MMSun SPOTs

Multimodal Interaction with the iWall Using Two Sun SPOTs

Mini-Project MMI

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Plan

- Goal
- Modalities
- System description
- The application
- Demo video
- Conclusion

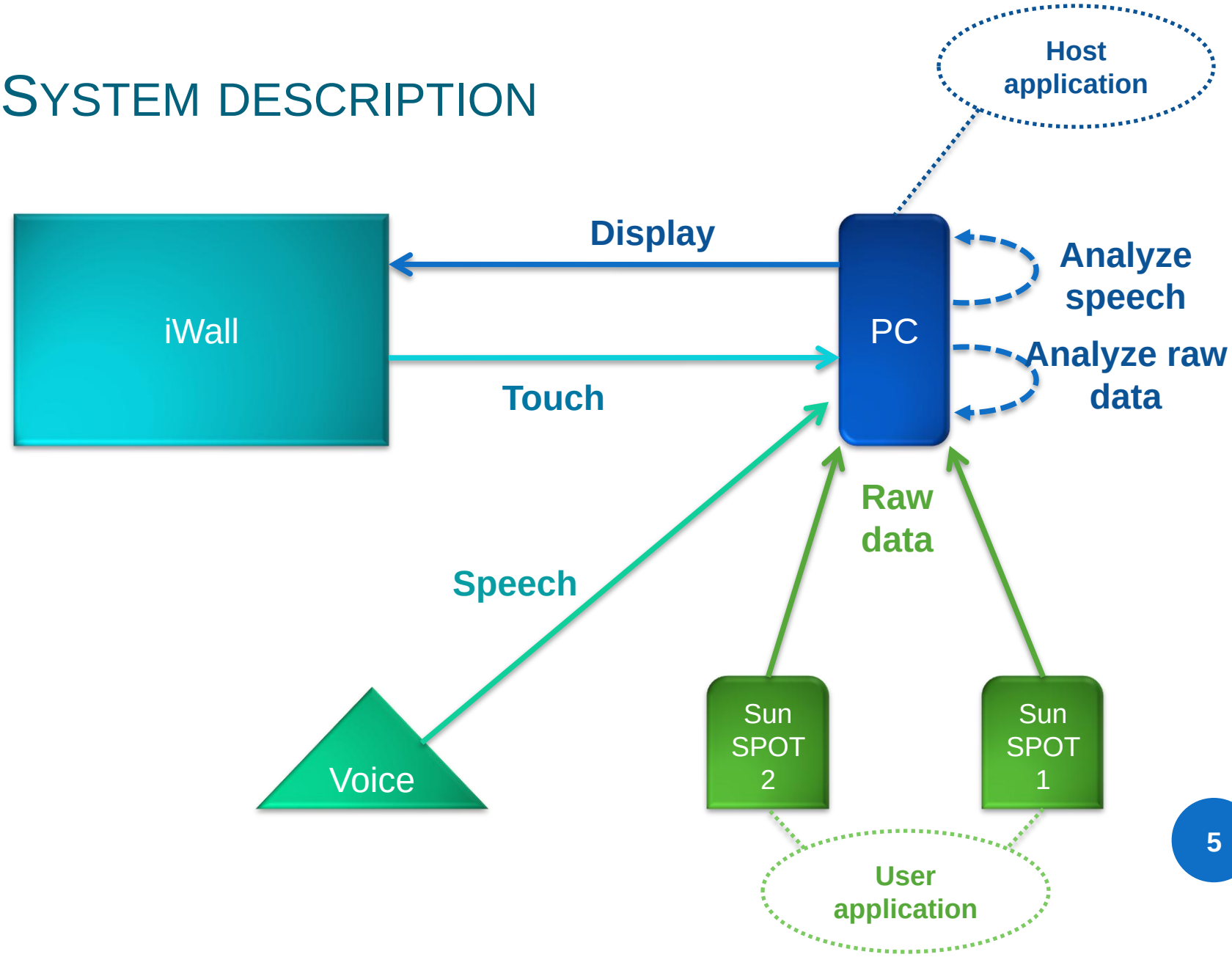
Goal

- Initial goal:
  - Interaction with the iWall through gestures and speech (in addition to touch)
  - Android smartphone for gestures
  - Application allowing to interact with the iWall directly (desktop, file manager, browser, etc.)
- Changes made:
  - Gestures done with two Sun SPOTs (initially one, the second was added for testing multi-user handling and additional functions)
  - Application with which the user can interact

Modalities

- Touch: using the touch foil on the iWall
  - Only single touch
  - Only left click and mouse movement
- Speech: using a headset
  - Allows to pass vocal commands for additional interaction possibilities
  - Uses Sphinx-4
- Gestures: using two Sun SPOTs
  - Allows for even more (especially distant) interaction with the iWall
  - Raw data from the Sun SPOTs is read and converted into movement

System description



The application (1)

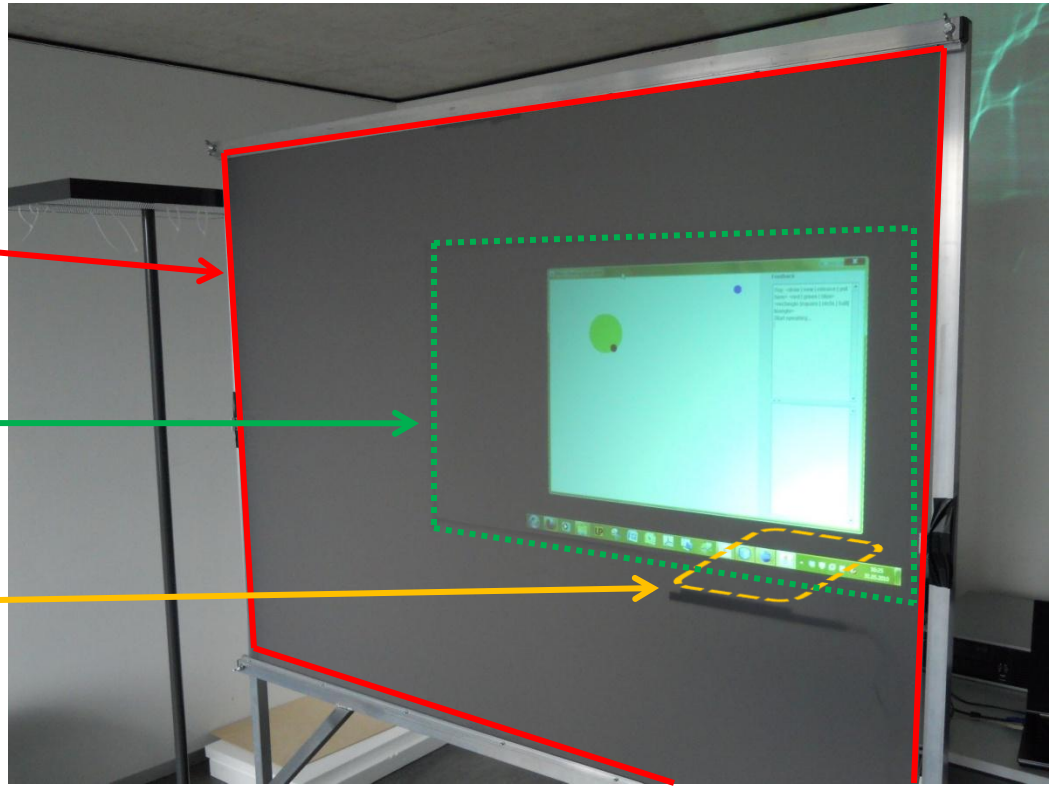
- Available shapes
  - Circle
  - Rectangle
  - Square
  - Triangle
- Available colors
  - Red
  - Green
  - Blue
  - Yellow

The application (2)

- Possible actions
  - Touch foil
    - Draw new random objects
  - Unmerged Sun SPOTs
    - Move
    - Merge to shape
  - Sun SPOT 1 merged
    - Move merged shape with Sun SPOT 1
    - Merge into another shape with Sun SPOT 1
    - Increase/decrease size by moving Sun SPOT 2
    - Change color by moving Sun SPOT 2 left or right
  - Voice
    - Draw new shape (e.g. “draw red triangle”, “draw blue ball”)
    - Release merged Sun SPOT (“release”)
    - Clear graphic panel (“clean up”)

System description – iWall

- Board
- Touch foil
- Projector

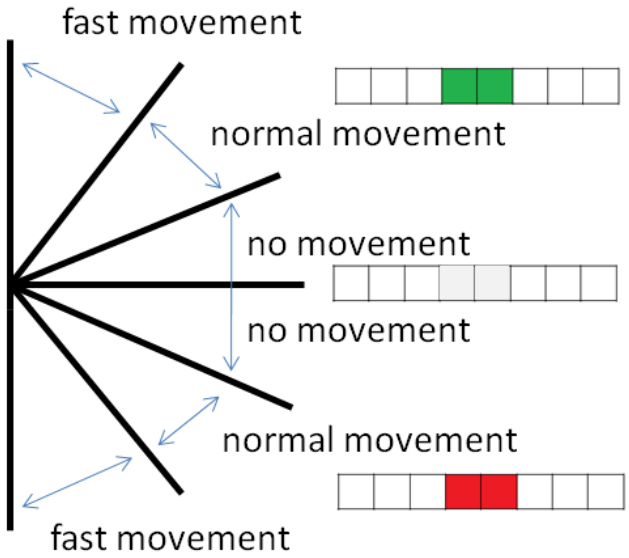


System description – Sun SPOT

- Device:
  - Communication through 11 channel 2.4 GHz radio
  - Sensor board (three-axis accelerometer)
  - Eight multicolor leds
  - Approx. 7 hours battery duration
- Basestation:
  - Similar to device, without sensors and battery
  - Connected to PC
  - Allows communication with Sun SPOT devices and deployment of applications

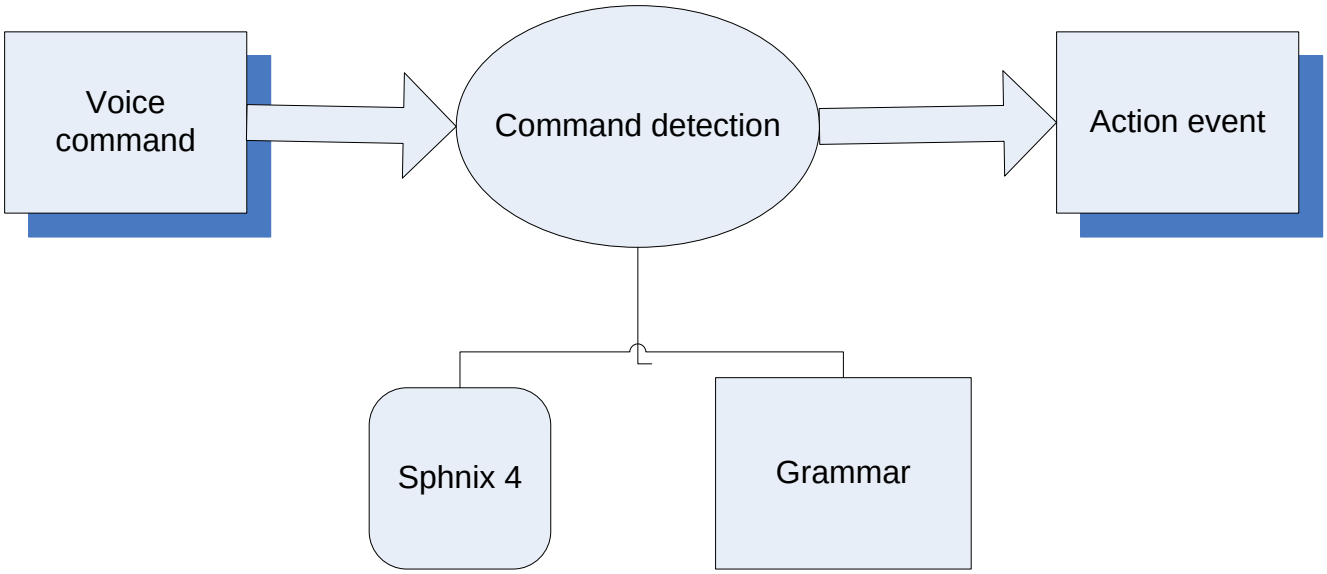
Sun SPOT gestures

- Movement zones
- Movement
  - Up
  - Down
  - Left
  - Right
  - Diagonal
- Options
  - Change color
    - Left: previous color
    - Right: next color
  - Change size
    - Up: increase size
    - Down: decrease size



SPHINX-4

- Small grammar file with needed commands
- Not very reliable



Demo video

Conclusion

- Summary
  - Good, intuitive and “ergonomic” interaction
  - Allows multiple users to interact with the iWall
  - Sun SPOTs:
    - Very reliable for accelerometer data
    - Stable communication
  - Sphinx-4 not reliable for speech recognition
- Future work
  - Improve speech recognition
  - More vocal commands (and more, and more…)
  - Allow users to interact directly with the iWall (not only with one single application)