The Intuitive ROS UI: FlexGui 4.0
introduction and industrial applications

Laszlo Nagy
PPM AS
02 November, 2016
PPM AS

- International high-tech robot-system integrator and software house
- Making robotization user friendly, highly flexible and cost efficient
- Developing cutting edge industrial robot installations and software for industrial robots
- Full member of ROS Industrial Europe
PPM AS – Industrial experience

......turning innovation into flexible automation....
Users know your software through the UI

Best software ever made
Windows Mobile 2003

Best software ever made
iOS 1.0

Touch screen phones are totally hopeless!

I must preorder two months before anyone has seen it!

I rather take a Blackberry with full QWERTY keyboard...

Let’s wait in a line overnight!
FlexGui Applications

Graphical Program Editor

Welding Monitor

Graphical Palletizing

....turning innovation into flexible automation....
Industry 4.0 → FlexGui 4.0

• Transparent access to all devices on a production line
• “Mobile phone” like interface
• Drag’n drop GUI to any application
• Open source (the source is on the ROS GitHub)
• Platform independent
• Based on ROS
## FlexGui 4.0 Components

<table>
<thead>
<tr>
<th>Feature</th>
<th>Industrial Apache License</th>
<th>Professional Commercial License</th>
<th>Enterprise Commercial License</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>FREE!</td>
<td>Contact us</td>
<td>Contact us</td>
</tr>
<tr>
<td>Offline work</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debug</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drag &amp; Drop</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fly &amp; Drop</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi Language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scripting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camera Image Editor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Sculpt Editor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced MACB Mode Support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No-Coding Wizard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Scripting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy Editing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon Background</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi Line Joints</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3D Lines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online Import support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cylinderized Cone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massstruc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote Mode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Themes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factory Designer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alarm Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pullferring Editor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spot Welding Monitor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pick &amp; Place</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphical Program Editor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDFisk</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Components by Connections

FlexGui
Expert PC

- Alarms Fidget
- Messenger Fidget
- Factory Designer
- Remote View
- Camera Fidget

FlexGui
Web Server

- Alarms service
- Online Expert Site

Linux PC
Raspberry Pi

- FlexGui Node
- Hyundai Link
- HIWIN Link
- FD Link
- Alarm Management
- Expert Site Link
- Camera HUB

ROSbridge

- ROSbag+
- ROScore
- MODBUS driver

- FD RT 5ms
- Robot
- PLC
- PLC

Hyundai Robot
Hyundai Robot
Nachi Robot
Nachi Robot
Network Camera
Network Camera
Network Camera

- UI layer
- Service layer
- ROS layer
- Hardware layer
Training setup
How to get FlexGui 4.0?

- Training page: [http://training.flexgui.net](http://training.flexgui.net)
- Homepage: [http://flexgui4.ppm.no](http://flexgui4.ppm.no)
  - Product description, documentation, on-line trial
- ROS: [github.com/ros-industrial/flexgui_industrial](https://github.com/ros-industrial/flexgui_industrial)
  - Open source download
Contact information

Laszlo Nagy
Head of Software Development
laszlo.nagy@ppmas.no

Balint Tahi
Senior FlexGui Developer
tahi.balint@ppmas.no

Trygve Thomessen
Managing Director
tth@ppm.no

PPM AS
Leirfossveien 27
NO-7038 Trondheim, Norway
Phone: +47 73 96 50 50
Email: www.ppm.no
Training steps
Registration

- Open training.flexgui.net
- Register
- FlexGui connects to ROS automatically
- The prepared screens work right away
Personalized welcome

Welcome László Nagy to FlexGui 4.0

FlexGui 4.0 is the latest graphical interface from PPM running on PC, Android and iOS. With FlexGui you can create beautiful and intuitive user interfaces easily, that are adapted to any operator’s skill.

With FlexGui you don’t need documentation, because the UI can talk for itself, and you can place built in help if required. This wizard is an example how to lead the user. We hope you enjoy our demo!

To open the FlexGui website, click the button below.

To start the training click the Start button!

First sight
- Screen belt
- Fidget belt
- Opening a website
- Opening a screen
- Opening properties of a Fidget
- Modifying a screen
Explaining the basics of figdets

Fidget basics
- Explaining data bindings
  - One way
  - Two way
- Explaining expressions
- Robot connection
  - Explaining the program running
- Local variables
- Image handling
- Simplicity
Placing some fidgets

The first fidgets
- Place
  - Progress bar
  - Checkbox
  - Boolean
- Set up robot variables
  - Integer
  - Output
- Inspect changes
- Alarms start to work
Competition one

Hacking the system
- The integer should be set outside of the allowed range
- Alarms start to ring
Competition two

Your norwegian name
- Find the topic called /norwegian_names
- Select your name using your ID
- Publish your name on the /my_norwegian_name topic
Replacing the robot

Switch NACHI to Hyundai
- We use the same node name
- Everything works as before
- True device independency
If there is time left: Language change

Everyone tries to change
- All properties and fidgets change their language
- Inspect menus
- Inspect helps
Additional slides
Demo 3 – Scriptable Alarm Definition

Custom Scripts
- Full JavaScript logic
- Kept simple
- Combine parameters
Demo 3 – FG ExpertSite Multiple Factory Management

Widget System
- Factories
- Alarms
- Multimedia Messages
Demo 3 – Diverse Alarm Possibilities

Push Messages

SMS messages
Demo 3 – Inspect the problem

Remote Access
- Over VPN
- All device variables
- Camera images
- History Mode
- Real Time Synchronization
Demo 3 – Prepare a solution

Remote Access
- Over VPN
- All device variables
- Camera images
- History Mode
- Real Time Synchronization
Demo 3 – Wait for the call

Remote Access
- Over VPN
- All device variables
- Camera images
- History Mode
- Real Time Synchronization
Demo 3 – Amaze the customer with 5s response time

- Not even an expert is required
FlexGui 4.0 – case setup

• **level 0:** Multi-factory monitoring and control
  (example; View status of factories, remote control, contact the local operator (audio, video, text))

Only 1 button press!

I need assistance
FlexGui 4.0 – case setup

- **level i: Factory monitoring and control**
  (example; View status of the factory and get access to any device by double click on the icon)
FlexGui 4.0 – case setup

- **level ii**: Device monitoring and control
  (example; View status and manufacturing data of one of the robots in the production)
FlexGui 4.0 – case setup

• **level ii**: Device monitoring and control
  (example; View the current status of the robot program being executed)
FlexGui 4.0 – case setup

• **level ii**: Device monitoring and control
  (example; View / playback error messages and synchronous video from the production)
FlexGui 4.0 – case setup

• **level iii:** Device operation – std interface
  (example; Safe remote monitoring / operation of the robot to assist the local operator duktion)
FlexGui 4.0 – case setup

• level iii: Device operation – FlexGui interface
  (example; Programming and operating the robot by FlexGui)
FlexGui 4.0 licenses

Additional Packages
- Optional Packages Trial
- Enterprise Trial
- ROS Industrial
- Advanced Drivers Trial
- ROS Device Drivers

Free of charge
- Optional Packages
- Application Packages
- Support Packages

Optional Packages
- Enterprise Packages
- Professional Package
- ROS Industrial Package

Enterprise
- High Performance FlexGui Core