PackML

Business Analytics Dashboard

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ROS-I Asia Pacific Program Manager
• PackML collaboration project with 3M, SwRI, ARTC, PlusOne Robotics

• **Benefits:** Ability to run ROS across multiple OEM PLCs for manufacturing plants for communication between PLCs, increased interoperability, modular and efficient

• **Current Status:**
  – **Developed** open-source C++ library (Boost) or python (SMACH)
  – **ROS as PackML Master,** Remote PLC as an equipment module

PackML (Packing Machine Language) state machine commonly used by PLCs in packaging
PackML Demonstration

Aim: PackML state transitions initiated from PackML GUI

Benefits:
• State machine applied to ROS C++ node for any industrial application
• State control reporting ROS-I messages, reusable GUI widget

Contributed by: PlusOne Robotics

16 May 2017 Global ROS-I Community Meeting
**Approach**

- Open source tools will be used to create the Dashboard, there is no need to “invent the wheel” on any components, leveraging the benefits of ROS.
- The components for development are available gui (QT), plots (pyqtplot) and communication with the robot (ROS).
- A generic PackML test system is available to developers for testing.
- A web-based Ruby on Rails implementation of the dashboard is desirable for operation on ANY system (windows, tablet, etc.).

**Metrics for success:**

- GUI demonstration on PackML system

**Motivation/Objective**

- **Motivation:**
  - Displaying the real-time OEE allows the end-user to measure and increase the ROI of the robot asset.
  - Standardization using the PackML state machine allows for swift implementation and reporting.

- **Objectives:**
  - Real-Time Pareto Analysis
  - Instantaneous & Historical OEE (Overall Equipment Effectiveness)
  - QT & Ruby on Rails implementation
  - Example code and documentation

**Scope Of Work**

- **Developer 1**
  - Task: QT implementation of OEE displays
  - Schedule: 1 week
- **Developer 2**
  - Task: QT implementation of Pareto Analysis
  - Schedule: 1 week
- **Developer 3**:
  - Task: Documentation, Examples & Testing
  - Schedule: 2 week
- **Developer 4**:
  - Ruby on Rails implementation of the Dashboard
  - Schedule: 3 weeks
Data from State Transitions: -

- Execute
- Hold
- Suspend
PackML Call for Contributors

Current Contributors:

• ROS-I AP: Mingli Han, SMACH and remote plc
• PlusOne Robotics: Shaun Edwards, C++ Package
• 3M: Schoen Schuknecht, Lex Tinkett, Tom Strey: PLC and PackML support
• SwRI: Austin Deric, Paul Evans

• Call for contributors and testers: C++ Package, SMACH
• Call for contributors for next phase (3-4 months)
  – Business Analytics Dashboard
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