

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

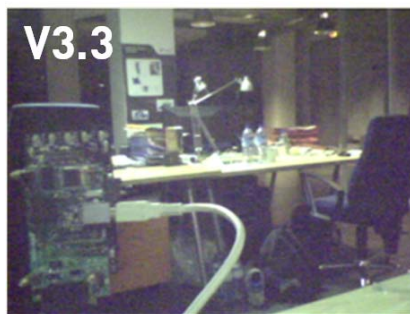


Figure 1: More sensitivity

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

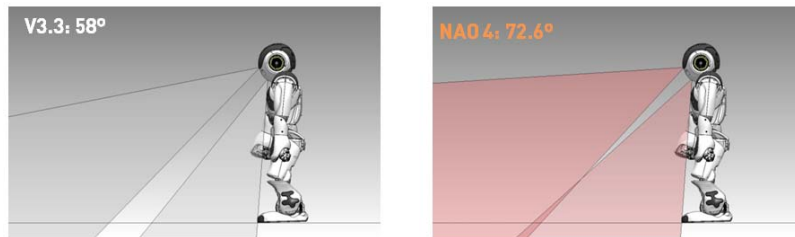


Figure 2: Increased and overlapping Field of View

- 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

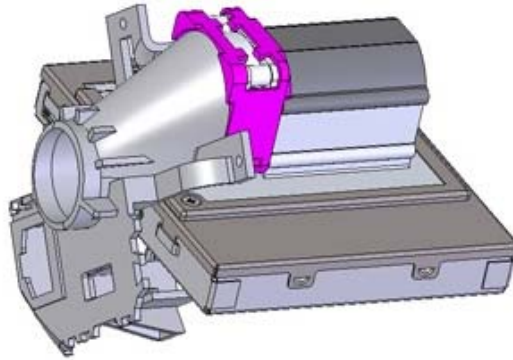


Figure 3: Temperature Controlled Fan with laminar forced convection

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

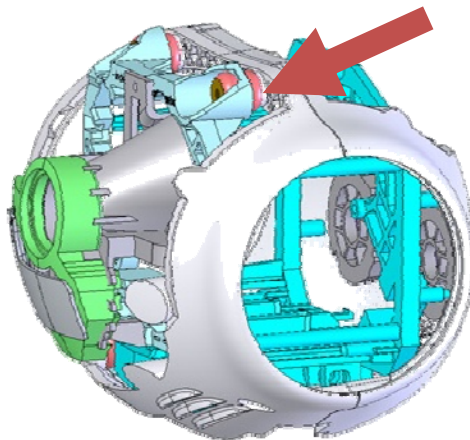


Figure 4: Shock absorbers (red arrow)

Body improvements:

- New spherical joints:
 - Better force distribution
 - Better elasticity coefficient

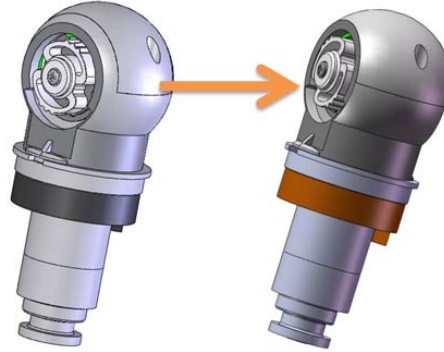


Figure 5: New spherical joints

- 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**

Annexe III

Agreement for the 2012 and 2013 Events between Aldebaran Robotics and the Robocup federation

	SPL		Regional	
	Products	Price excl VAT	Products	Price excl VAT
<u>New product acquisition</u>	5 RoboCup NAO 4*	16 000€	4 RoboCup NAO 4*	20 000€
Add'l product	1 RoboCup NAO 4*	3 200€	1 RoboCup NAO 4*	5 000€
Add'l charger	1 charger	140€	1 charger	140€
Add'l battery	1 battery	190€	1 battery	190€
<u>Full robot replacement</u>				
when 1 NAO 3.2	1 NAO 4*	2 750€	1 NAO 4*	4 000€
when 1 NAO 3.3	1 NAO 4*	2 750€	1 NAO 4*	4 000€
<u>Head replacement</u>				
Wether NAO 3.2 or 3.3	1 NAO 4 Head	690€	1 NAO 4 Head	750€
<u>Modification</u>				
when NAO 3.3 (only)	1 motor control board modification	890€	1 motor control board modification	1 000€

* includes charger and battery