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A vision on vision

First MSL vision system without mirror

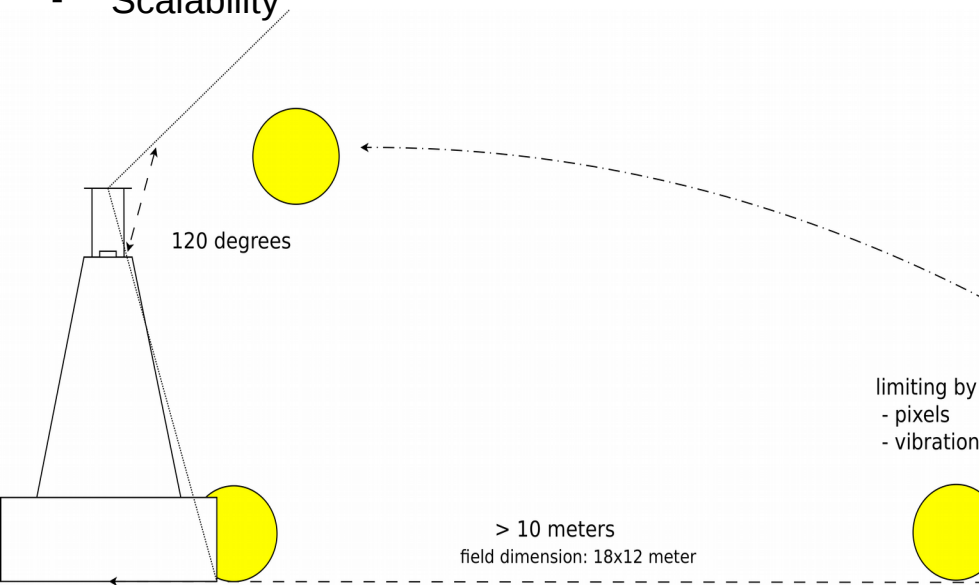
Topics



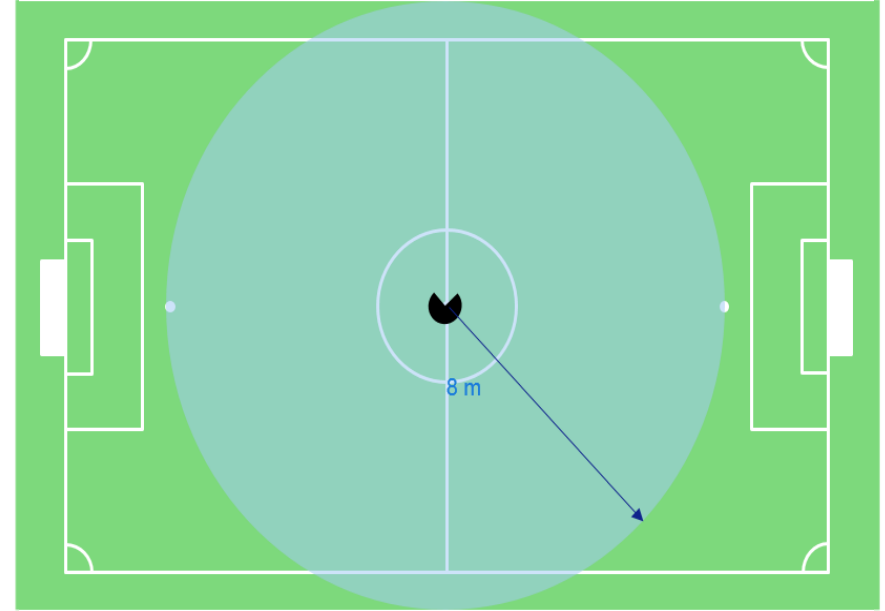
- Why change to multi camera setup
- Hardware
- Current vision processing
- Challenges
- Calibration goals
- Demonstration
- Future work
- Questions

Why change to multi camera setup

- Vision range was too small
- More pixels
- See flying balls
- Parallelism
- Less latency
- Future proof
- Scalability

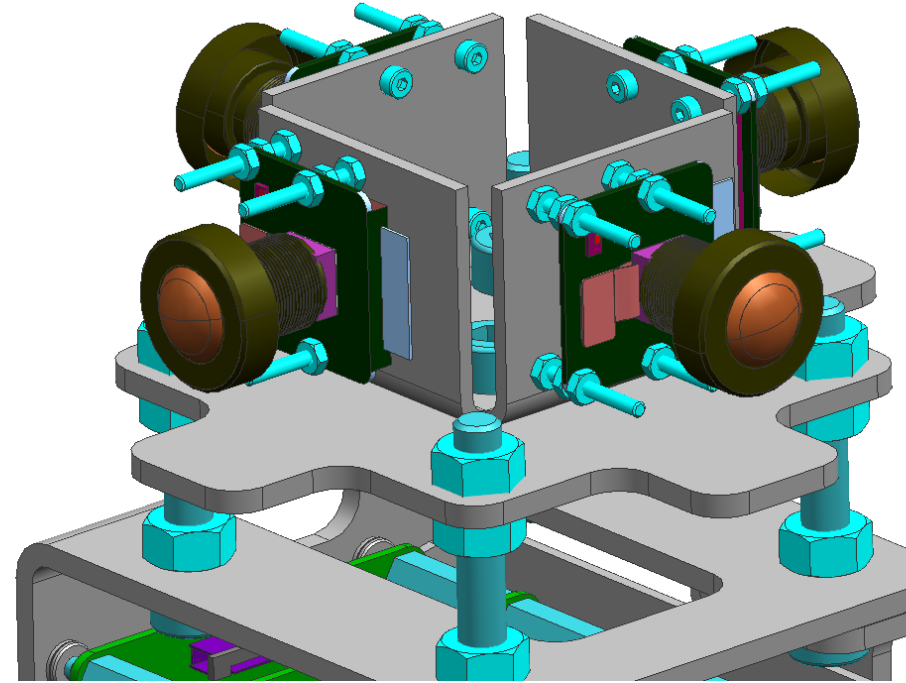
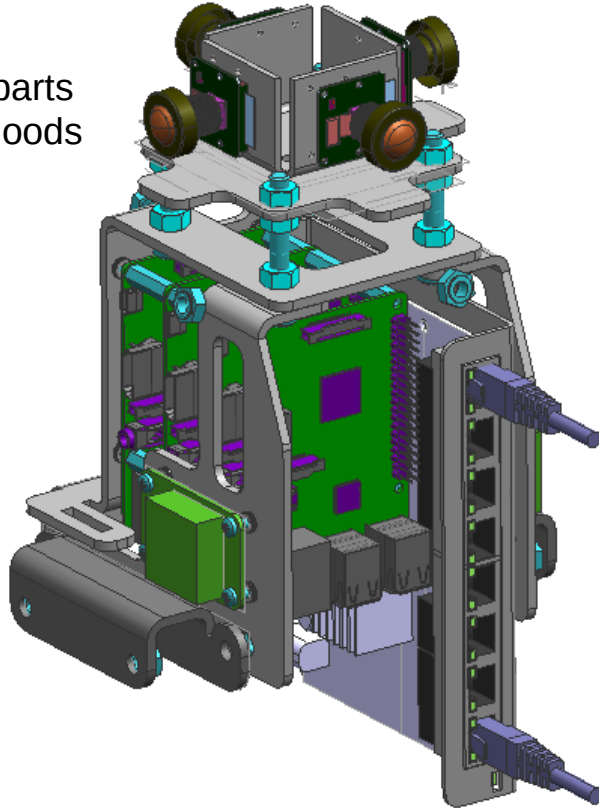


limiting by
- pixels
- vibration

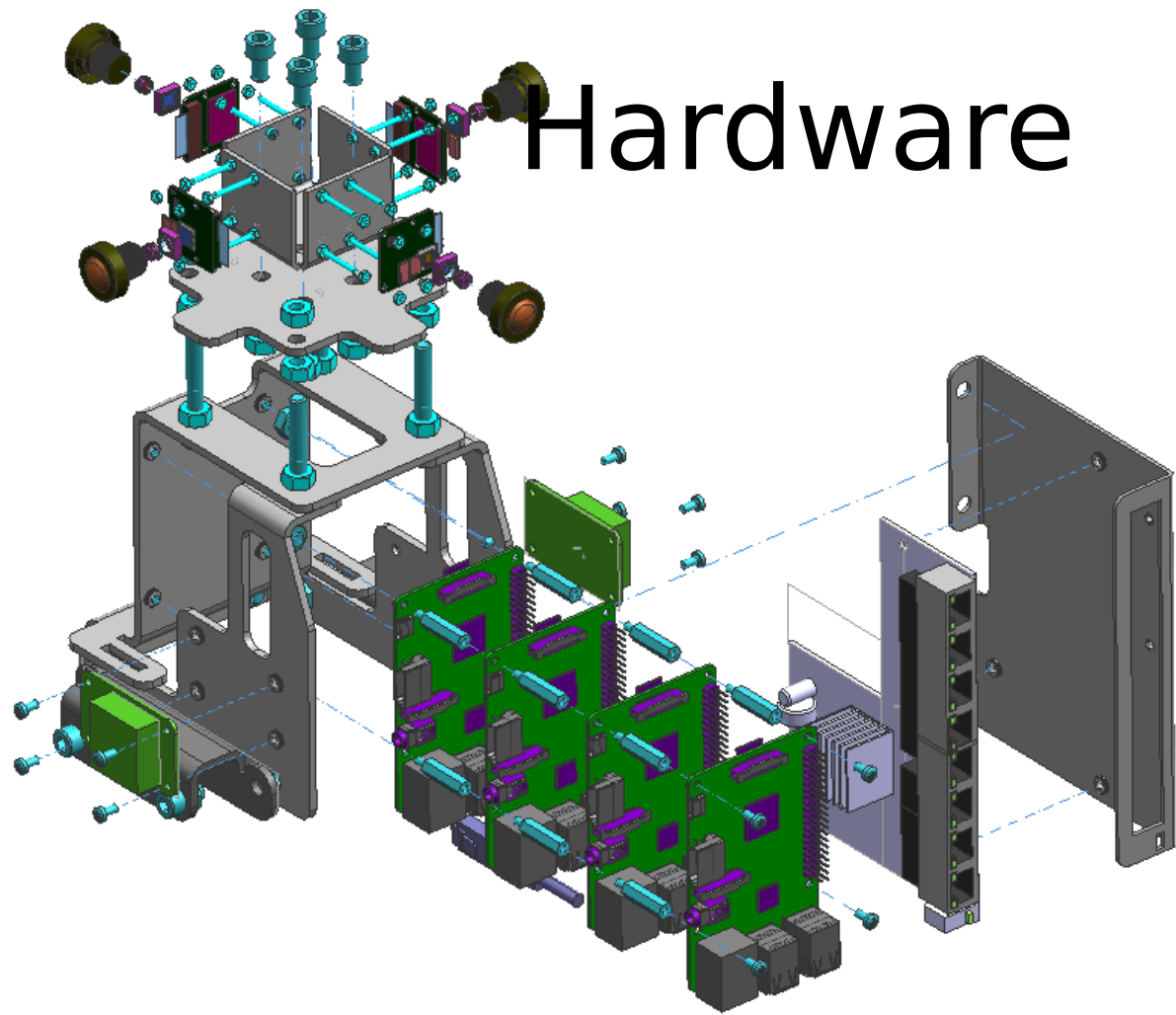


Hardware

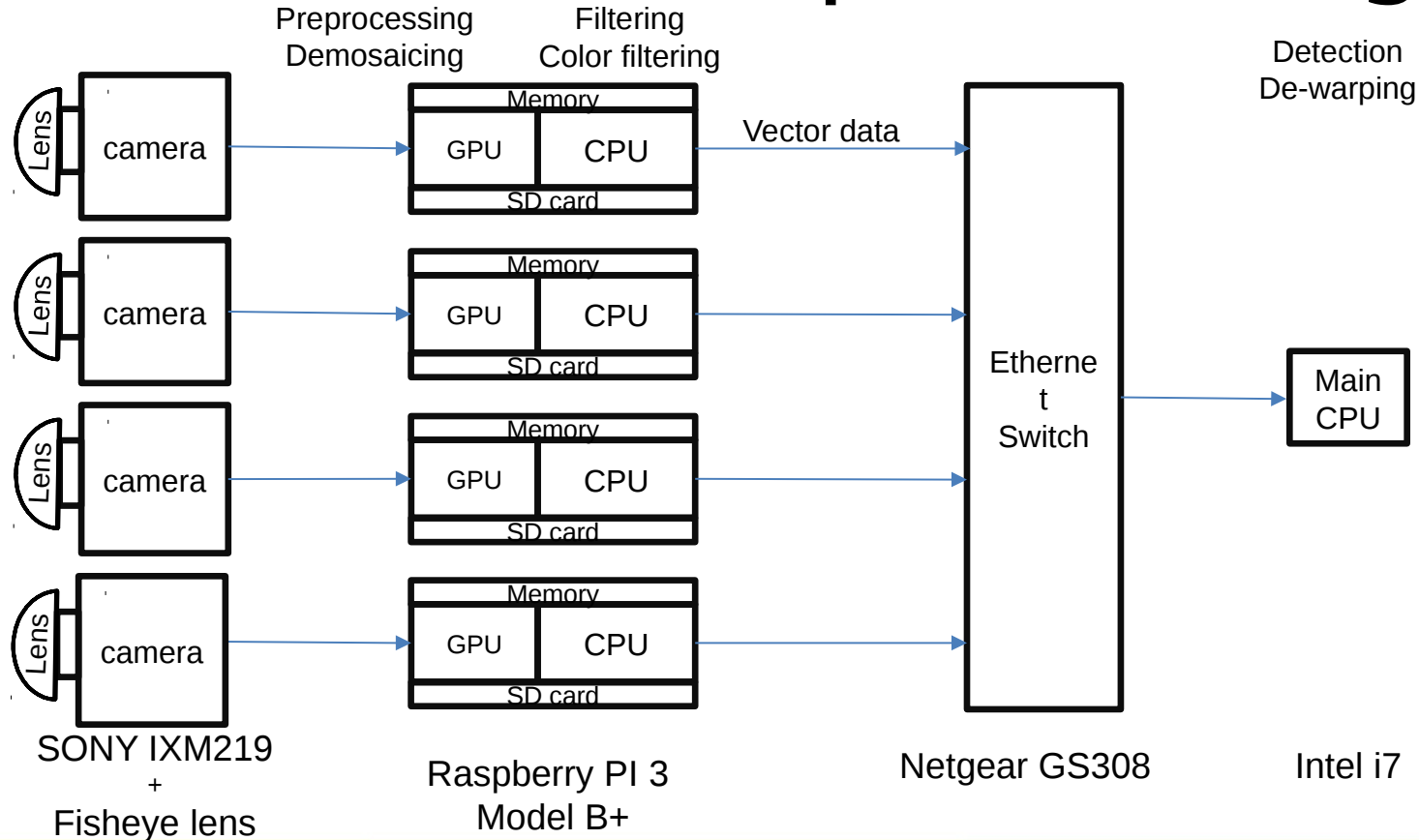
- Commercial parts
- Low cost of goods



Hardware



Current vision processing





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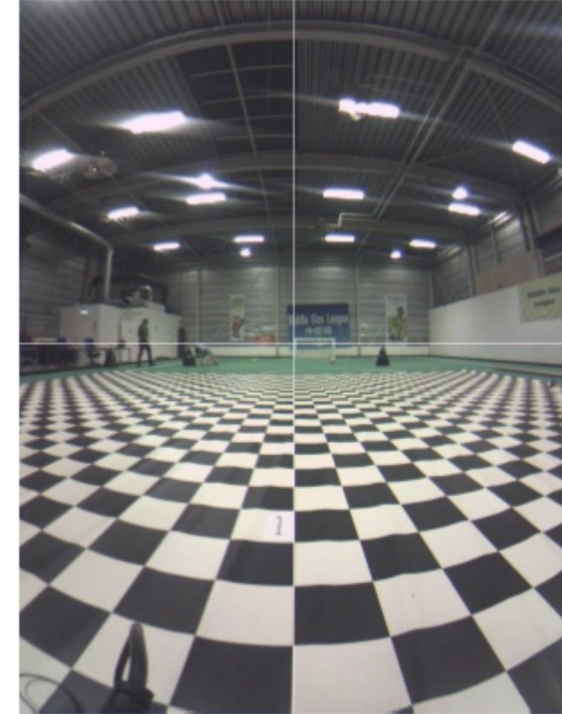
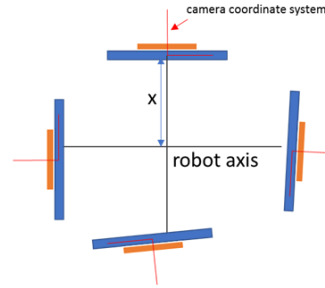
Challenges

- Dynamic calibration (color)
- Optical calibration (dewarp)
- More frames per second
- Dynamic camera range



Calibration

- Camera raw images have a large **fish-eye distortion**
- Camera's are **not mounted perfectly**,
- Previous linear-interpolation-based method + calibration procedure required **considerable effort** and resulted in **mediocre** accuracy



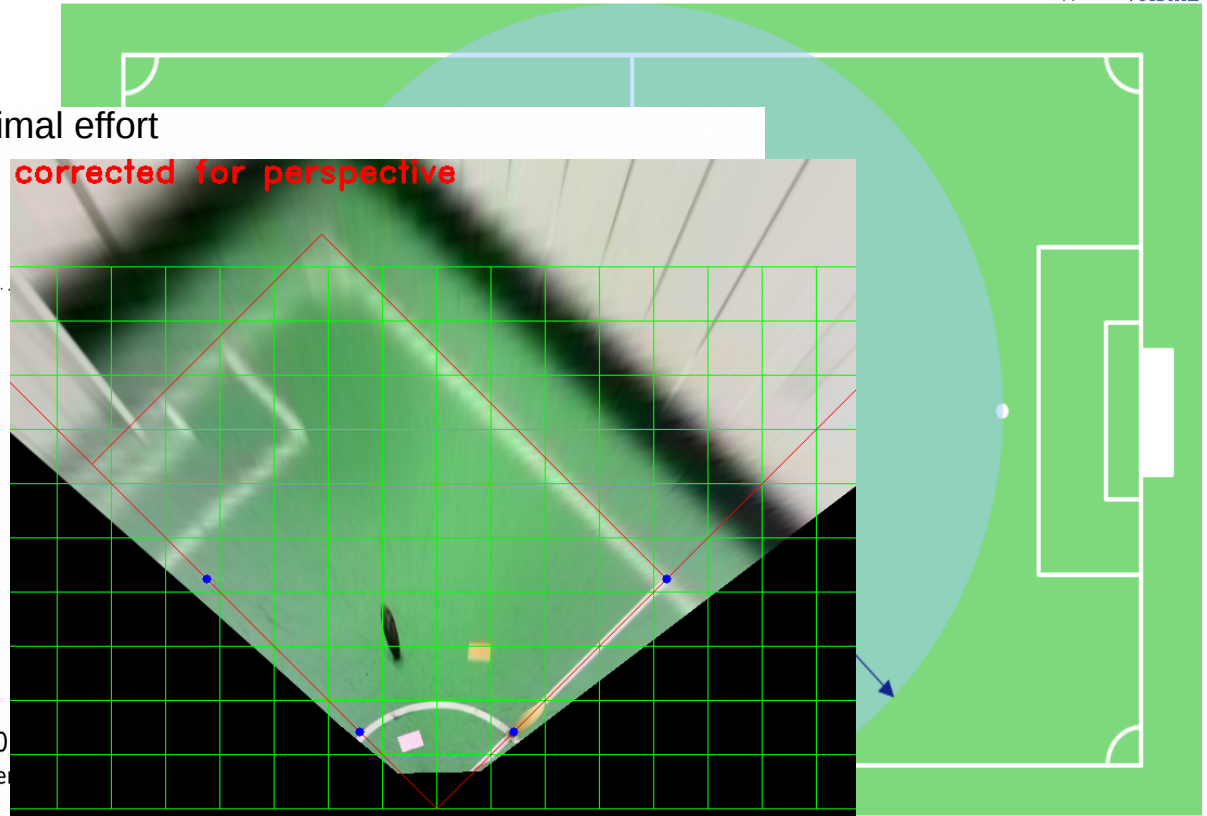
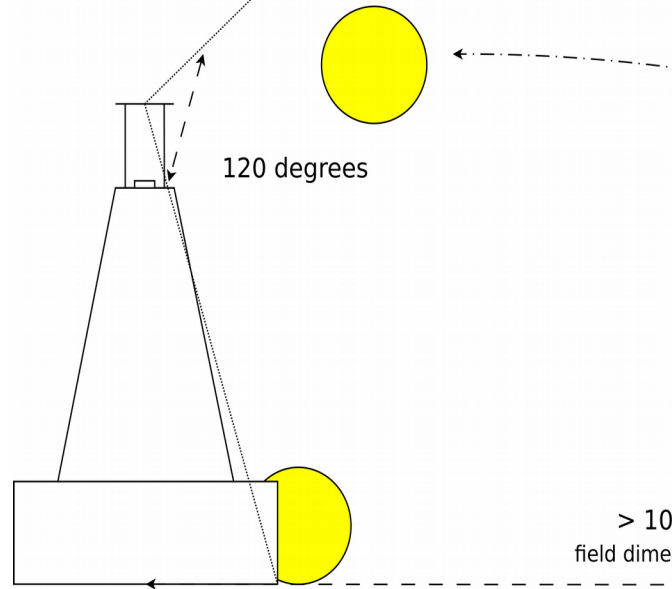
Goal: minimize calibration effort, maximize accuracy



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Conclusion

- Improved vision range
- See ball over 80 cm height
- Maximize accuracy with minimal effort
- Scalable solution



Future work



- Replace GPU by FPGA
- Implement synchronization of camera images
- Add more camera's



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