



**RAWSEEDS: Robotics Advancement through Web-publishing of Sensorial and Elaborated Extensive Data Sets**

Politecnico di Milano (Coordinator)  
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# Mobile Robotics in a Nutshell

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- Perceive information about the environment;
- Extract from that information the elements needed to execute and assigned task;
- Decide which actions are needed to proceed towards the goal of the task;
- Correctly execute the selected actions;
- Manage the gap between the expected effect of the actions on the environment also taking into account dynamic environments;
- ...



# The Focus of RAWSEEDS

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*“An autonomous mobile robot should be able to move through the environment safely and without collision as well as being able to reach a goal location autonomously ... ”*

- Map Building
- Self Localization (with map given)
- Simultaneous Localization and Map Building

**Is there any market ready product ?**

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# Benchmarking Beyond Radish

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Nowadays we feel the lack of tools and methods to compare and evaluate market strength of products. To aim at these results we foster publishing of:

- Extended multi-sensor data sets for the testing of systems on real-world scenarios
- Benchmarks and methodologies for quantitative evaluation and comparison of algorithms/sensors
- Off-the-shelf algorithms, with demonstrated performances, to be used for research bootstrap and comparison.



# What is RAWSEEDS ?

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- A specific support action to collect and publish a benchmarking toolkit for (S)LAM research
- EU Funded Project in the VI Frame Program from the 1<sup>st</sup> of November 2006 to April 2009
- Involved Institutions:
- Politecnico di Milano (Italy – Coordinator)
  - Università di Milano-Bicocca (Italy – Partner)
  - University of Freiburg (Germany – Partner)
  - Universidad de Zaragoza (Spain – Partner)
  - (Spain – Partner)

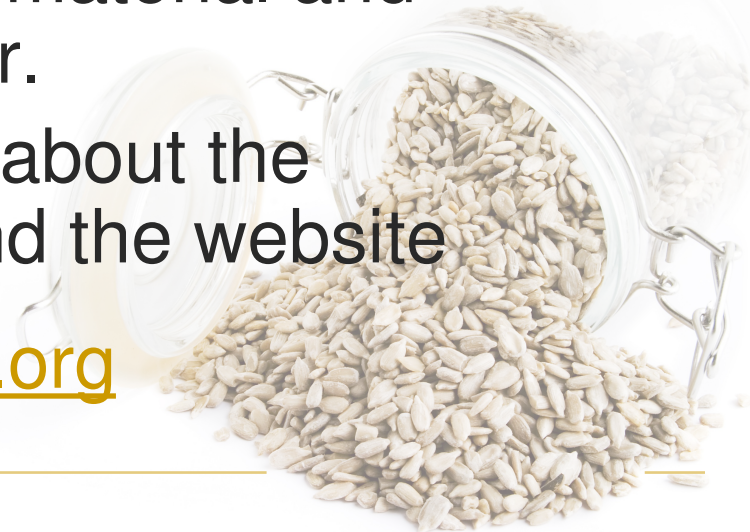


# The RAWSEEDS Objectives

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- Definition and collection of benchmarks and methodologies for the assessment/comparison of algorithms for (S)LAM
- Creation of a website from which researchers and companies will be able to download these benchmarks, contribute new material and communicate with each other.
- Dissemination of knowledge about the RAWSEEDS benchmarks and the website

[www.rawseeds.org](http://www.rawseeds.org)



# Algorithms Comparison

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Assessment and comparison of algorithms/methods in (S)LAM requires:

- Common data sets with ground truth
- Evaluation methodologies agreed in the community
- Automatic & Objective tools for evaluation

***RAWSEEDS aims at this!***



# Benchmarks Problems & Solutions

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The RAWSEEDS Toolkit is obtained through the combination of Benchmark Problems (BP) and Benchmark Solutions (BS).

Benchmark Problems aim at testing algorithms and include detailed:

- Description of the task
- Multi-sensor Data Set related to the task
- Evaluation Methodology and Tools





# Benchmarks Problems & Solutions

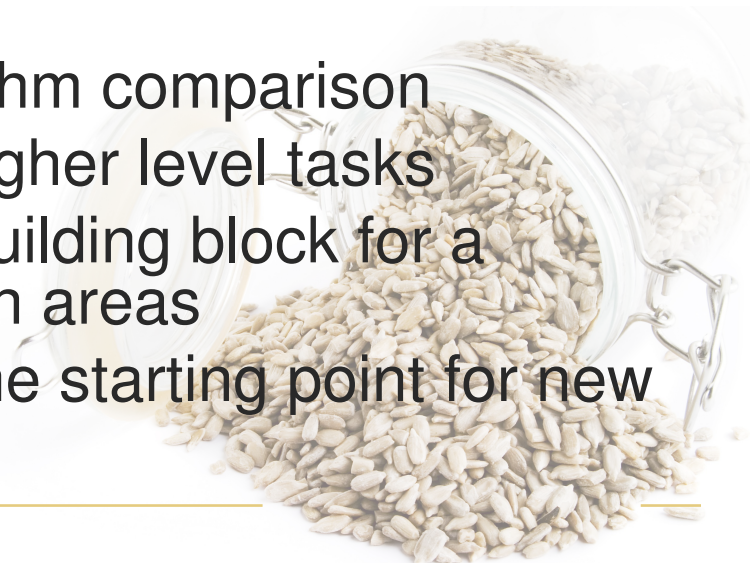
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Benchmark Solutions (BS) extend BPs with:

- Description of the algorithm for solving the BP
- Implementation (source code or binary)
- Algorithm output on the BP dataset
- Evaluation (using the BP methodology)

The use of Benchmark Solutions:

- Evaluation can be used for algorithm comparison
- Output can be used for feeding higher level tasks
- Implementation can be used as building block for a complete system in other research areas
- Implementation can be used as the starting point for new developments in (S)LAM



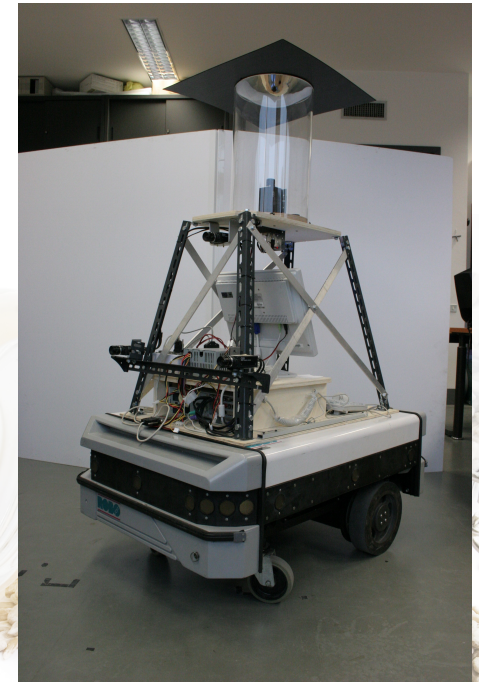
# RAWSEEDS Sensor Suite

- Use of an extensive sensing suite
  - B/W + Color cameras (mono/stereo)
  - 3D cameras
  - LRFs (2D)
  - Omnidirectional camera
  - Sonars
  - GPS and D-GPS
  - Other proprioceptives (odometry, gyros)
- Both cheap and expensive



# RAWSEEDS Scenarios

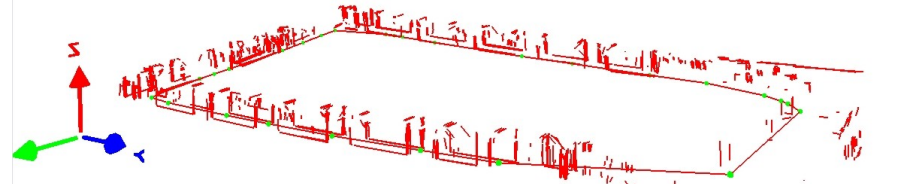
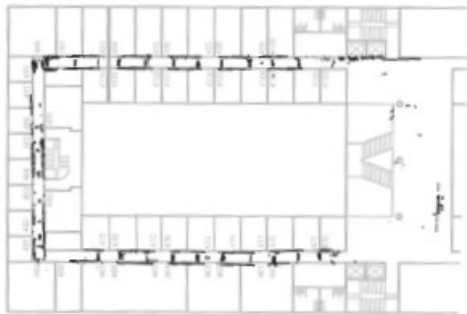
- Different scenarios and robot platforms
  - Indoor (e.g., office building, house, etc.)
  - Outdoor public roads
  - Outdoor moderately rough terrain & parks



# RAWSEEDS Solutions

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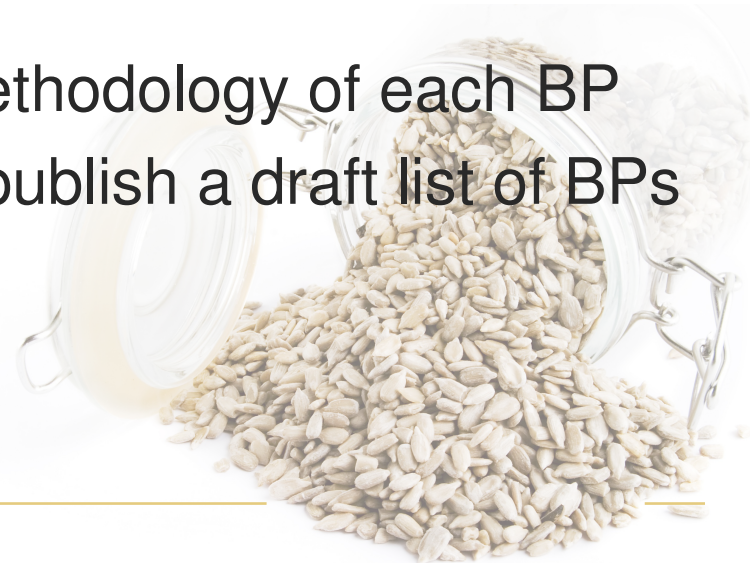
- State of the art solutions for the tasks will be provided such as:
  - Ground truth and planimetry
  - Occupancy grids and 2D maps
  - Full 3D maps



# RAWSEEDS Contributors

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- BPs provided mostly by RAWSEEDS project partners
- BSs provided by RAWSEEDS and (mainly) from the community at large so ...
- Contribute with:
  - The definition of evaluation methodology of each BP
  - The definition of BPs (we will publish a draft list of BPs in the next months)
  - YOUR solution (BS) to a BP



# Contact RAWSEEDS

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Thanks for your attention and please  
get in touch with us!

- [info@rawseeds.org](mailto:info@rawseeds.org)
- [www.rawseeds.org](http://www.rawseeds.org)

This presentation and other material will be available with  
the beginning of the project

