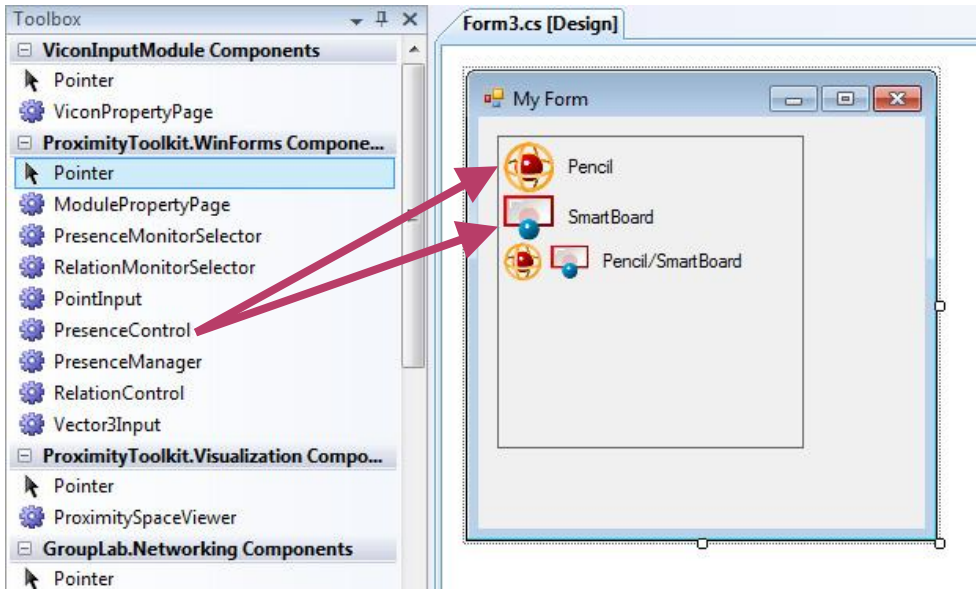
- PresenceName
- PresenceType
- Monitor
- IsOptional
- CustomImage

Events:

- OnLocationUpdated
- OnDirectionUpdated
- OnOrientationUpdated
- OnRotationUpdated
- OnMotionUpdated
- OnUpdated

- Set PresenceName (match ProximityServer)
- Set PresenceType
 - (Presence/Display/Volume/Device)
- Set Monitor
 - None, Location, Direction, Orientation, Rotation, Motion, All
- Set IsOptional / CustomImage

WINFORMS RELATION CONTROLS



Properties:

- A
- B
- Monitor

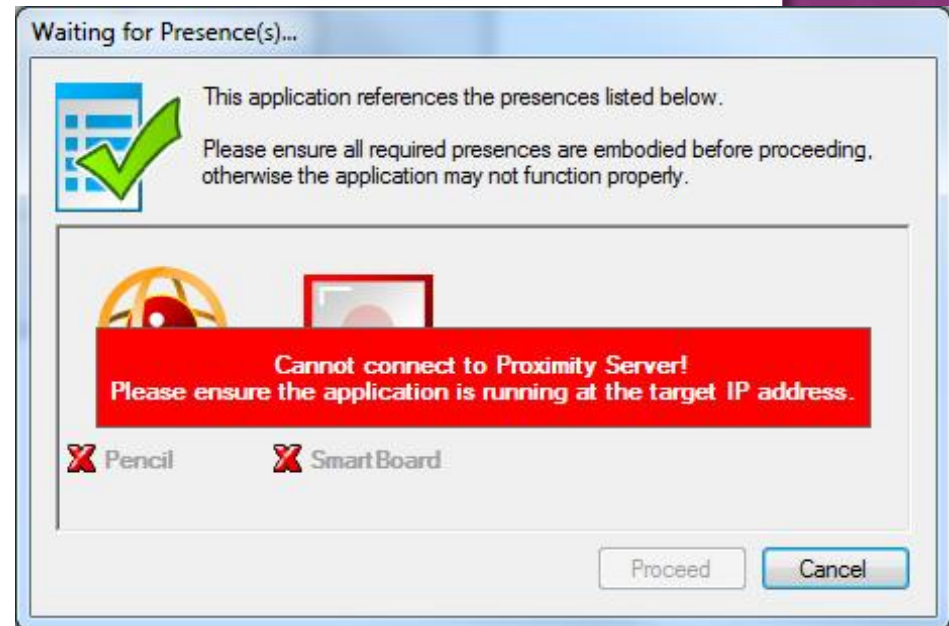
Events:

- OnLocationUpdated
- OnDirectionUpdated
- OnOrientationUpdated
- OnRotationUpdated
- OnMotionUpdated
- OnCollisionUpdated
- OnPointingUpdated
- OnUpdated

- Set A to a Presence Control
- Set B to a Presence Control
- Set Monitor
 - None, Location, Direction, Orientation, Rotation, Motion, Collision, Pointing, All

EMBODIMENT DIALOG

- Appears on Program Startup
- Availability Verification
 - Connection
 - Presences



WPF DIFFERENCES

- PresenceManager not a container
 - Can organize with Stack Panel, set to Hidden
- PresenceControl
 - Monitors are bool properties
 - MonitorLocation, MonitorDirection, etc.
- RelationControl
 - Monitors are bool properties
 - MonitorPointing, MonitorCollision, etc.
 - Must specify NameA and NameB

GUI-INDEPENDENT SUPPORT

- ◉ ProximityClientConnection
- ◉ PresenceBase for Presences
 - Space.GetPresence(“name”),
.GetDisplay(“name”), .GetVolume(“name”),
.GetDevice(“name”)
 - DataUpdating/DataUpdated events
 - GetRelationInterface for types ILocatable,
IMovable, IOrientable, IDirectable, etc.
- ◉ RelationPair for Relations
 - Same Events as RelationControl, all Asynch

HELP & RESOURCES

HELP AND RESOURCES

- Cookbook Page

- <http://grouplab.cpsc.ucalgary.ca/cookbook>
- Reference

- E-Mail

- rob.diazmarino@gmail.com

THE END
(DEMO TIME?)