Title：**Natural Perception and Interaction with Digital Information (MR)**

**personalize: try to add this word to the title.**

1. **Background**

User interface: from WIMP with mouse and keyboard to natural gesture interaction

Display: From 2D screen and projector to wearable and 3D display

Perception: from real world to VR and AR

1. **Review and System classification**
2. Natural gesture interface + 2D screen and projector: most AR application, such as magic mirror system, spacial AR, smart gesture for multi-screen
3. Mouse and keyboard + wearable and 3D display: virtual world
4. Natural gesture interface + wearable and 3D display:

Advantage, technical methods and implementation of every classification

1. **Natural perception: Interactive AR mirror for entertainment, learning and rehabilitation.**

General medical info –> Kinect tracks user -> personalize perception

One device-> multi user or one user

Magic mirror: anatomy learning, interactive muscle, organ game, bone puzzle, rehabilitation

1. **Natural interaction with Mixed Reality**

**pointing gesture interface for traditional display (multi-screen)**

Personal pointing gesture -> general user interface-> do interaction with computer.

Multi-user -> multi-display and device

**Natural perception and pointing interaction for optical see-through AR**

1. **Collaborated Mixed Reality**

**Mix the magic mirror and pointing user interface**

One patient <-> one Kinect and one display doing the rehabilitation exercise.

One nurse with pointing gesture: to control multi-screen and device to give introduction

Parents monitor children’s magic mirror teacher monitor student’s magic mirror

**TODO: finish the philosophical abstract one page about the big picture and at least a scenario mixed magic mirror and pointing gesture.**

**Start writing the thesis from January**

**What have I done:**

Anatomy learning using Magic Mirror (Basic interactive AR, methods to improve accuracy of the overlay between Virtual element and Real world: five bone points to improve the skeleton and exploded view of organs)

Bone puzzle and Muscle interactive learning (Natural interactive AR game for the learning, comparing with traditional atlas learning)

AR for rehabilitation

Improve user recognition from RGB-D sensor for AR application

Virtual view synthesized from two RGB-D sensor (virtual viewpoint for video see-through AR, depth map up-sampling)

Natural gesture interaction with multi-screen, tracked objects (basic setup, eye-finger pointing system calibration (drawing lines, single marker active calibration)

**What I am doing:**

Application and user study of Natural pointing interaction with multi-screen.

**What will I do:**

Natural pointing to virtual element in AR HMD application

Natural pointing interaction for optical see-through AR

Point to it and start interaction with any ambient devices and objects