ROSIN: ADVANCING ROS IN EUROPE

Carlos Hernandez, TU Delft

ROS-I Conference 2018, Dec 11, Stuttgart

rosin-project.eu

**Cognitive Robotics Department**

- Robot Dynamics
  - Motion planning and control
  - Prediction-error minimization
- Robot software
  - Model-based self-adaptation for autonomy through metacontrollers

Team Delft winning Amazon Robotics Challenge 2016

© ROSIN – ROS-Industrial Quality-Assured Robot Software Components
ROS-INDUSTRIAL QUALITY-ASSURED ROBOT SOFTWARE COMPONENTS

- ROSIN: 4 years, ~8 million EUR IA H2020-ICT-2016-1
  - Speed-up the industrial uptake of advanced robotics applications.
  - Builds upon the ROS-Industrial Europe community, to make it sustainable and leading worldwide.

- H2020 EU Digital Industrial Platform for Robotics

... and more
ROS-INDUSTRIAL QUALITY-ASSURED ROBOT SOFTWARE COMPONENTS

- ROSIN Activities

  - Quality Assurance tools
  - Education in ROS-Industrial
  - Funding robot software development
Quality Assurance

17:00  Quality Assurance Initiatives and Tool Development for ROS

Adam Alami & Zhoulai Fu
IT University of Copenhagen
ROSIN Education

16:10  Training and Education Activities
Stephan Kallweit, FH Aachen
Jonathan Hechtbauer, Fraunhofer IPA
TOC

- ROSIN introduction
- ROSIN Education Delft
- ROSIN Focused Technical Projects
  - Application process
  - Call Results
  - Projects results (teaser)
@ TU DELFT CAMPUS

- 800 M² FOR ROBOTICS
- CONNECTS END-USERS <> ROBOT DEVELOPERS
- ROS-INDUSTRIAL TRAININGS, TESTING FACILITIES, WORKSHOPS

2019 TRAININGS:
FEBRUARY 14, 15
MAY 16, 17
Hello (Real) World with ROS – Robot Operating System

DelftX - ROS1x
Ended - Oct 31, 2018

Learn the fundamentals of ROS – Robot Operating System
to create advanced real-world robotic systems
ROSIN Internships

- Opportunity to sponsor ROS-I Schools and connect with talented, enthusiastic students.
ROSIN Focused Technical Projects

15:10 Experiences and Outcomes of ROS Developments

Nobleo Projects
Roboception
Pilz
PPM Robotics AS
Grants for robot software development: Focused Technical Projects

**What service?**
- **Finance ROS open source development**
  - **Concrete industry need:** driver, algorithm, application template, license or code audits…
  - We fund 1/3 of the development efforts
  - Up to **EUR 100K** ~ 1 year duration
  - Also **ROS education** actions

**Who can benefit?**
- Robot software **developers** and **users**: companies, research centers…
- EU H2020 program eligible entities (small consortiums)

**How to apply?**
- **Open call till 2020** at: [http://rosin-project.eu/ftps](http://rosin-project.eu/ftps)
- **Simple** application template (~5 pages):
  - What / How / Proof of commitment

> next cut-off April 5th
Scope of FTPs

- All industrial application areas:
  - Manufacturing, but also
  - Intralogistics
  - Agriculture
  - Drones
  - ...

- ROS(1) and ROS2.0
Scope of FTPs

Target a **concrete business need**, i.e.: software development, definition of technical standards, security and license audits, etc.

- **HW-related components**, e.g. drivers, configuration tools;
- **ROS Enhancement Proposals (REPs)**: REPs are akin to, e.g. IEEE standards with a reference implementation of a working system;
- **algorithms**: e.g., a SLAM algorithm which currently exists only as a MATLAB implementation;
- “**application templates**” driven by **concrete use cases**, e.g. a configurable software component for a palletizing work cell;
- **improvement of existing components**, e.g., Rviz, the ROS navigation stack;
- **process-related work**, e.g. code security audits.
- **improvement of documentation**: technical manuals, deployment guides, etc.
- **integration with other software frameworks**

… (this is a non-exhaustive list)
How to Apply

**FTP submission**

*Who*
FTP applicants: H2020 eligible robot sw developers and users

*When*
Anytime! we are open to new applications

*Where*
http://rosin-project.eu/ftps

*How*
Simple template (~5 pages)
Focused, well-defined goal
Clear work plan: Milestones
Compromise to fund M2, M3

**Evaluation and selection**

*When*
4 times a year

*Who*
Experts from ROSIN and ROS-I community

*How*
Criteria available online in the Applicant’s Guide

**Contract agreement**

*Who*
ROSIN FTP applicants

*When*
immediately upon selection

*What*
Contract agreement
ROSIN funds 33% (M1)
Applicants fund 67% (M2,3)

ROSIN pays
40% of M1
FTP budget and ROSIN grant

- ROSIN grant funds up to **33% of person months of software development**
- Additional project costs are **not considered** when calculating the requested ROSIN contribution:
  - Over-head costs > *lump sum*
  - Hardware
  - Travelling
  - Demonstrators

Total project budget

Max ROSIN contribution

33%
**ROSIN FTP Contract**

FTP applicants:

- **Obligation by the applicants to execute the development** planned for **M1** in the FTP in time, specifically Milestone 1.
- **Commitment to fund the remaining 2/3 of the project** (payment schema)
- **Commitment to collaborate with other selected FTPs with overlapping scopes.**
- **Lump sum** schema for costs.
  - No time sheets or overhead costs
- The FTP results need to be open source under **appropriate open-source license**.
  - Apache 2.0 license recommended
    - Business friendly, standard in ROS-industrial community.
  - Background IP can be defined.
Overview 6 FTP calls

- Cum. sum
- FTPs

<table>
<thead>
<tr>
<th>Month</th>
<th>FTPs</th>
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<tbody>
<tr>
<td>Jun 2017</td>
<td>2</td>
</tr>
<tr>
<td>Nov 2017</td>
<td>5</td>
</tr>
<tr>
<td>Apr 2018</td>
<td>10</td>
</tr>
<tr>
<td>Jun 2018</td>
<td>8</td>
</tr>
<tr>
<td>Sep 2018</td>
<td>9</td>
</tr>
<tr>
<td>Nov 2018</td>
<td>21</td>
</tr>
</tbody>
</table>
Overview 6 FTP calls

- Under review: 21
- Rejected: 10
- Granted: 24
Funding available 2019-20 (forecast)

- 55.1% After round 6
- 44.9% Remaining funding
Geographic distribution FTP applicants
Organization type

- Company: 14.5%
- OEM: 5.5%
- SME: 5.5%
- System Integrator: 7.3%
- Research Center: 16.4%
- University: 50.9%
Project Category

- Driver: 26.2%
- REP: 15.5%
- Algorithm: 14.6%
- Application: 19.4%
- Improvements: 12.6%
- Security Audit: 6.8%
- Code review: Other
FTP successful stories: selected June and Nov. 2017

http://rosin-project.eu/results

**Robotics Language**

<table>
<thead>
<tr>
<th>Champion</th>
<th>Robot Care Systems, Netherland</th>
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<tbody>
<tr>
<td></td>
<td><a href="https://github.com/robotcaresystem">https://github.com/robotcaresystem</a></td>
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**Ensenso-ROSIf**

<table>
<thead>
<tr>
<th>Champion</th>
<th>Ensenso GmbH, Germany</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><a href="http://wiki.ros.org/ensenso_driver">http://wiki.ros.org/ensenso_driver</a></td>
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**Visard4ROS – Easy to use 3D vision for robots**

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<th>Champion</th>
<th>Roboception, Germany</th>
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<tbody>
<tr>
<td></td>
<td><a href="http://wiki.ros.org/rc_visard">http://wiki.ros.org/rc_visard</a></td>
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</table>
### FTP in execution – Selection Nov. 2017

<table>
<thead>
<tr>
<th>Coverage Path Planning and Control</th>
<th>ZIVID-ROS</th>
<th>ROSdyn</th>
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<tbody>
<tr>
<td><strong>Champion</strong></td>
<td><strong>Champion</strong></td>
<td><strong>Champion</strong></td>
</tr>
<tr>
<td>Nobleo Projects BV, Netherland</td>
<td>Zivid Labs, Norway</td>
<td>CNR-ITIA, Italy</td>
</tr>
</tbody>
</table>
FTP in execution – Selection April 2018

**Industrial trajectory generation for MoveIt!**
Champion: Pilz GmbH & Co. KG, Germany

**Pattern Manager**
Champion: Danish Technological Institute, Denmark

**PAL Robotics**
Statistics Framework
Champion: PAL Robotics, Spain
https://github.com/pal-robotics/pal_statistics

**ARViz: Augmented Reality Visualizer for ROS2**
Champion: Robotics Group of Rey Juan Carlos University, Spain

**ROSWELD**
ROS based framework for planning, monitoring and control of multi-pass robot welding
Champion: PPM AS, Norway
FTP in execution – Selection June 2018

AEROSTACK 3.0: Aerial robotics framework for the industry
Champion: Universidad Politécnica de Madrid, Spain
https://github.com/vision4uav/aero

HRIM: The Hardware Robot Information Model
Champion: Erle Robotics S.L., Spain
https://github.com/erlerobot/HRIM

ROS industrial indoor positioning system
Champion: Inovasyon Mühendislik Ltd Sti., Turkey
https://github.com/inomuh/indoor_j

Earth Rover ROS – The Open-Source Agrirobot
Champion: Earth Rover Limited, United Kingdom

ROS IMC drives interface
IMC drives
Champion: Beta Robots, Spain

Rvis2AR
Champion: Awesome Technologies Innovationslabor GmbH, Spain
## FTP in contract phase – Selection Sep. 2018

<table>
<thead>
<tr>
<th>Company</th>
<th>Country</th>
<th>Component</th>
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</thead>
<tbody>
<tr>
<td>Alias Robotics</td>
<td>Spain</td>
<td>RedROS-I</td>
</tr>
<tr>
<td>PAL-Robotics</td>
<td>Spain</td>
<td>ros_control</td>
</tr>
<tr>
<td>Me-Meßsysteme GmbH</td>
<td>Germany</td>
<td>CalibROS-FTX</td>
</tr>
<tr>
<td>Universal Robots A/S</td>
<td>Denmark</td>
<td>Universal Robots ROS-Industrial Driver</td>
</tr>
<tr>
<td>NGi Systems</td>
<td>England</td>
<td>ROS2AR</td>
</tr>
<tr>
<td>Bosch Eng GmbH</td>
<td>Germany</td>
<td>RoScan</td>
</tr>
<tr>
<td>Inovasyon Muhendislik Ltd</td>
<td>Turkey</td>
<td>Prognostics and Health Management Tool for ROS</td>
</tr>
</tbody>
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SUMMARY

- **ROSIN FTP funding**
  - Open-source software industry-ready
  - ~1 year 33% costs, (typically 50-100K grant)
  - Simple and quick application process

- **Training:**
  - edX MOOC
  - On-site: RoboHouse in Delft, Stuttgart and Aachen
More information

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http://rosindustrial.org

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More information: http://rosin-project.eu/
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