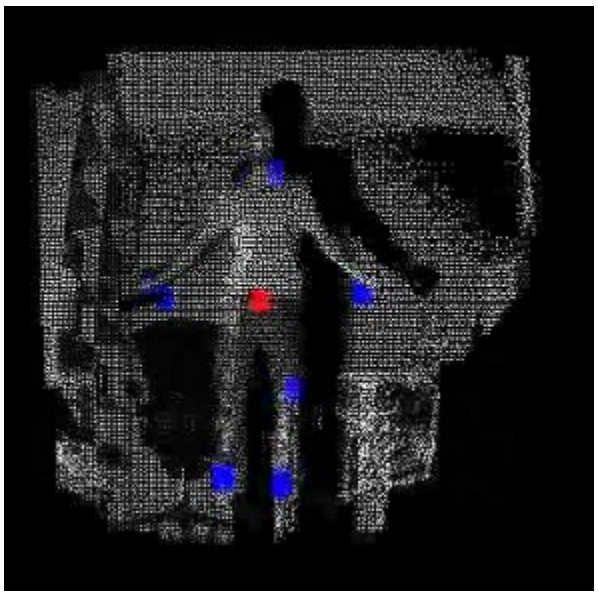
**Docket #:** S09-369

# Detecting and Classifying Body Parts and Gestures in Range Images

A team of researchers from the Stanford Artificial Intelligence Laboratory have developed a portfolio of patented innovations that harness depth sensing technology to analyze human motion for touch-free control of devices and motion capture. This system for classifying body parts provides the technical foundation for the automatic analysis of human gestures including full body motion without physical contact. It enables robust detection of salient body parts such as hands, head, feet, and shoulders from an input stream of depth images.

**Downloadable Video Demonstration**



*This video shows test data of body part detection via active motion capture. Experiments showed that this system is significantly better at detecting body parts in depth images than state-of-the-art sliding-window based detectors.*

**Additional Technologies in this Portfolio:**
“Marker-less Tracking of Human and Articulating Bodies using Parallel Processing Hardware” (Stanford Docket S09-319)

“Marker-less Motion Capture with Time-of-Flight Sensors on Parallel Processing Hardware” (Stanford Docket S09-343)
“Ergonomic Touch-Free User Interfaces" (Stanford Docket S10-147)
“Touch –Free Control of Devices” (Stanford Docket S10-148)

## Applications

- **Human-machine interface** for touch free interactions with devices such as:
  - computers - web-browsing, data entry
  - television - gesture-based remote controls
  - smart phones
  - gaming consoles
- **Motion capture** for:
  - animation
  - task demonstration and teaching for industrial and robotic applications
  - rehabilitation and athletics
- **Surveillance and security**

## Advantages

- **Touch-free** - no physical contact between the user and the device is required (neither tethered, nor via a wireless input device such as a remote control)
- **Robust:**
  - adapts to changing lighting conditions
  - minmal assumptions about the recorded scenes (e.g. the pose of the observed person, his/her clothing, etc.)
  - includes methods to remove noise and measurement artifacts

## Publications


- Christian Plagemann, Varun Ganapathi, Daphne Koller, Sebastian Thrun, "Real-time Identification and Localization of Body Parts from Depth Images", IEEE International Conference on Robotics and Automation (ICRA), Anchorage, Alaska, USA, 2010.

- Plagemann, Christian, Hariraam Varun Ganapathi, and Sebastian Thrun. "Intelligent part identification for use with scene characterization or motion capture." U.S. Patent No. 8,611,670. 17 Dec. 2013.

## Patents

- Published Application: 20110206273
- Published Application: 20140133740
- Issued: 8,611,670 (USA)
- Issued: 9,087,241 (USA)

## Innovators

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## Licensing Contact


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