

# GOT PERCEPTION?

**USC / Institute for Creative Technologies**

**MRE Perception Squad**

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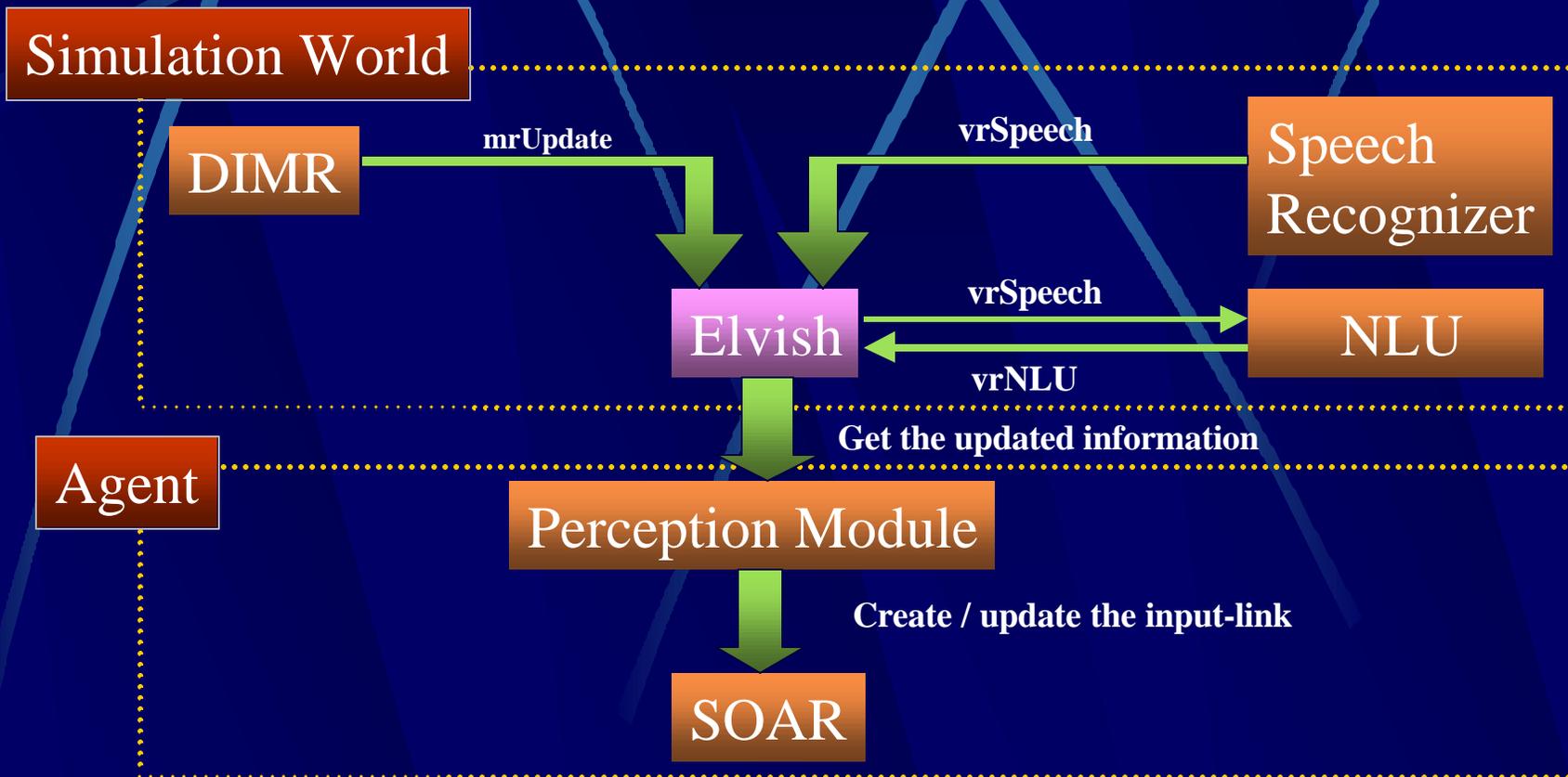
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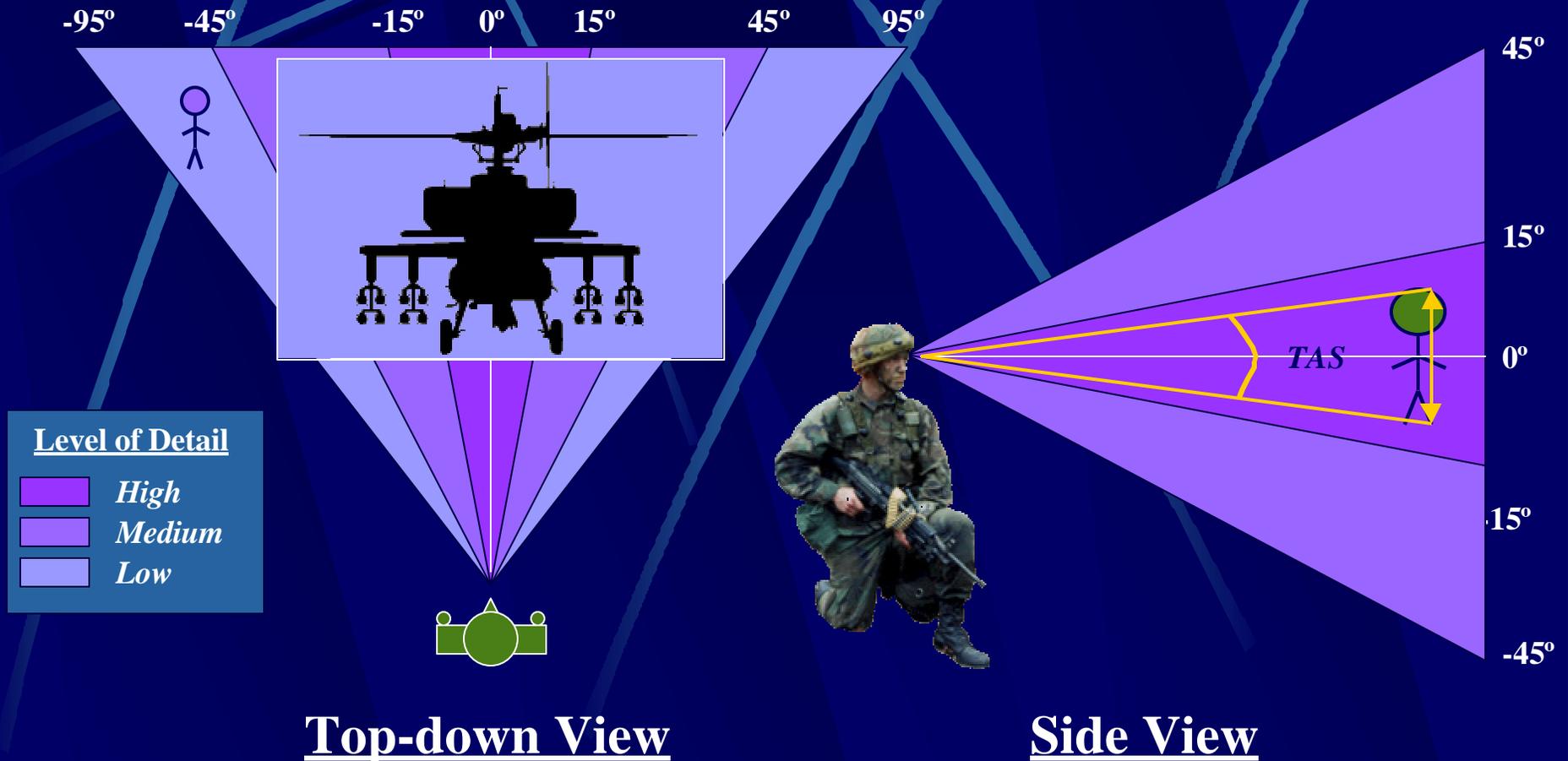
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# Overall Perception Architecture in MRE



# Synthetic Vision of Agents



- 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
```



sergeant

100 m

Driving: 80 dB SPL



# Situation 1: Humvee is approaching

I am still hearing  
a *quiet* sound  
(46 dB) that seems like a  
“heavy vehicle” is  
approaching

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



sergeant

50 m

Driving: 80 dB SPL



# 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
```



sergeant

25 m

Driving: 80 dB SPL



# 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
```



sergeant

Driving: 80 dB SPL

2 m



# 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)

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

Normal Speech: 65 dB SPL  
Sergeant, Secure the area!

2.19 m

crowd



sergeant

```
^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