

Design of a Large-Scale Robotic Swarm

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Why Swarm Robots?

- Systems are composed of hundreds of robots which end up becoming increasingly complex.
- Leverage the strength of numbers to achieve these tasks, relying on simple and distributed coordination.
- Can be seamlessly regulated without concern for single points of failure or bandwidth.
- Explores design of such swarm robots as simple hardware platforms

Single Robot Design

- Onboard power and processing units essential for autonomous operation and decision-making within the swarm.
- Emphasizes functionality at a microscale level, equipped with accelerometers, microphones, speakers, and IR sensors
- Simplifies maintenance and reduces costs but also scales efficiently.

Interaction & Coordination

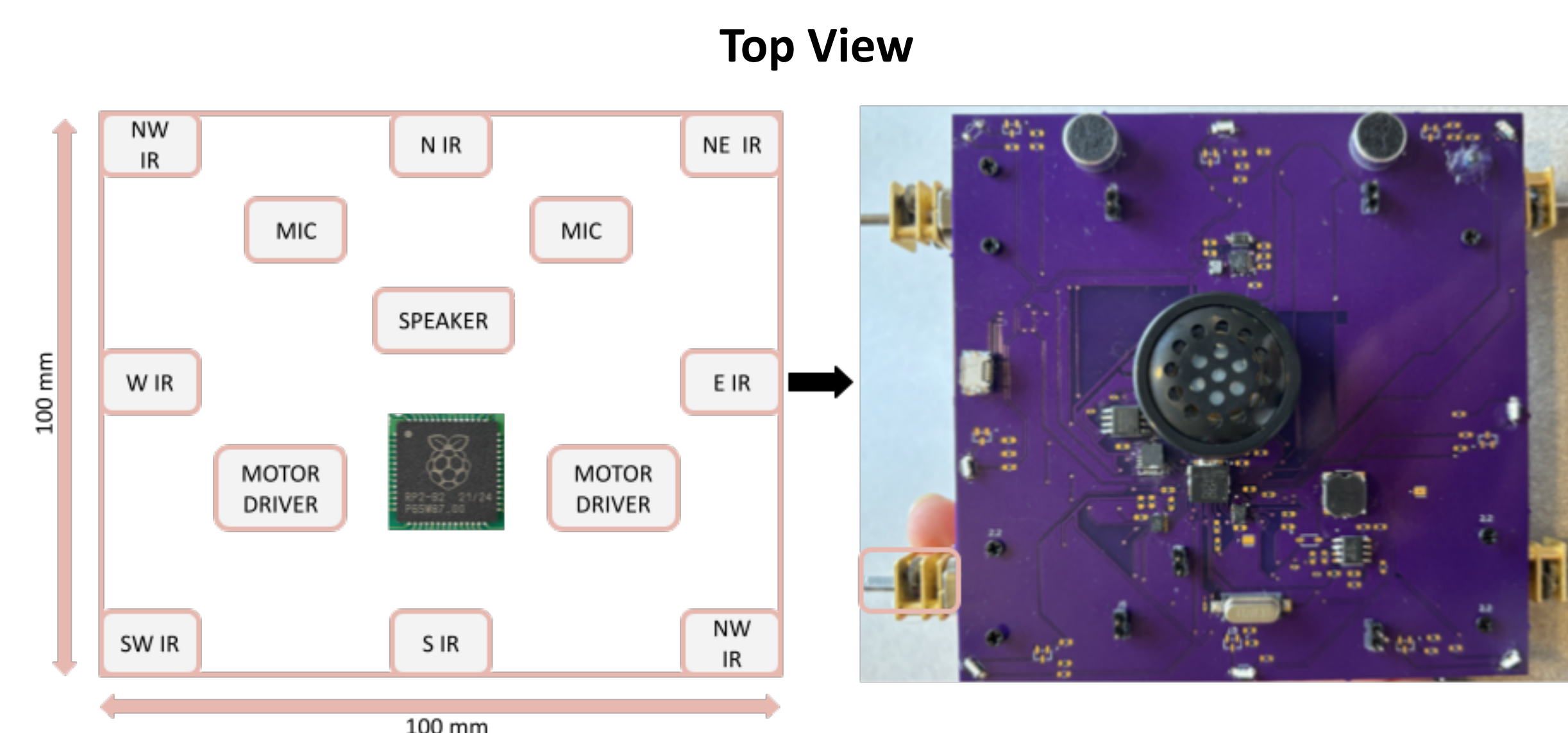
IR Sensors:

- Positioned around its body to detect and transmit signals to nearby robots.
- These sensors serve as both emitters and receivers, allowing for a full 360-degree communication range.

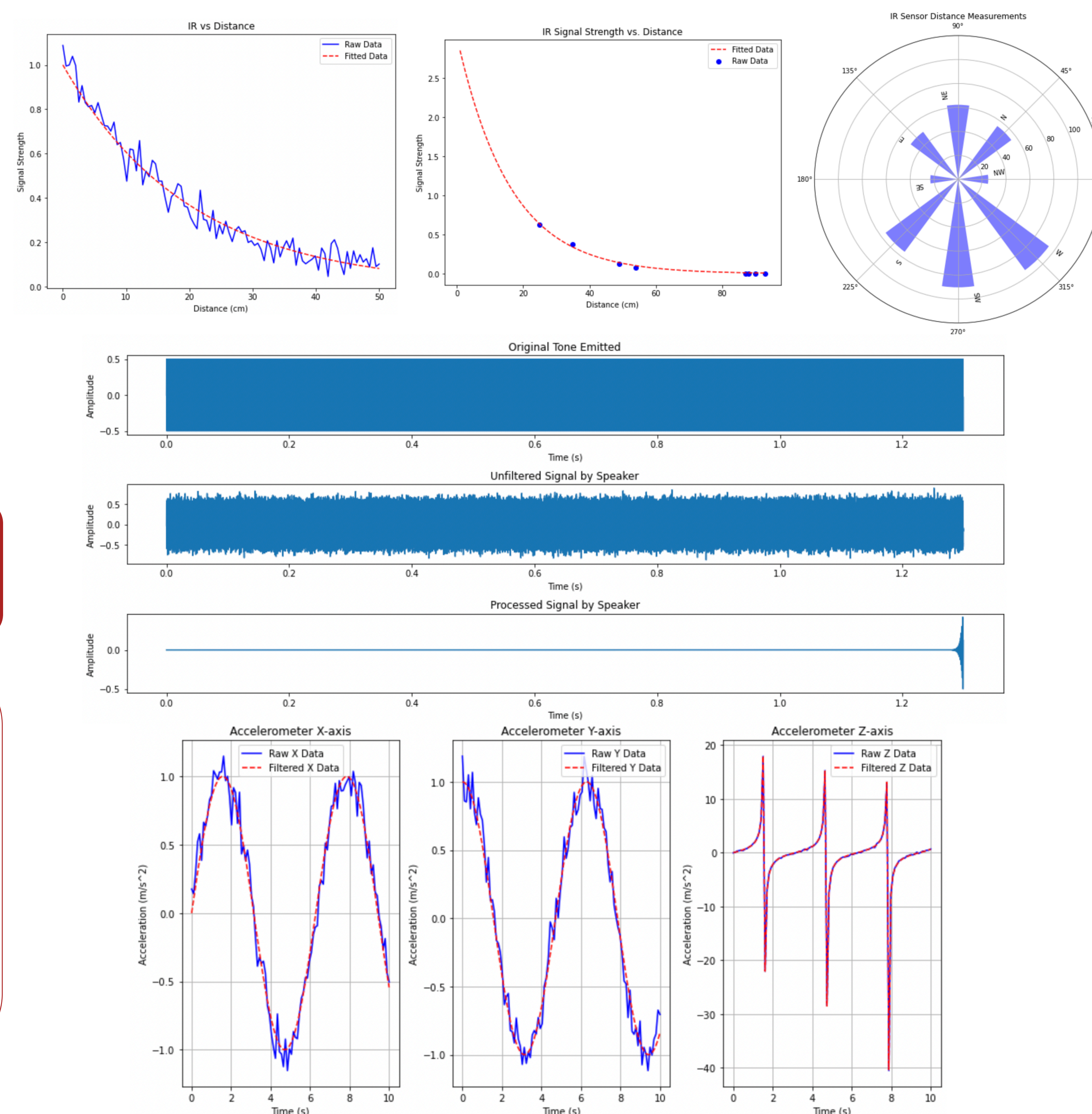
Audio – Microphones + Speakers

- Longer-range communication within the swarm
- Speakers emit modulated sound waves that are captured by microphones on other robots.
- Facilitating coordinated actions when visual contact is not feasible.

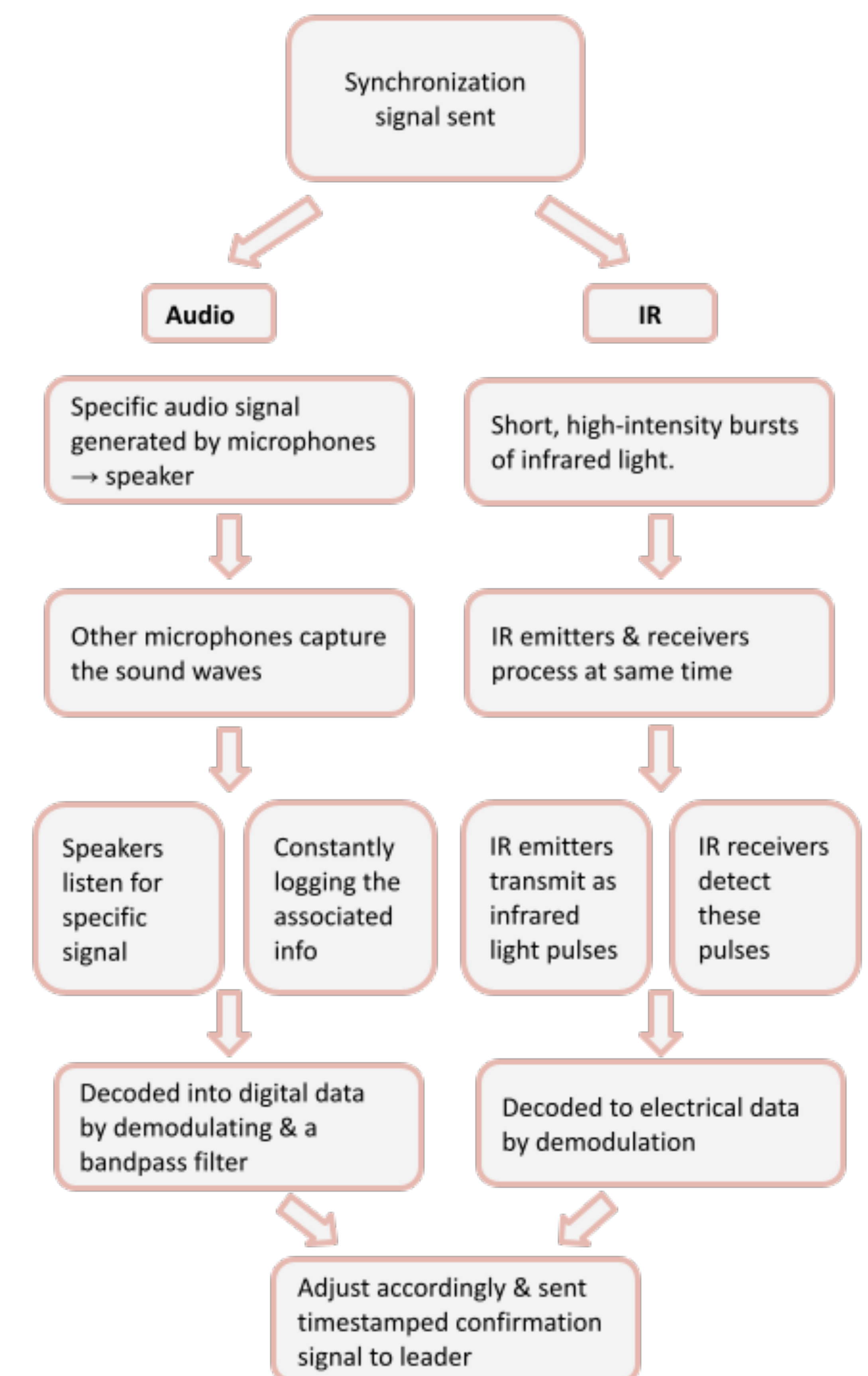
Hardware Design



Robots in Action



Communication Between Robots



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