



Building Perceptive Robots with INTEL® EUCLID™ DEVELOPMENT KIT

Amit Moran

Perceptual Computing Systems Innovation







armed Kealistans







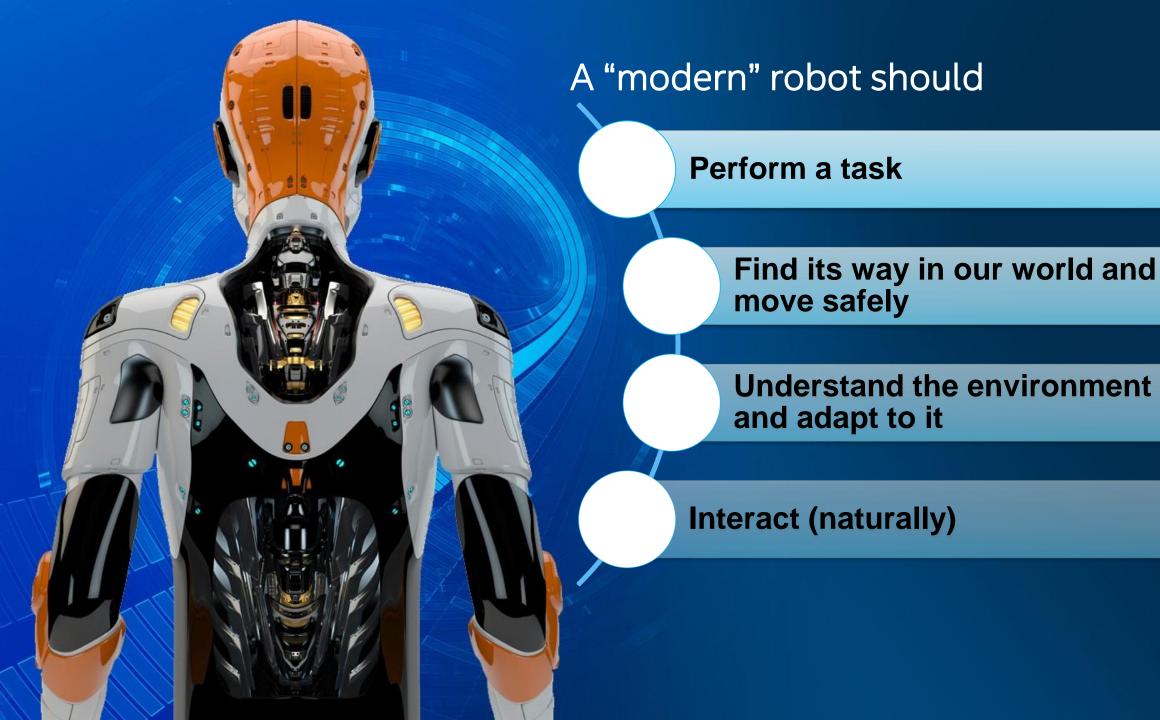




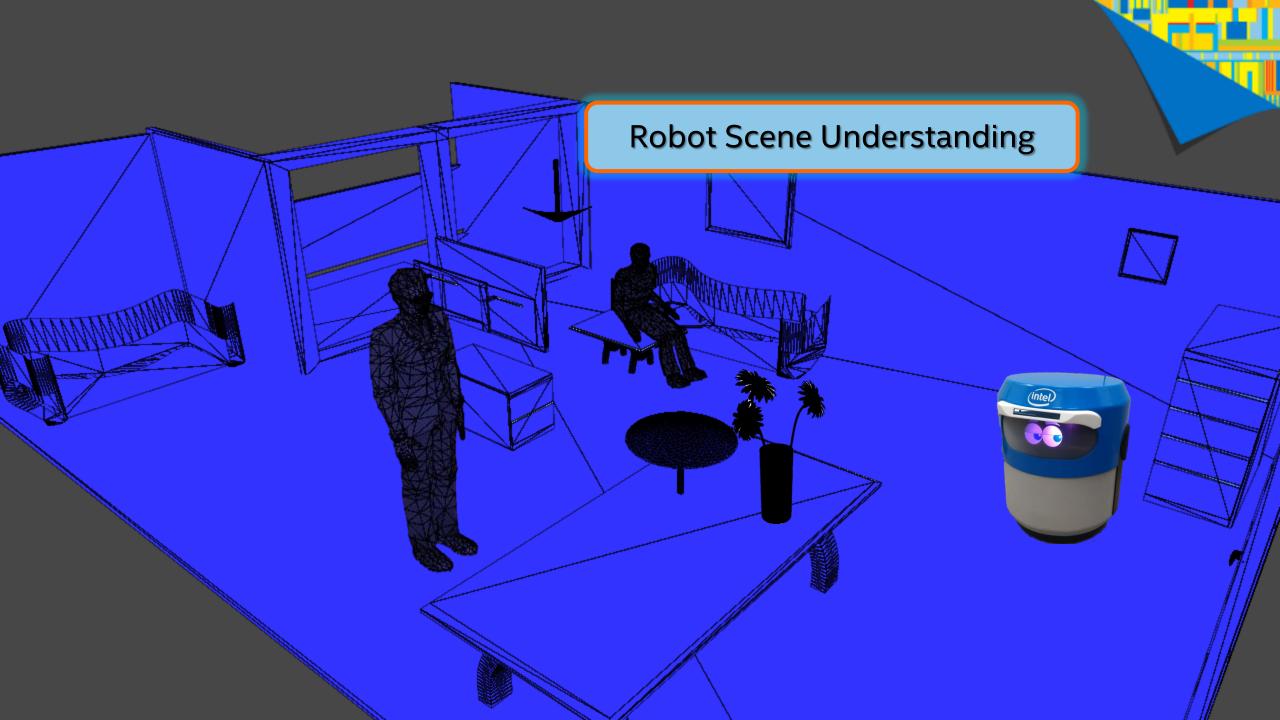


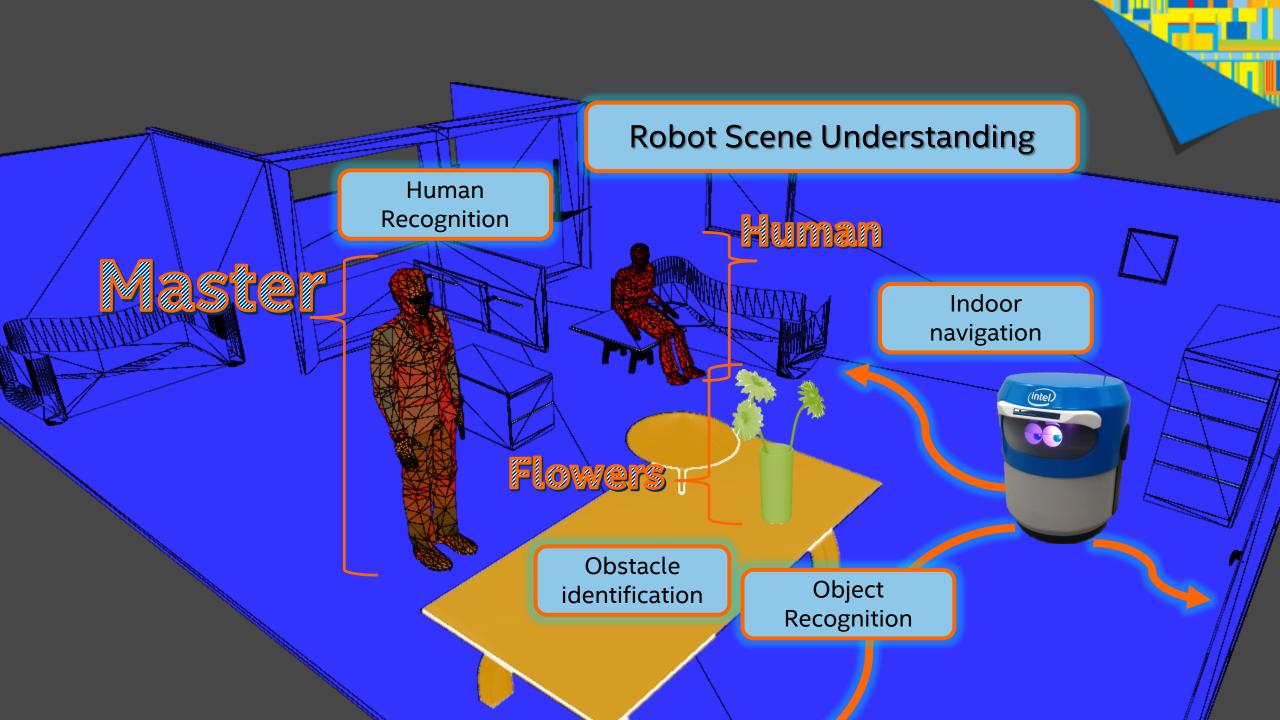


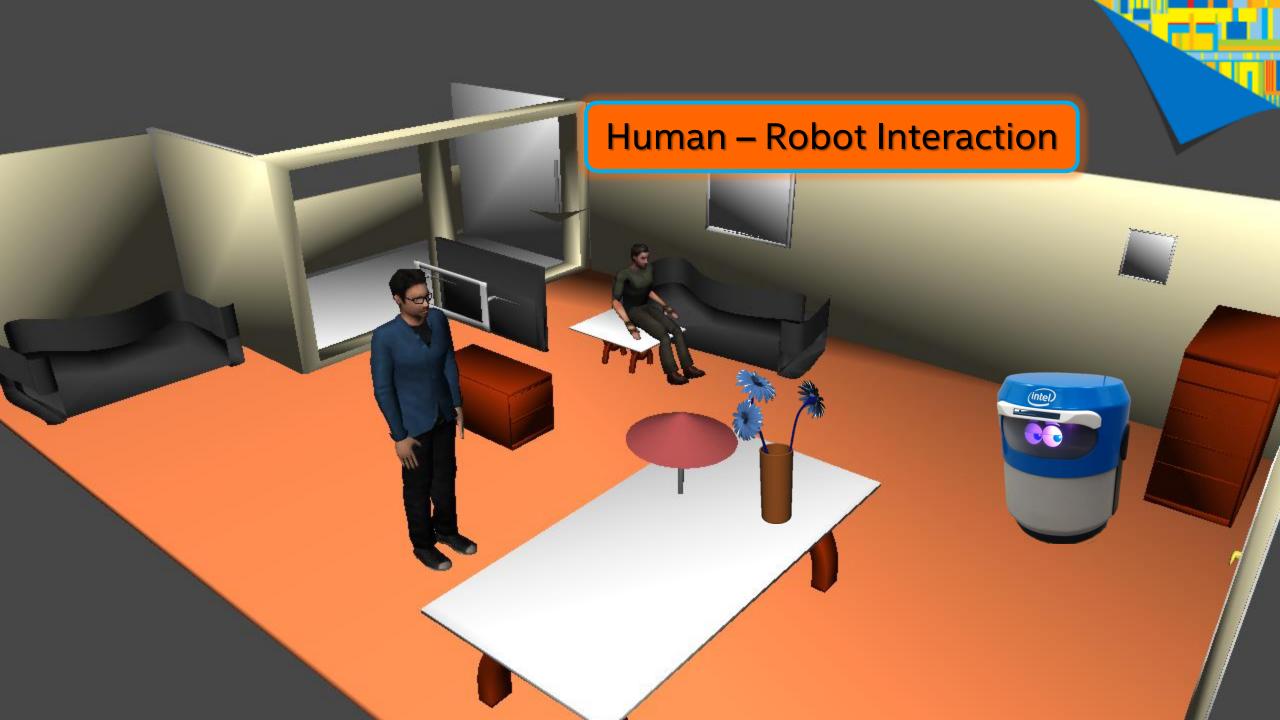


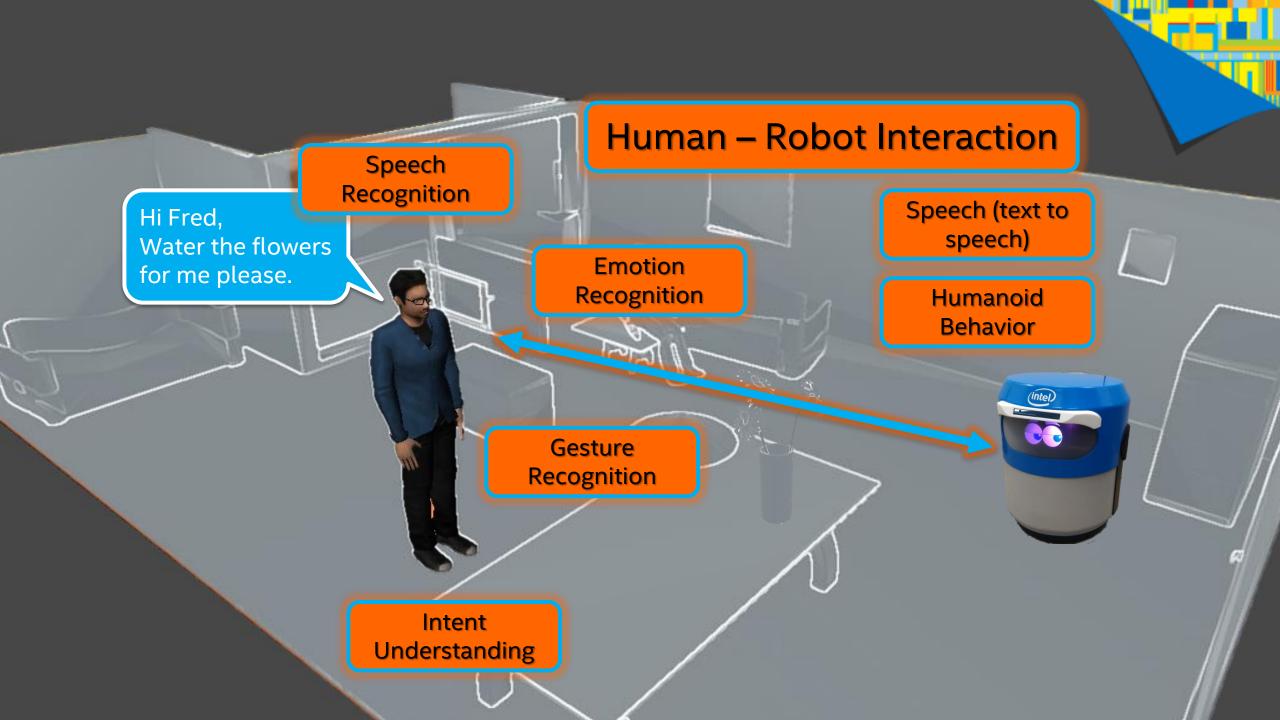












Robot Scene Understanding

Human Recognition

Obstacle identification

Indoor navigation

Object Recognition



Human – Robot Interaction

Speech Recognition

Gesture Recognition

Emotion Recognition

Intent Understanding Speech (text to speech)

Humanoid Behavior



Robotics capabilities

System Human-robot interaction Sensing and perception Task execution Mechanics engineering Multi-modal System Relative position Cost efficient interaction integration and velocity Dynamic and arms and compliant control estimation grippers Relating over time Serviceability and error (Know Me) recovery Semantic understanding Task and motion planning Real-time Social Modularity and reaction and reinteraction interoperability planning 3D perception **Emotion** Navigation, mapping, and localization Verification and validation recognition Modeling Object recognition contact Human activity Power-efficient dynamics Multi-agent recognition computing coordination Object classification Cost efficient Learning and data Intent actuators management recognition Automatic feedback Scene and adaptation Cooperative robot understanding Object Meaningful networks expression Manipulation Sensor fusion Training and skill acquisition Security Safe interaction Inherently safe Sensing mechanics Privacy materials User-aware design

Locomotion

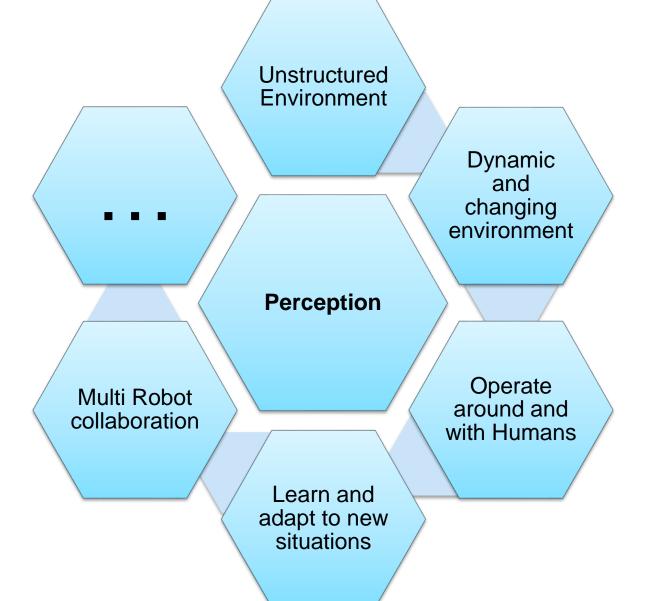
Sources: NASA; euRobotics; internal analysis.

Legend:

Perception

needed







Intel® RealSense™ Robotics Innovation



Support roboticists in their quest to innovate and create the next big thing in robotics







*The product, product specifications and data may be subject to change without notice





Standard/Community
Easy to use/ "zero-installation"

Intel[®] Euclid[™] - Highlights Audio: Mics, Speaker **Environmental Sensors Detachable Battery** Soft buttons ZR300 (Depth & Motion) Intel® Atom™ Quad-Core SOC Coms: WiFi, BT, USB3, UART, HDMI Internal Storage Memory Roboticist/Makers vision solution Disclaimer THE PRODUCT. PRODUCT Complete **Standard/Community**



CHANGE WITHOUT NOTICE

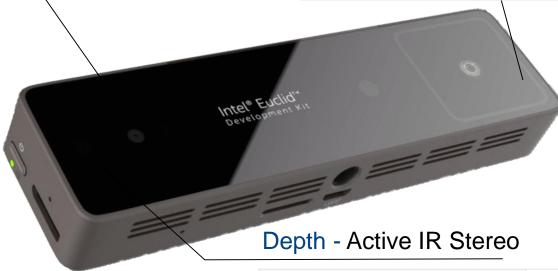
Easy to use/ "zero-installation"

Color -

RGB	2MP, Up to 1080p @
Stream	30fps, 16:9, rolling shutter, fixed focus
	Silutter, lixed locus
FOV (D x	75° x 41.5° x 68°
$V \times H$)	

Tracking Module -

\	
Fisheye Stream	VGA @ 30 fps
FOV (D×V×H):	166° × 100° × 133°
IMU - 3-axis accel.	Time Stamp: 50 µsec accuracy
& 3-axis gyro.	



Roboticist/Makers vision solution

Complete

Standard/Community
Easy to use/ "zero-installation"

Depth Stream	Up to 628×468 @ 60 fps, global shutter
Depth Output Format	16-bit
Range	0.5m (480x360) - 4m (Varies depending on light conditions)
Stereo Imagers FOV (D x V x H)	70° x 46° x 59°

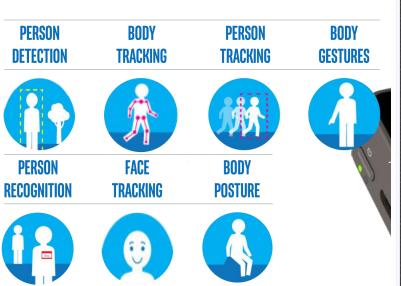




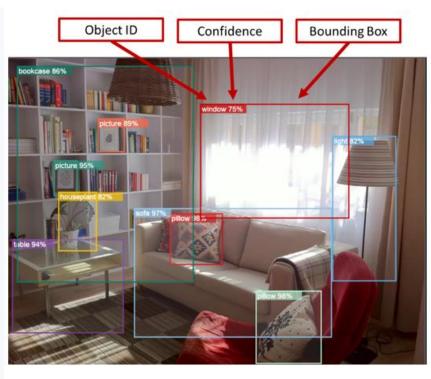
PERSON LIBRARY

SLAM LIBRARY

OBJECT LIBRARY







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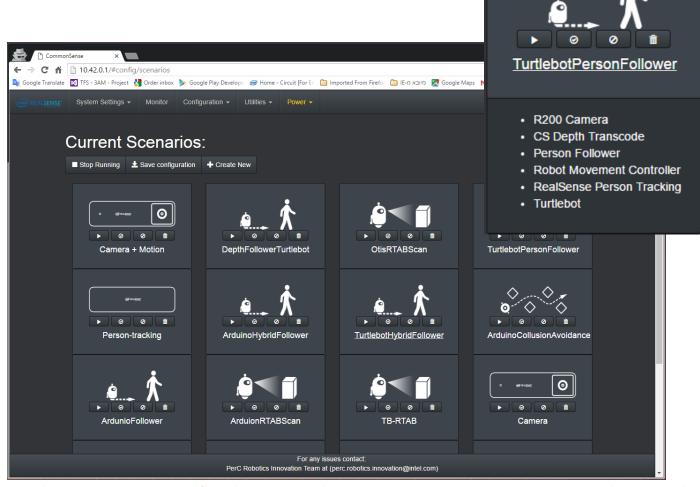


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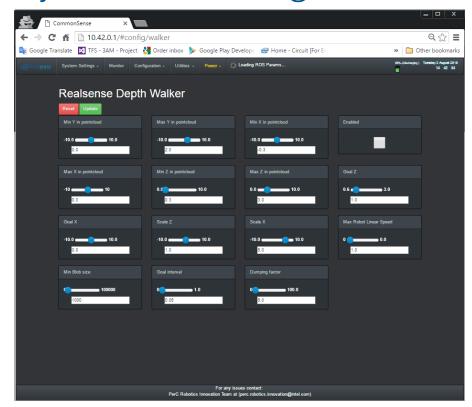
Intel® Euclid™ - C&C Web interface



Scenarios



Dynamic Reconfigure



ROS nodes configuration standard







