

GOT PERCEPTION?

USC / Institute for Creative Technologies

MRE Perception Squad

Youngjun Kim

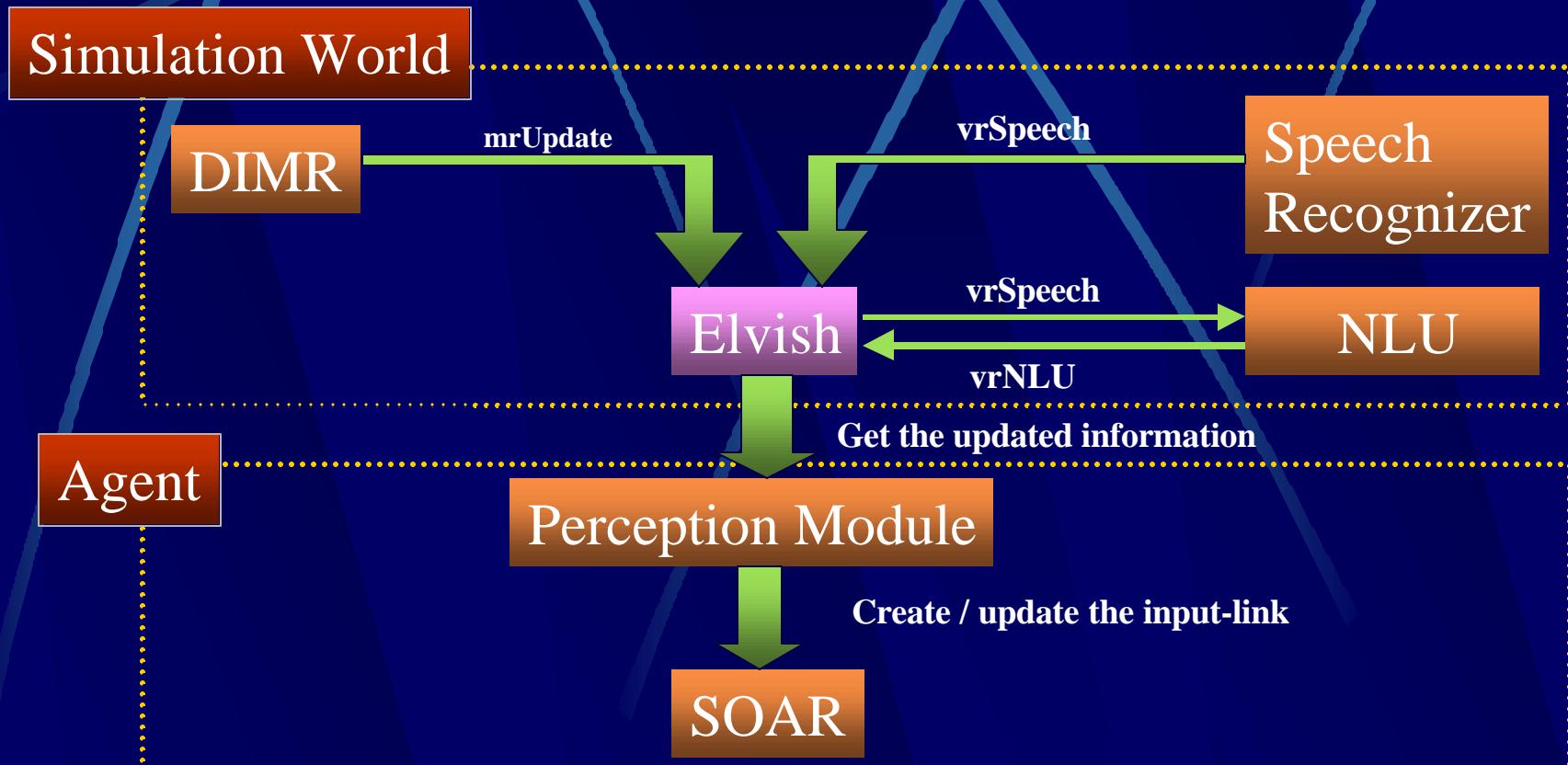
Dr. Randall W. Hill, Jr.

Dr. Michael van Lent

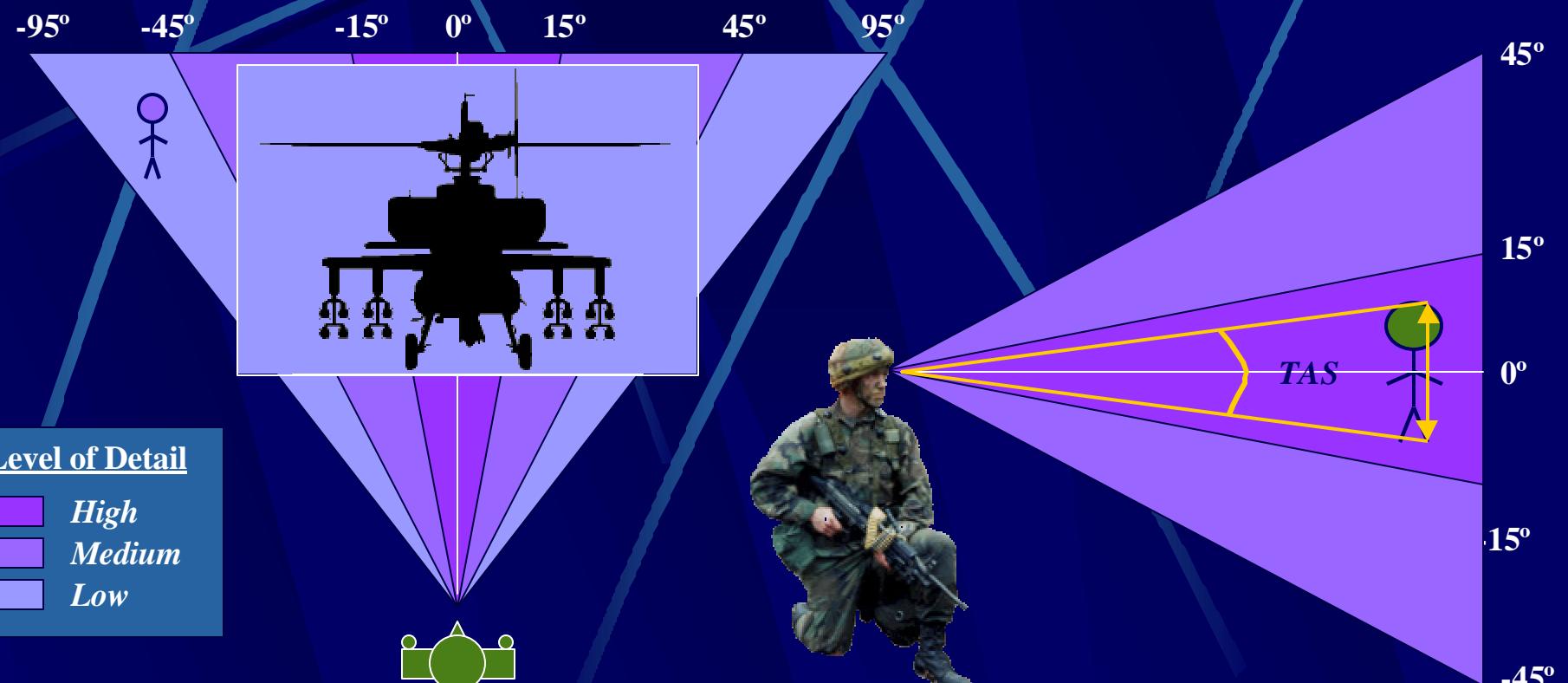
Changhee Han

{yjkim,hill,vanlent,hanc}@ict.usc.edu

Overall Perception Architecture in MRE



Synthetic Vision of Agents



Top-down View

Side View

- Synthetic vision: the simulated vision for a virtual agent / actor.
- With synthetic vision, we don't need to address the problems of recognition and interpretation of 2D images
- TAS: Target Angular Size

The Sensory Info of an agent

	LOD (High)	LOD (Medium)	LOD (Low)	Speech Event	Aural Event
identifier	*				
type	*	*	*	*	*
gender	*	*		*	
age	*	*		*	
rank	*				
social-role	*	*			
stance	*	*			
focus-of-attention	*				
health-status	*				
speech-input	*	*	*	*	
aural	*	*	*		*
facial-expression	*				
location	*	*	*	*	*
speed	*	*	*		*
velocity	*	*	*		
body-orientation	*	*	*	*	*
head-orientation	*	*	*	*	*
angle-off	*	*	*	*	*
closing-velocity	*	*	*		
lateral-range	*	*	*	*	*
lateral-sep	*	*	*	*	*
slant-range	*	*	*	*	*
body-target-aspect	*	*	*	*	*
head-target-aspect	*	*	*	*	*

: If the object is not in the visual field of view, the values in the area will have the error bound 4

Synthetic Audition



Situation 1: Humvee is approaching

I am hearing a *quiet* sound (40 dB) that seems like a moving “vehicle” or something

```
^input-link <il>  
<il> ^vehicle.aural <va>  
<va> ^volume-level 40  
    ^audible yes  
    ^loudness quiet
```

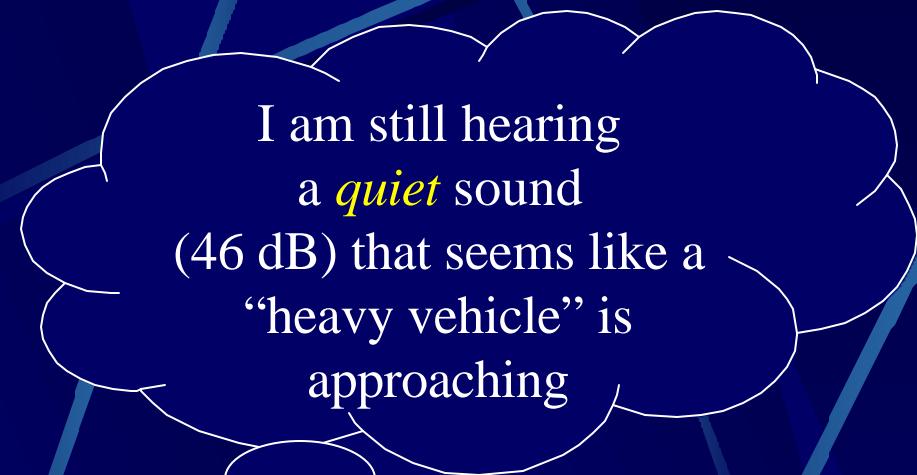


100 m

Driving: 80 dB SPL



Situation 1: Humvee is approaching



`^input-link <il>
<il> ^vehicle.aural <va>
<va> ^volume-level 46
^audible yes
^loudness quiet`



50 m

Driving: 80 dB SPL



sergeant

Situation 1: Humvee is approaching

I am hearing a *normal* sound (52 dB) that seems like a “heavy humvee” is approaching

```
^input-link <il>  
<il> ^vehicle.aural <va>  
<va> ^volume-level 52  
    ^audible yes  
    ^loudness normal
```



Driving: 80 dB SPL



25 m

sergeant

Situation 1: Humvee is approaching

I am hearing a *loud* sound (74 dB) that seems like a “humvee” is next to me. Hey, Stop! Oops. It’s the LT.

```
^input-link <il>  
<il> ^vehicle.aural <va>  
<va> ^volume-level 74  
    ^audible yes  
    ^loudness loud
```



Driving: 80 dB SPL



2 m

sergeant

Situation 2: "Sir, I can't hear you!"

Flying Helicopter: 120 dB SPL



200 m

- Total SPL: 74
- SPL of LT: 58
- SPL of Helicopter: 74
- Since SPL of LT is 15 SPL less than Total SPL, Sergeant can not hear the voice of LT (the masking sound is the sound of Helicopter)

Normal Speech: 65 dB SPL

Sergeant, Secure the area!

crowd



sergeant

Sir, I can't hear you
because of the helicopter!
and the bleeping crowd..

2.19 m

`^input-link <il>
<il> ^vehicle.aural <va>
<va> ^volume-level 74
 ^audible yes
^human.speech-input <h>
<h> ^ sound-pressure-level 58
 ^audible no`



nt

Next Step: Attention Mechanism

- Top-down attention
 - Task oriented attention
 - Jeff Rickel
- Bottom-up attention
 - Loud noise, movement, bright color...
 - Youngjun Kim
- Integration of top-down and bottom-up

Nuggets and Coal

- Nuggets
 - Physiological model of human perception
 - Vision
 - Audition
 - Integrated with MRE
- Coal
 - Not used by every aspect of MRE
 - Currently top-down attention only