

IV. Intelligent Behavior

- Behavior Tree Notation for medical robotics?
- Marzinotto et al., ICRA 2014

CMU Summer School 7.2014@ 11-Sept-2013 Blake Hannaford, University of Washington

1

Behavior Trees

- Video Game Industry
- Notation for composition of behaviors

CMU Summer School 7.2014 Blake Hannaford, University of Washington

2

Behavior Trees

- Root generates periodic 'tics'
- A 'pointer' designates a single active node
- At each tick the active node can return:
 - "Working"
 - "Success"
 - "Failure"
- Leaf = robotic procedure / macro / control loop

CMU Summer School 7.2014 Blake Hannaford, University of Washington

3

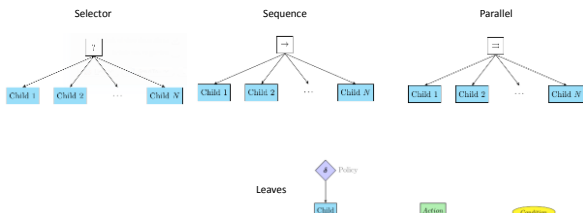
Node types

- *Selector* Pass the tick to each child in turn Return Success when first child returns Success (try each child).
- *Sequence* Pass the tick to each child in turn Return Failure when first child returns Failure (perform each child in sequence)
- *Parallel* Launch all children simultaneously Return Success when > 50% of children return Success.

CMU Summer School 7.2014 Blake Hannaford, University of Washington

4

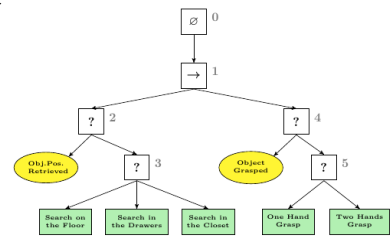
Diagrams:



CMU Summer School 7.2014 Blake Hannaford, University of Washington

5

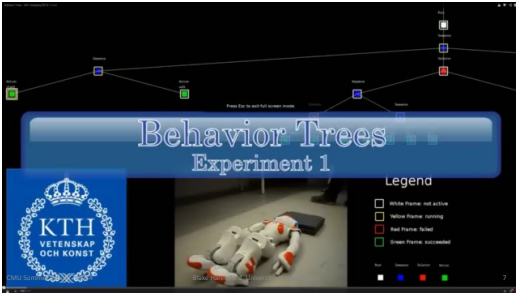
Example



CMU Summer School 7.2014 Blake Hannaford, University of Washington

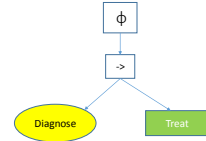
6

Marzinotto et al. Video



Behavior Trees: Medical

- Medical Behavior

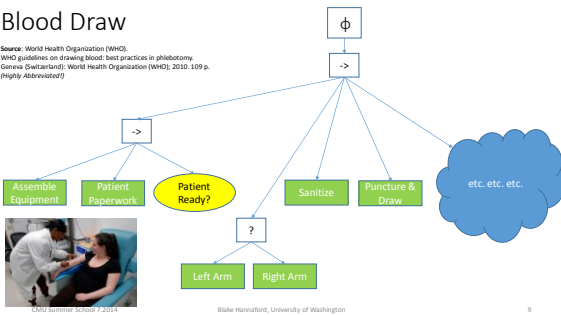


CMU Summer School 7.2014

Blake Hannaford, University of Washington

Blood Draw

Source: World Health Organization (WHO). WHO guidelines on drawing blood: best practices in phlebotomy Geneva (Switzerland): World Health Organization (WHO); 2010. 109 p. (Highly abbreviated)

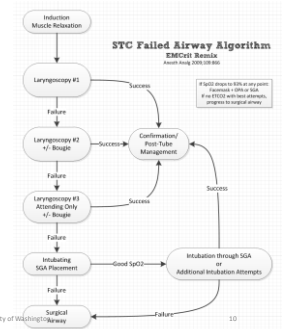


Emergency Airway Algorithm

- Source: emcrit.org (<http://emcrit.org/blogpost/s-hock-trauma-center-failed-airway-algorithm/>)

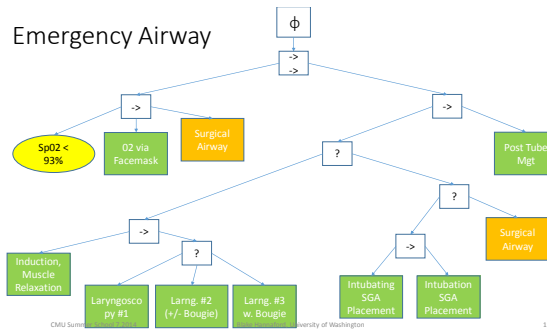


<http://orangecountyfl.net/emsref/>



Blake Hannaford, University of Washington

Emergency Airway



CMU Summer School 7.2014

Blake Hannaford, University of Washington