

# Uncovering Device Whispers in Smart Homes



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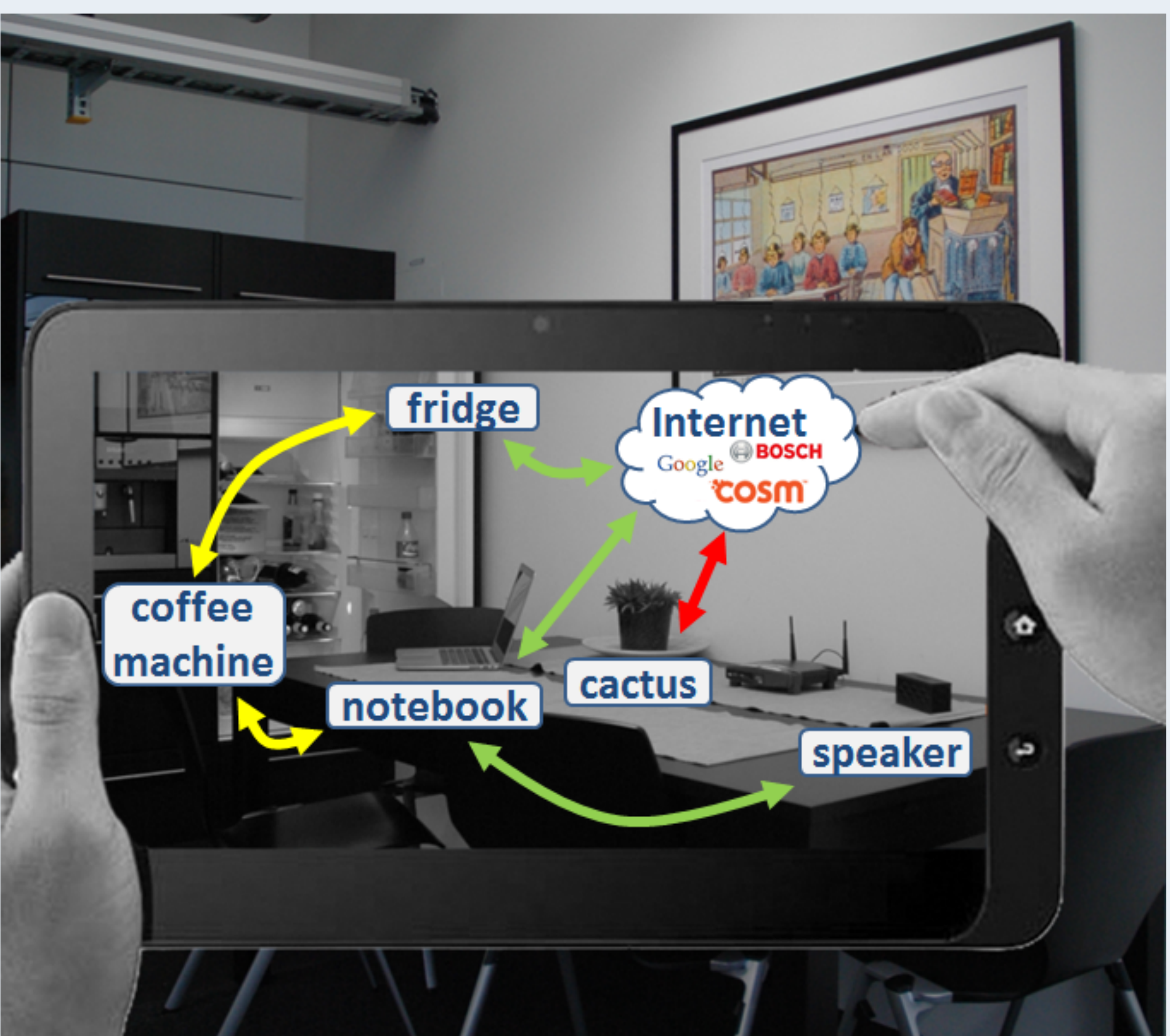
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## Major Challenges in Highly Connected Environments

- Devices and applications communicate invisibly behind the back of inhabitants
- “Poor strategies for diagnosis and troubleshooting” in home networks [4], debugging tools are hard to operate and almost never used by ordinary end users [3]
- Privacy-sensitive data flows out of home network (e.g., from smart thermostats) and “fear of pirating” by remote services [2, 5]

## Uncovering Device Whispers

- Visualization of network traffic enables users to **keep track of interactions between devices and with remote services**
- **Network sniffer application** on router (non-invasive: commodity hard- and software)
- Intuitive **augmented reality interface** on mobile front end (“magic lens” approach [1])



## Implementation Details

- ✓ Hardware platform: Linksys WRT54GL with Linux-based OpenWRT OS
- ✓ Sniffing via Linux *netfilter* firewall
- ✓ Information about connections between devices (including strength and direction) exposed via Web interface

## Mobile Frontend

- ✓ Resolution of QR-codes or AR-markers of devices to their IP address
- ✓ Lookup of information about connections of that IP at backend
- ✓ Visualization of traffic textually, graphically, or as augmented reality interface (ARToolkit for Mobile)

## Summary

**AR-based monitoring of the interaction of smart devices with each other and with remote services, using widely deployed commodity hardware**

### Next steps

- Also consider contextual information about devices (e.g., their location or the type of device)
- Set networking policies via the augmented reality interface (“software-defined networking”)

## References

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[4] E. S. Poole et al. More Than Meets the Eye: Transforming the User Experience of Home Network Management. In Proceedings of the 7th ACM Conference on Designing Interactive Systems, DIS '08, pages 455–464, Cape Town, South Africa, 2008. ACM.  
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