Kinect and Depth Camera
Apps/Research (and some tech)

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Microphone Array

IR emitter

Depth Camera

Tilt Motor

Color Camera

USB Cable

(Kinect v1)
Mapping
Depth Maps

Research to create better depth maps with software from the data from Kinect

Example: using image processing to filter Kinect output for better quality depth maps

“Using the proposed method can significantly extend the range of the applications of the Kinect depth map in computer vision”

http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=5877202
Object Recognition

Research to identify objects with the Kinect

Example: using the depth camera and an RGB camera to identify objects

“Nowadays, cameras that capture RGB images with depth information are available. Such sensing systems allow to propose new attractive solutions for robot navigation problems like 3D mapping and localization, object recognition, 3D modeling, visual odometry among others perception tasks”

http://www.

Fig. 5. (a) RGB color image (b) Euclidean distance from each pixel to the point of interest (the probabilistic image) (c) Initial mask
Skeleton Tracking
Gesture Recognition

Research problems around gesture recognition using Kinect

Example: American Sign Language (ASL) can be interpreted pretty accurately with the Kinect and depth camera

“The [Kinect] depth information is used for ASL phrase verification, whereas the RGB image stream is used to provide live signing feedback to the signer.”

http://dl.acm.org/citation.cfm?id=2070532
Improving Body Tracking

Research in detecting the pose of a human

Example: identifying 3D locations of joints to recognize a “pose”

“By using computer graphics to synthesize a very large dataset of training image pairs, one can train a classifier that estimates body part labels from test images invariant to pose, body shape, clothing, and other irrelevances. Finally, we generate confidence-scored 3D proposals of several body joints by reprojecting the classification result and finding local modes.”

http://dl.acm.org/citation.cfm?id=2398381
Using Body Tracking

Research on different ways to use body tracking

Example: accurately evaluating a dancer’s performance

“The system acquires the motion of a performer via Kinect-based human skeleton tracking, making the approach viable for a large range of users, including home enthusiasts.”

http://dl.acm.org/citation.cfm?id=2072412
Games
Exergames

A game that motivates people to exercise

Example: Dance Central

“Featuring full-body tracking, the magic of Kinect for Xbox 360 allows you to experience real dance with your friends and family.”

http://www.ign.com/games/dance-central/xbox-360-77445
Educational Games

Research on how to use the Kinect for education

Example: helping students who have learning disabilities

“The [Kinect] games work on the basis of kinesthetic learning -- the learning style by which students adopt new ideas more easily when they touch or are physically involved in what they are studying.”

http://www.wired.co.uk/news/archive/2014-01/31/kinems
Diagnoses

Research on how to use the Kinect to make diagnoses

Example: using the Kinect to evaluate whether a person has scoliosis

“The proposed system is capable to identify the posture of the human body and to monitor the correctness of the realized exercises to correct the scoliosis. The system constructed from the Kinect sensor which has the role to collect the spatial data about the patient. [sic]”

http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=7208266
Monitoring

Research in monitoring those with health problems

Example: monitoring the health of seniors in case of falls

“We have presented the senior health monitoring system using the Kinect device to collect data and performed posture recognition (sitting versus standing) and gait recognition (normal walking versus abnormal walking).”

http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6315918
User Interaction
Tangible User Interfaces

Research to explore a Kinect-based interface using real-life objects

Example: creating 3D animations easily with the Kinect

“During a performance, the puppeteer physically manipulates these puppets in front of a Kinect depth sensor. Our system uses a combination of image-feature matching and 3D shape matching to identify and track the physical puppets.”


Figure 1. Our system allows puppeteers to use toys and other physical props to directly perform 3D animations.
Natural User Interfaces (NUI)

Research done on how to use Kinect as a more natural interface

Example: exploring new ways for users to interact with different kinds of maps

“Hands-free gesture and speech recognition, e.g., as offered by the Kinect sensor, are expected to change our human-computer interaction with online and desktop interfaces.”
Thank you!