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# A Appendix

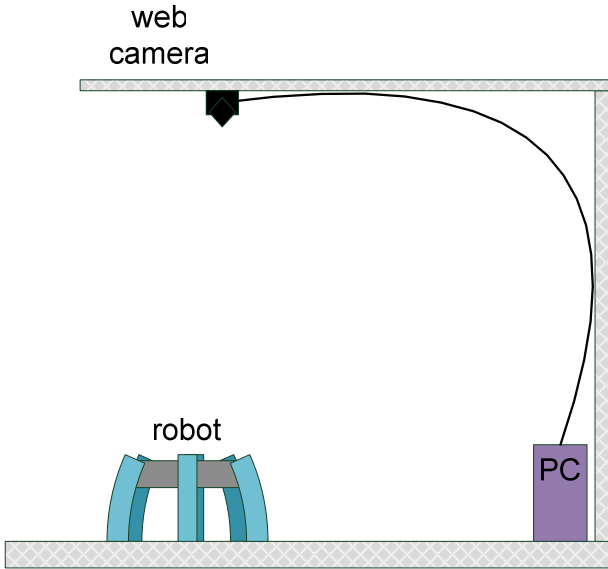
## A.1 Test Bed for Tracking the Robot OSCAR-X during the Experiments

The tracking of the robot's walking was done with a web camera and specially made tracking software utilizing the OpenCV library [Ope09] and its methods for blob tracking. There were also one red and one green circle placed on the robot (Figure A.1). The red circle was mounted on the back of the robot between legs 0 and 5 (Figure A.1, Figure A.3), the green circle on the front of the robot between legs 2 and 3 (Figure A.1, Figure A.3). The colored circles are recognized by the tracking software and a vector pointing from the red circle to the green circle shows the direction in which the robot is walking.

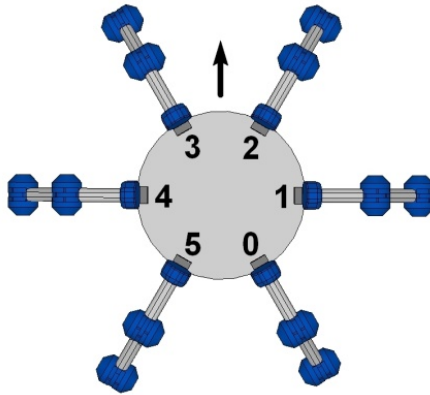
The test setup is presented in Figure A.2. The web camera is positioned about 4.5 meters above the terrain on which the robot is walking. The camera is connected to the computer (PC) where the tracking, recording of video, and logging of the orientation of the robot is done by the specially prepared tracking software.



**Fig. A.1** Setup of the robot OSCAR-X with red and green indicators that aid in tracking with camera.



**Fig. A.2** Schematic of the tracking setup for robot's walking with the web camera and a specially developed tracking software running on a computer (PC).



**Fig. A.3** Model of a hexapod robot with its legs numbered.

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## **Keywords**

Six legged robot, walking robot, hexapod robot OSCAR, fault tolerant walking robot, decentralized robot control architecture, robot anomaly detection, robot fault detection, artificial immune system, self-adapting, robot anomaly detection engine, RADE, robot leg amputation, robot leg ejection mechanism, R-LEGAM, S.I.R.R., swarm intelligence for robot reconfiguration, self-reconfiguration, self-reconfiguring hexapod robot, dynamically prolongation and shortening of robot's walking gait patterns, emergent robot gait synchronization, firefly synchronization, humanoid robot, self-synchronization, self stabilizing humanoid robot, S2-HuRo, biologically inspired approach, humanoid robot walking optimization, symbiosis, SelSta, symbiosis score, self-stabilization, self-optimization.

# Glossary

AIS	Artificial Immune System
BCU	Basic Control Unit
CPG	Central Pattern Generator
DAQ	Data acquisition
DOF	Degrees Of Freedom
OCU	Organic Control Unit
RADE	Robot Anomaly Detection Engine
S.I.R.R.	Swarm Intelligence for Robot Reconfiguration
OSCAR	Organic Self Configuring and Adapting Robot
ORCA	Organic Robot Control Architecture
PC	Personal Computer
S2-HuRo	Self Stabilizing Humanoid Robot
SelSta	Self-Stabilization (Approach)
SymbScore	Symbiosis Score
ZMP	Zero Moment Pole

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