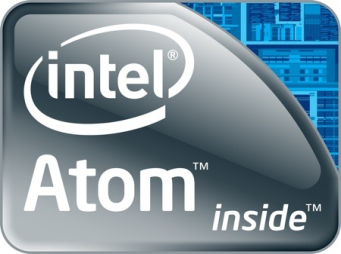
Appendix II

Key features of the RoboCup NAO 4

#### New ATOM head:



* Intel Processor:
  + **Intel® Atom™ Processor Z530**
  + (512K Cache, 1.60 GHz, 533 MHz FSB)
  + HyperThreading
  + Instruction Set: 32-bit
  + Instruction Set Extensions: SSE2, SSE3, SSSE3
* 1GB of DDR2 RAM
* 2GB of SATA Flash
* Minimum of 8 Go micro-SD Flash
* 2x HD Cameras (1280x960)

|  |  |  |
| --- | --- | --- |
|  | **V3.3** | **NAO 4** |
| **Pixel size** | 3.6µm x 3.6µm | 1.9µm x 1.9µm |
| **Resolution & fps** | Up to VGA@30fps | Embedded frame rates:  1280x960@30fps  640x480@30fps |
| **Sensitivity per pixel** | 1.3V/(Lux.sec) | 2.24V/(Lux.sec) |

* + Features:
    - Digital or analog binning
    - **4x more sensitivity** than v3.3

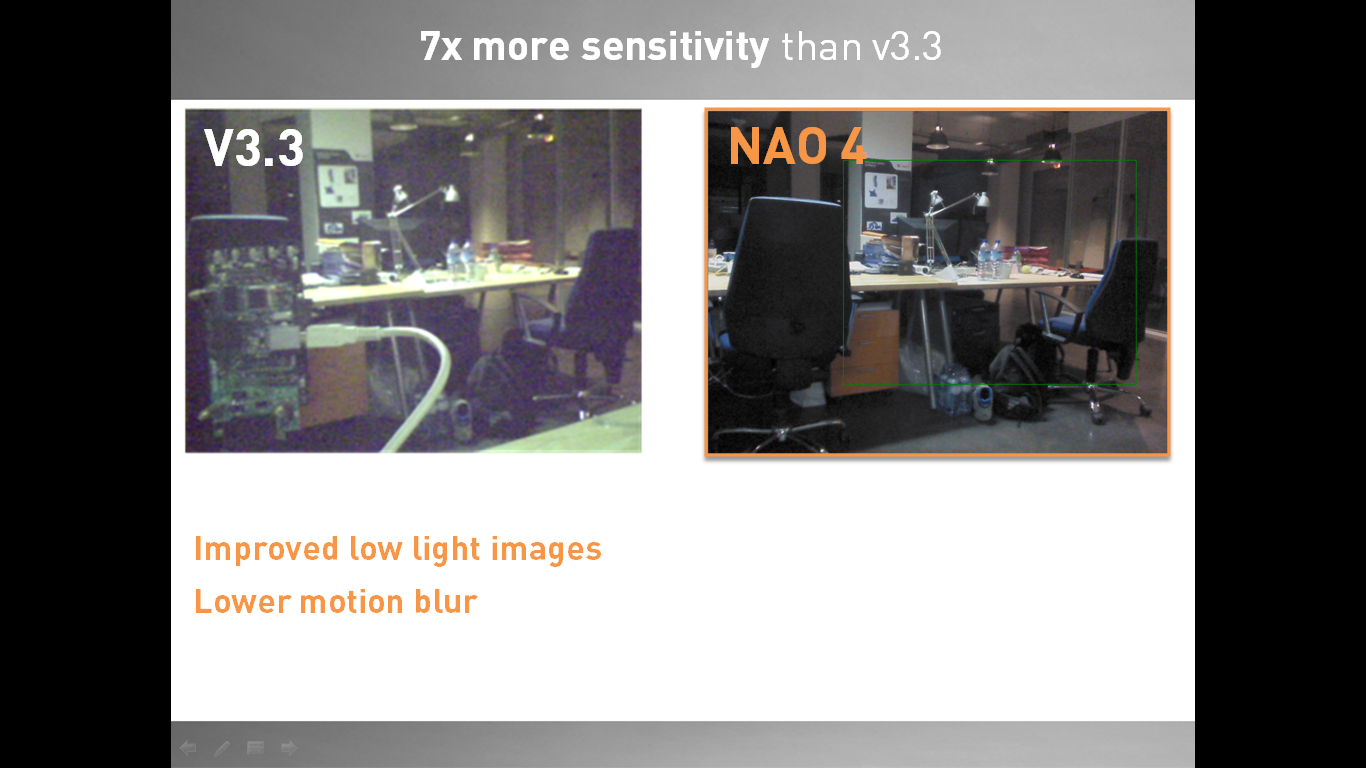


Figure : More sensitivity

* + - Camera Diagonal Field of View: **increased and overlapping**

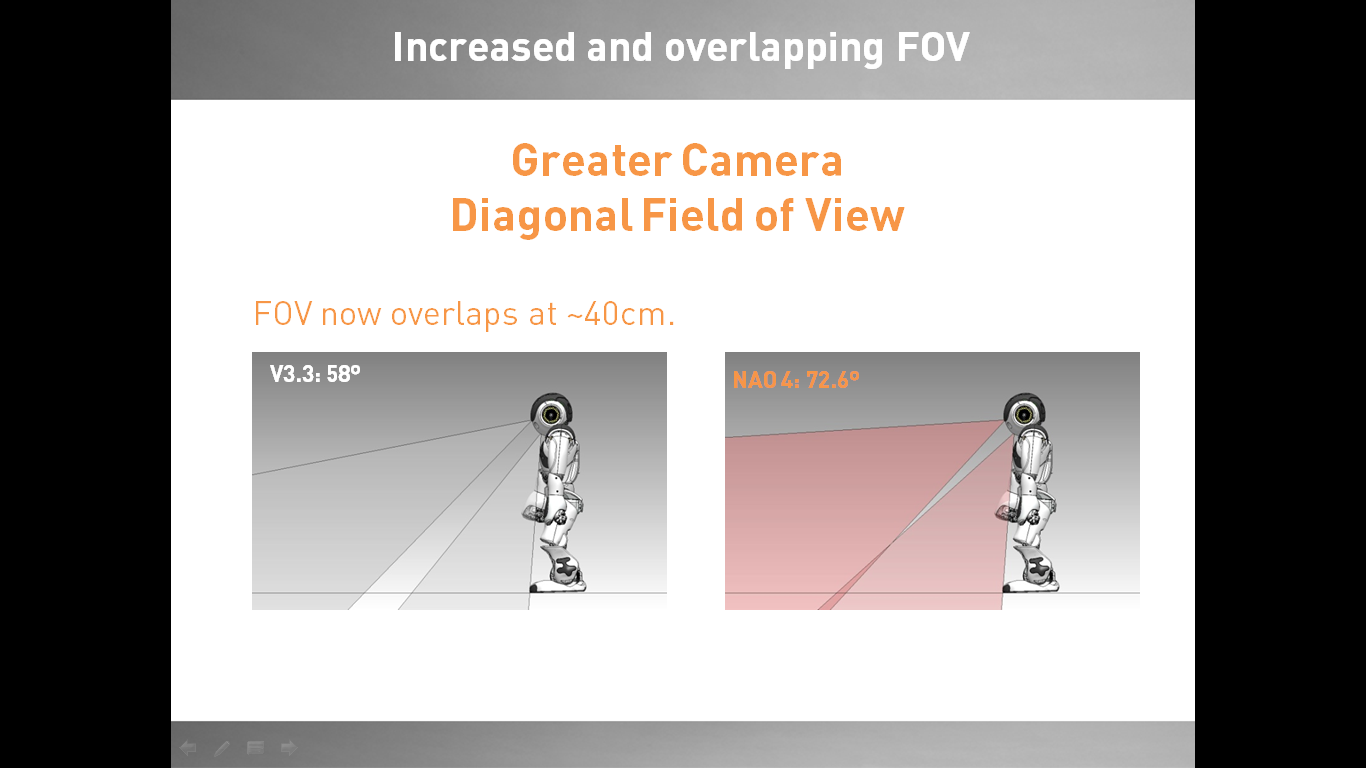


Figure : Increased and overlapping Field of View

* + - Dedicated and non-programmable FPGA: 2 simultaneous video streams
    - Rolling shutter issues divided by 2.5
    - **Low noise levels**
* Head thermal management:
  + **New Fan:** 2x more airflow
  + Airflow control redesign



Figure : Temperature Controlled Fan with laminar forced convection

* **New Skull/brain paradigm** 
  + Shock absorbers
  + New connectors with **high misalignment tolerances**



Figure : Shock absorbers (red arrow)

#### Body improvements:

* New spherical joints:
  + Better force distribution
  + Better elasticity coefficient

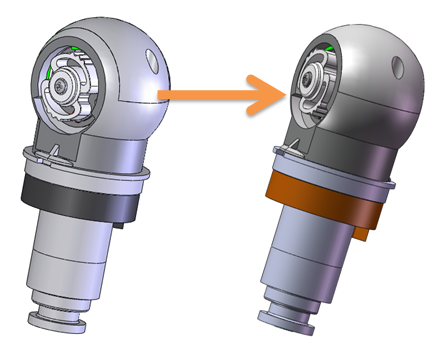


Figure : New spherical joints

* New motor boards (torso and legs) to improve motor thermal management: this improvement is in testing process and therefore subject to approval by the qualification team.
* Lighter robot due to new motor **Better motor integration**

