

ARINA:

Arduino Remote Infrared Network Adapter

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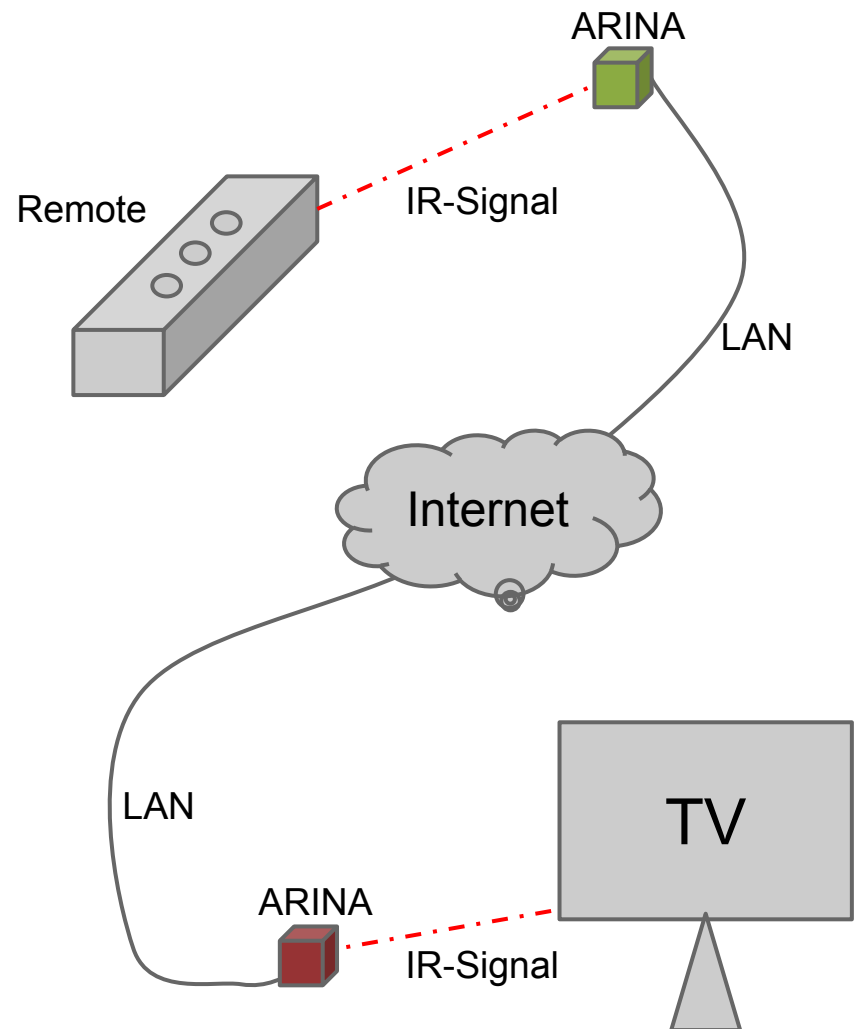
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Outline

1. Introduction
2. Related work
3. Infrared signaling
4. Protocol background
5. ARINA Protocol
6. Hardware
7. Evaluation
8. Summary
9. Future work
10. Your Questions

Introduction

- Receive infrared signals
- Decode received signals
- Transmit receive data
- Send infrared signals



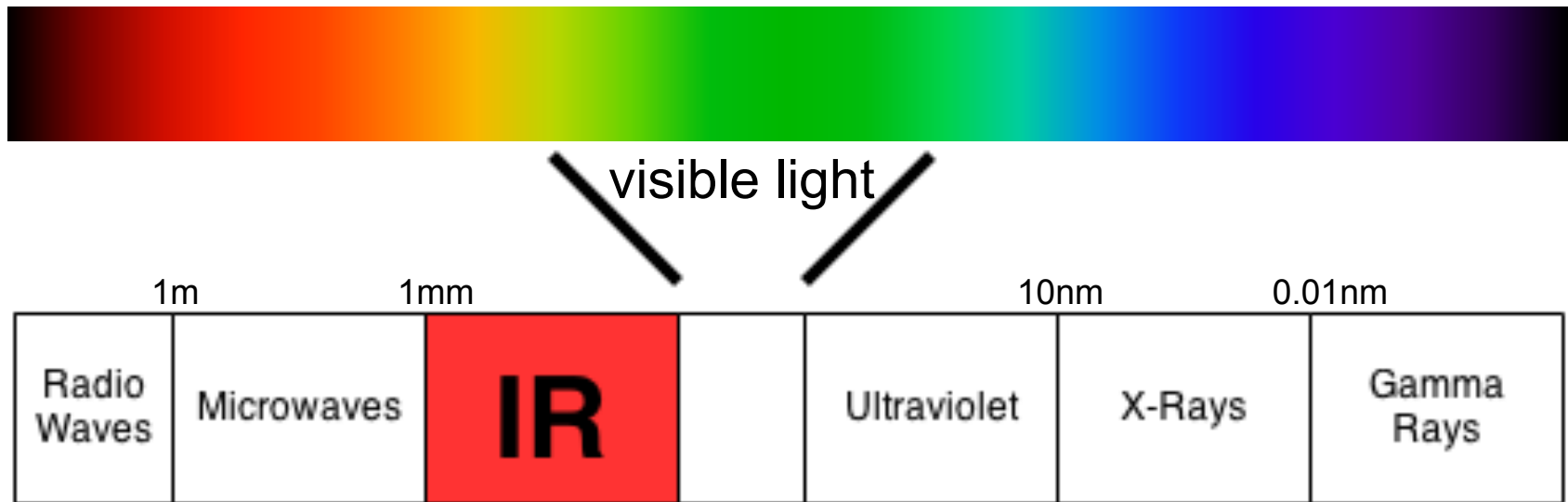
Related work

- Commercially available products by Logitech, Philips and others
- Quite expensive
- Proprietary systems
- Limited to provided features



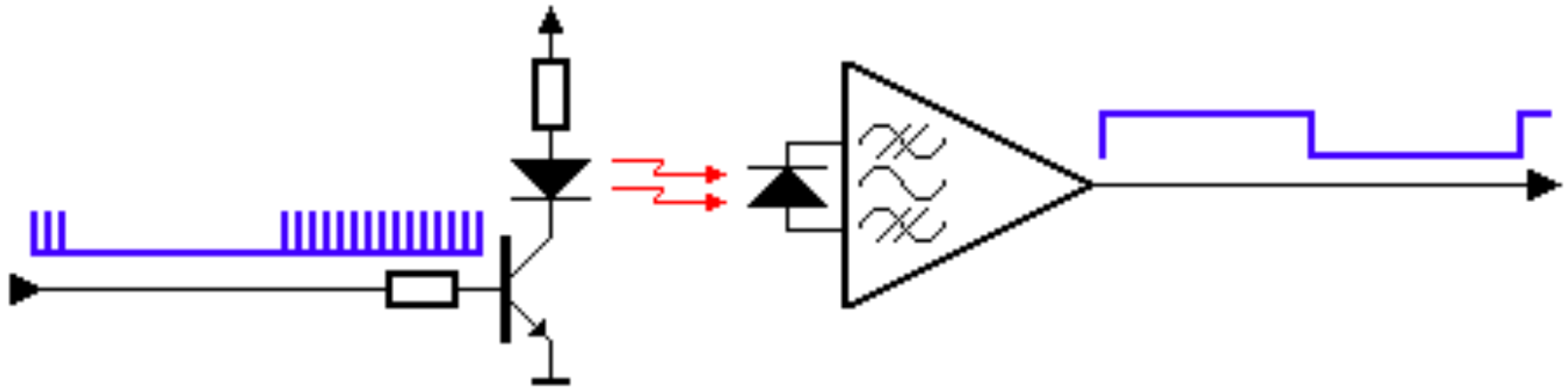
Figure: Logitech Harmony Ultimate Hub

Infrared Signaling I




- not visible to a human's eye
- commonly used IR diodes: 840 - 950nm
- cheap IR diodes to receive and transmit

Infrared Signaling II



- transmitting from sender to receiver
- Signal modulation: 36 - 40 kHz


01100111...

Protocol (NEC)

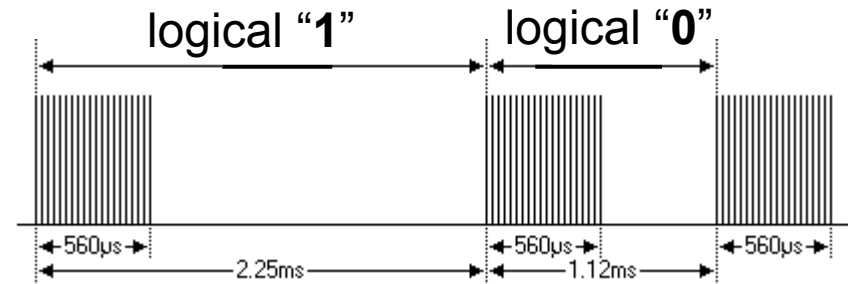
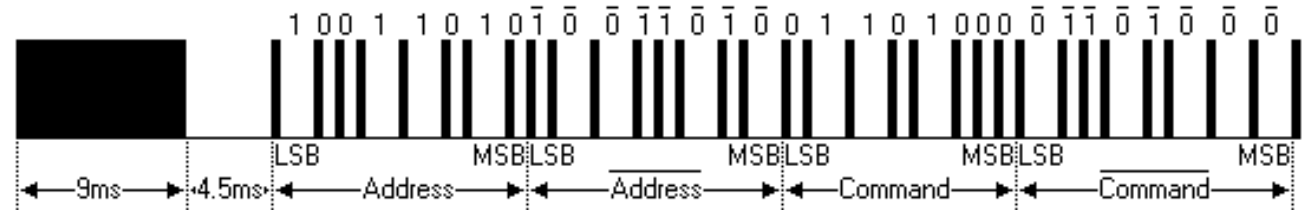


Figure: 0 and 1 as specified by NEC protocol

01100111...

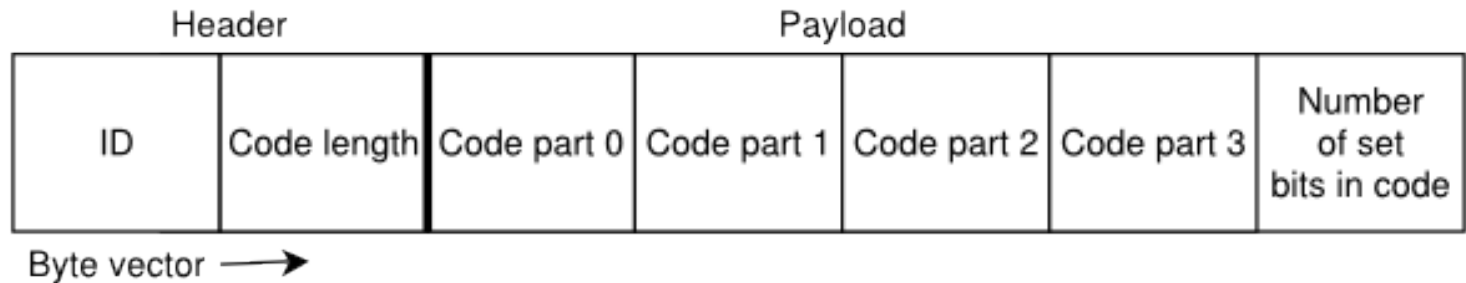


<< Play >>

0x68 - 0x00	Play
0x68 - 0x01	Record
...	...

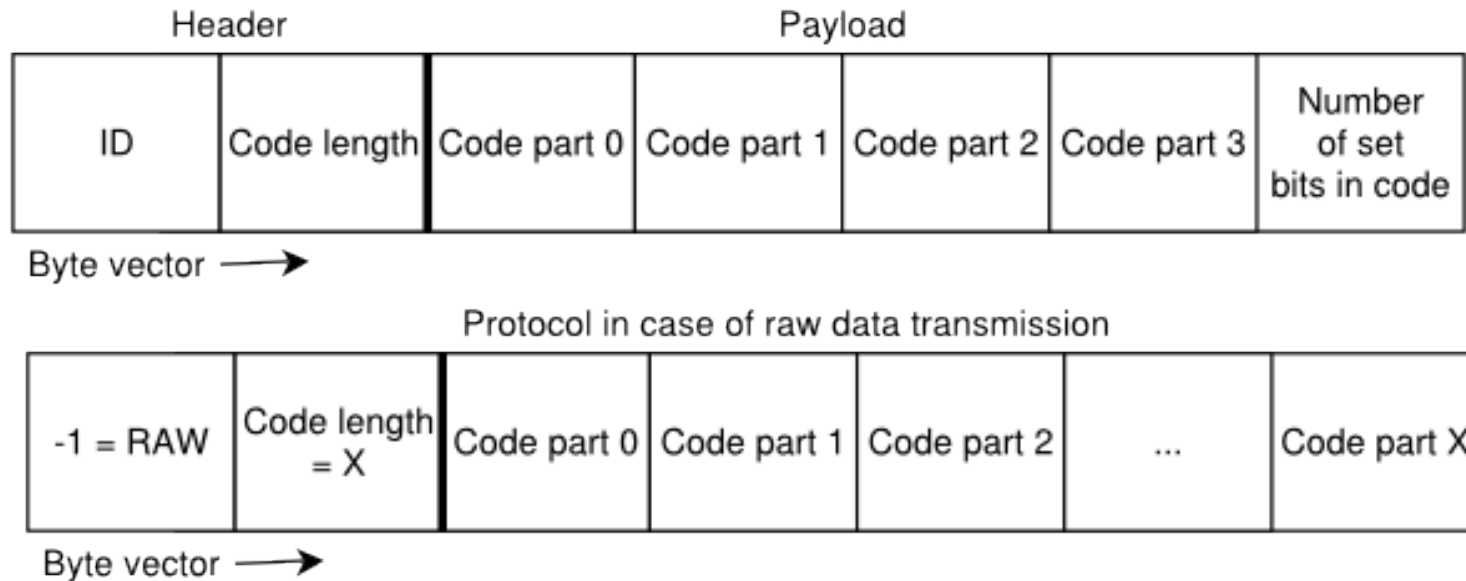
Table: mapping of "code send" to "function invoked"

ARINA Protocol



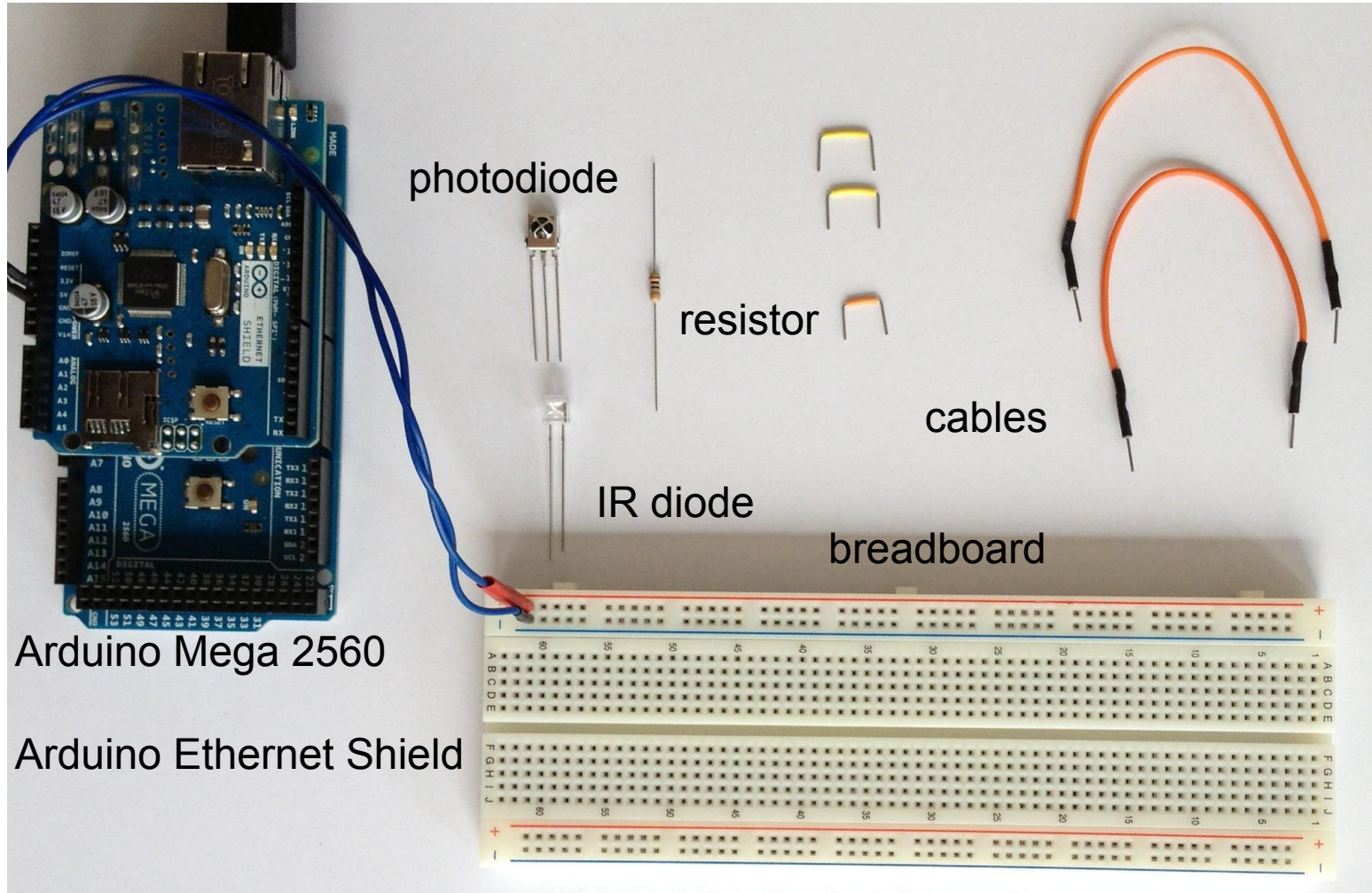
- Transmission of recognized protocols
 - NEC, Philips RC-5, Philips RC-6, ...

ARINA Protocol

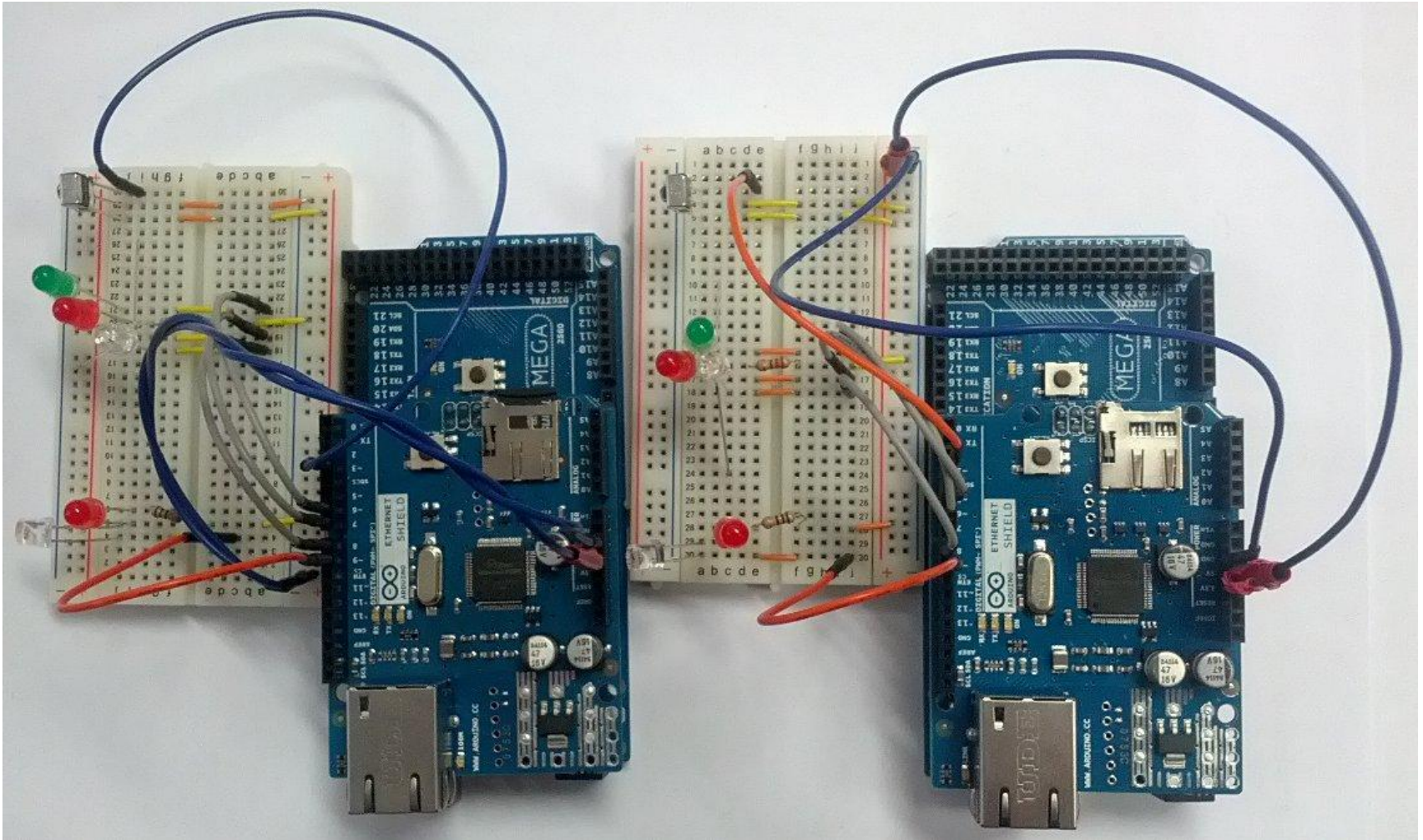


- Transmission of recognized protocols
 - NEC, Philips RC-5, Philips RC-6, ...
- Transmission of RAW data

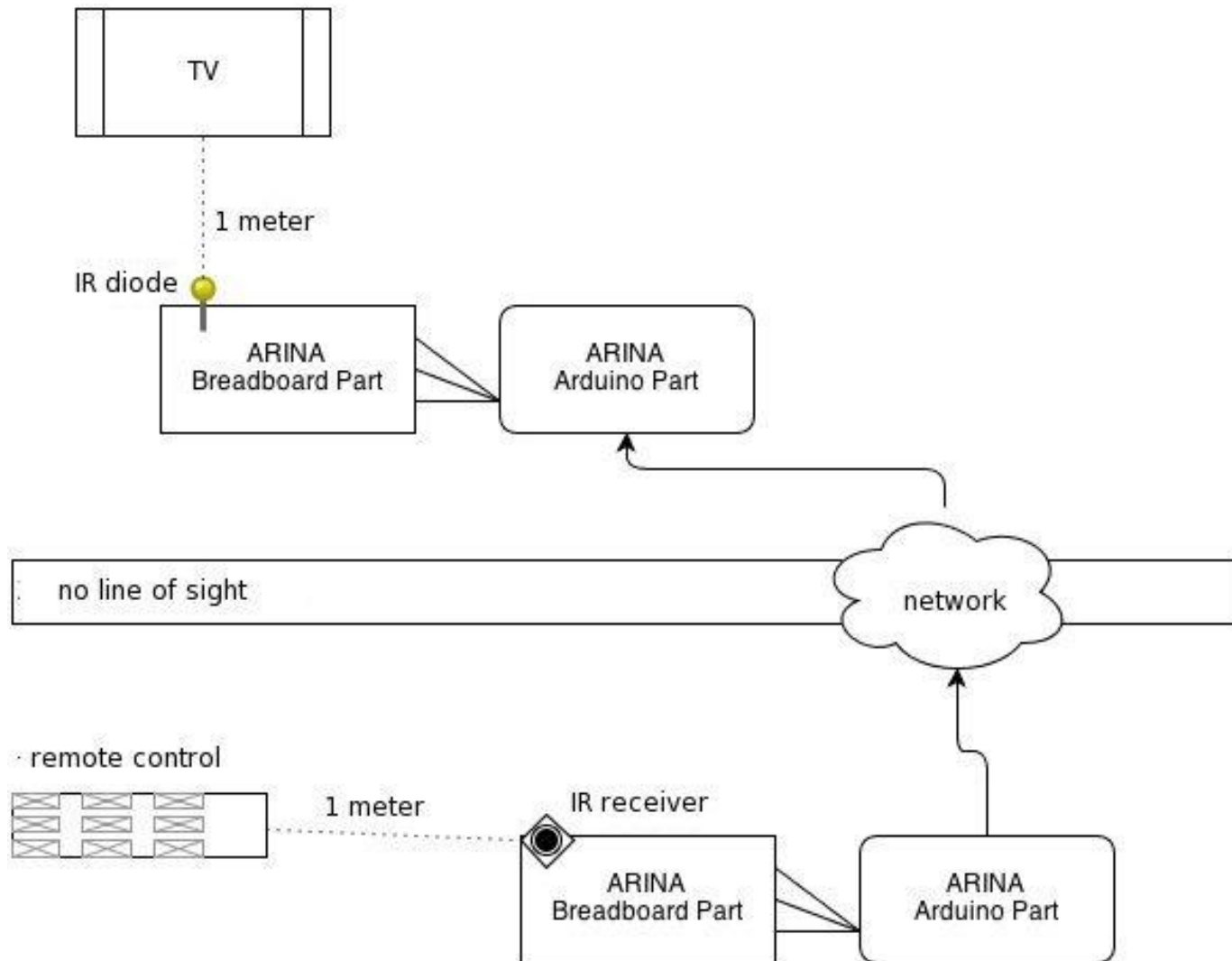
Hardware I



Hardware II



Evaluation setup



Evaluation results

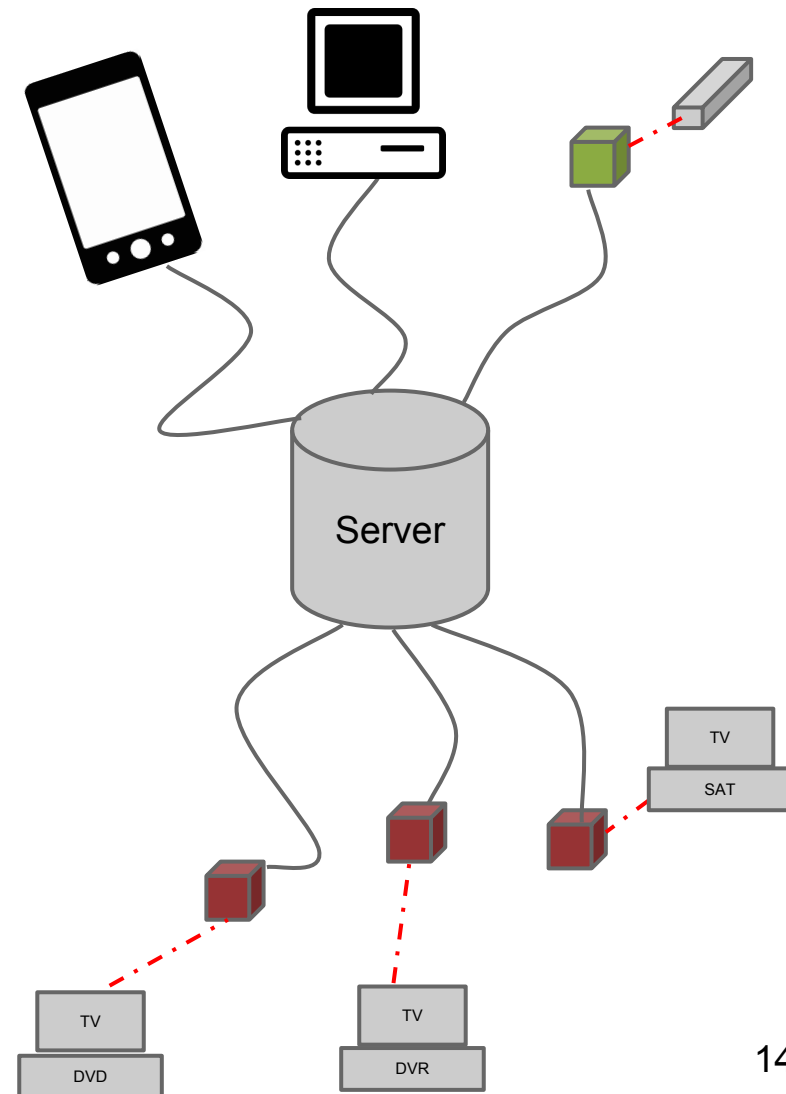
Device name	Type	Manufacturer	Protocol	All keys	Year of purchase
EB-1771W	Projector	Epson	NEC	yes	2012
UE40EH5000	TV	Samsung	RAW	yes	2012
BD-E5500	3D-Blu-ray Player	Samsung	RAW	yes	2012
42LV579S	TV	LG	NEC	yes	2012
DVX592H	DVD Player	LG	NEC	yes	2012
Connect ID 32	TV	Loewe	RC-5	yes	2009
230E	DVD Player	Redstar	NEC	yes	2001
55FU4243	TV	Thomsen	NEC	yes	2012
SoundTouch	HiFi	Bose	RAW	yes	2014

Features of ARINA

- supports common IR protocols
- supports RAW data transmission
- small in size
- can be powered by battery (~ 20h)
- PoE ready (single cable for LAN and power)
- materials costs: ~30€
- easy to build on your own
- easy to modify and extend

Future work

- encrypted transmission
- control multiple ARINA
- Web-based control interface
- Smartphone app to control ARINA



Thank you.

Special thanks to Matthias,
all reviewers, Prof. Meier

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Questions?