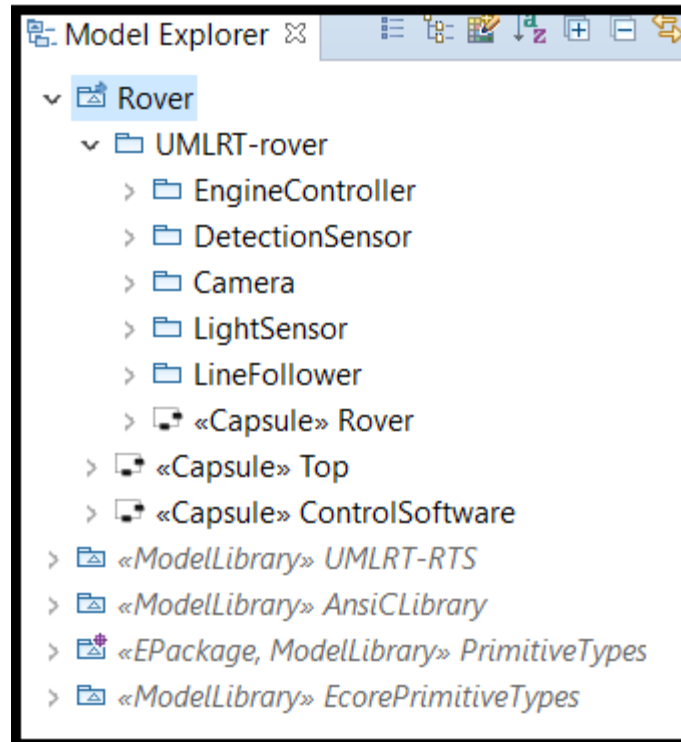


Customizing Papyrus-RT for Model-Driven Development of Rover Software

Supervised By: Dr. Juergen Dingel

Sudharshan Gopikrishnan, Nicolas Hili
Queen's School of Computing

The Problem ??



Problem Statement



How to change or verify the design configurations with ease ?



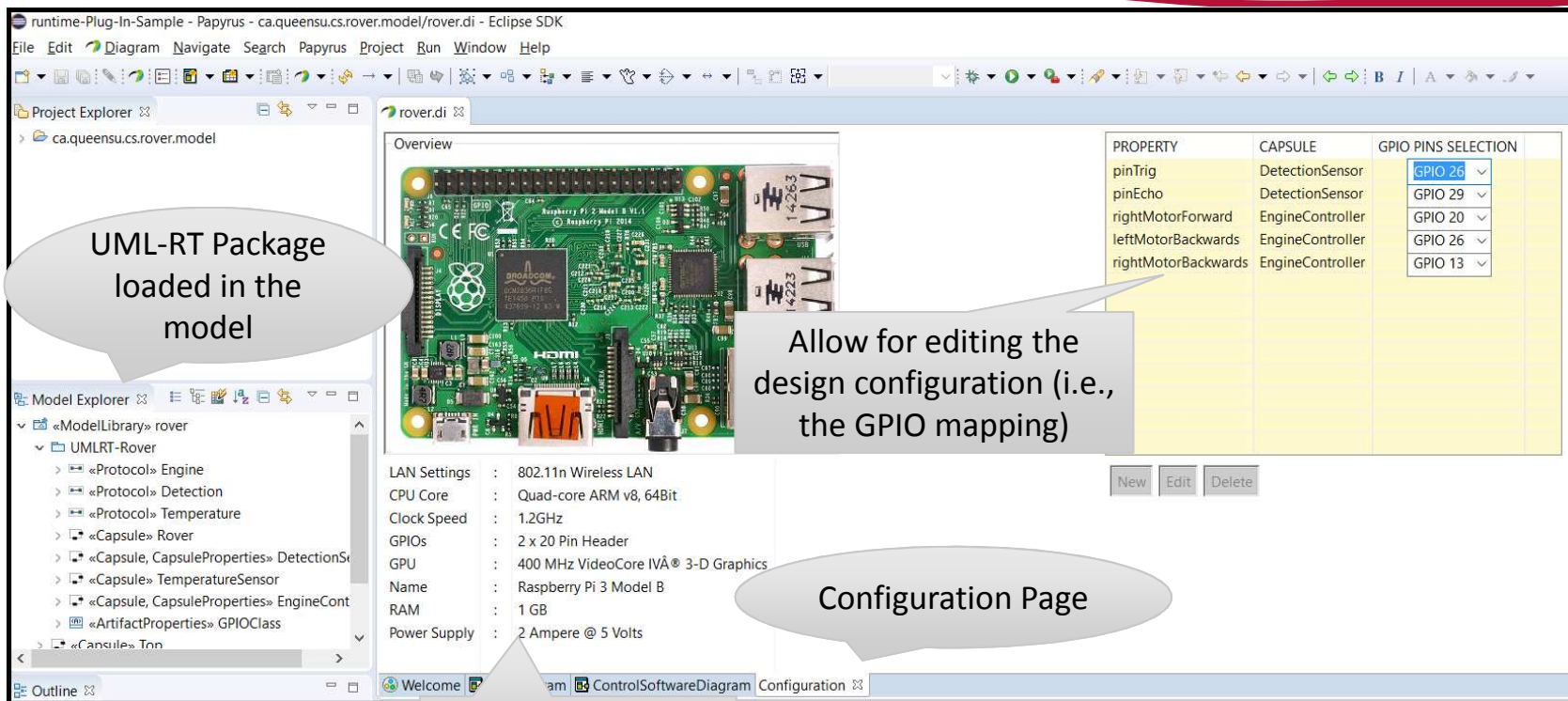
Motivation ↔ Solution



- Embedding a specific configuration page with the loaded library
- Providing an unique user experience when designing the Rover Model

SOLUTION

Six Months Ago ..



runtime-Plug-In-Sample - Papyrus - ca.queensu.cs.rover.model/rover.di - Eclipse SDK

File Edit Diagram Navigate Search Papyrus Project Run Window Help

Project Explorer
ca.queensu.cs.rover.model

Model Explorer
«Modellibrary» rover
UMLRT-Rover
«Protocol» Engine
«Protocol» Detection
«Protocol» Temperature
«Capsule» Rover
«Capsule, CapsuleProperties» DetectionS
«Capsule» TemperatureSensor
«Capsule, CapsuleProperties» EngineCont
«ArtifactProperties» GPIOClass
«Capsule» Top

Overview

LAN Settings : 802.11n Wireless LAN
CPU Core : Quad-core ARM v8, 64Bit
Clock Speed : 1.2GHz
GPIOs : 2 x 20 Pin Header
GPU : 400 MHz VideoCore IVÂ® 3-D Graphics
Name : Raspberri Pi 3 Model B
RAM : 1 GB
Power Supply : 2 Ampere @ 5 Volts

PROPERTY	CAPSULE	GPIO PINS SELECTION
pinTrig	DetectionSensor	GPIO 26
pinEcho	DetectionSensor	GPIO 29
rightMotorForward	EngineController	GPIO 20
leftMotorBackwards	EngineController	GPIO 26
rightMotorBackwards	EngineController	GPIO 13

New Edit Delete

Configuration Page

Montreal, Dec 2017

Platform Overview

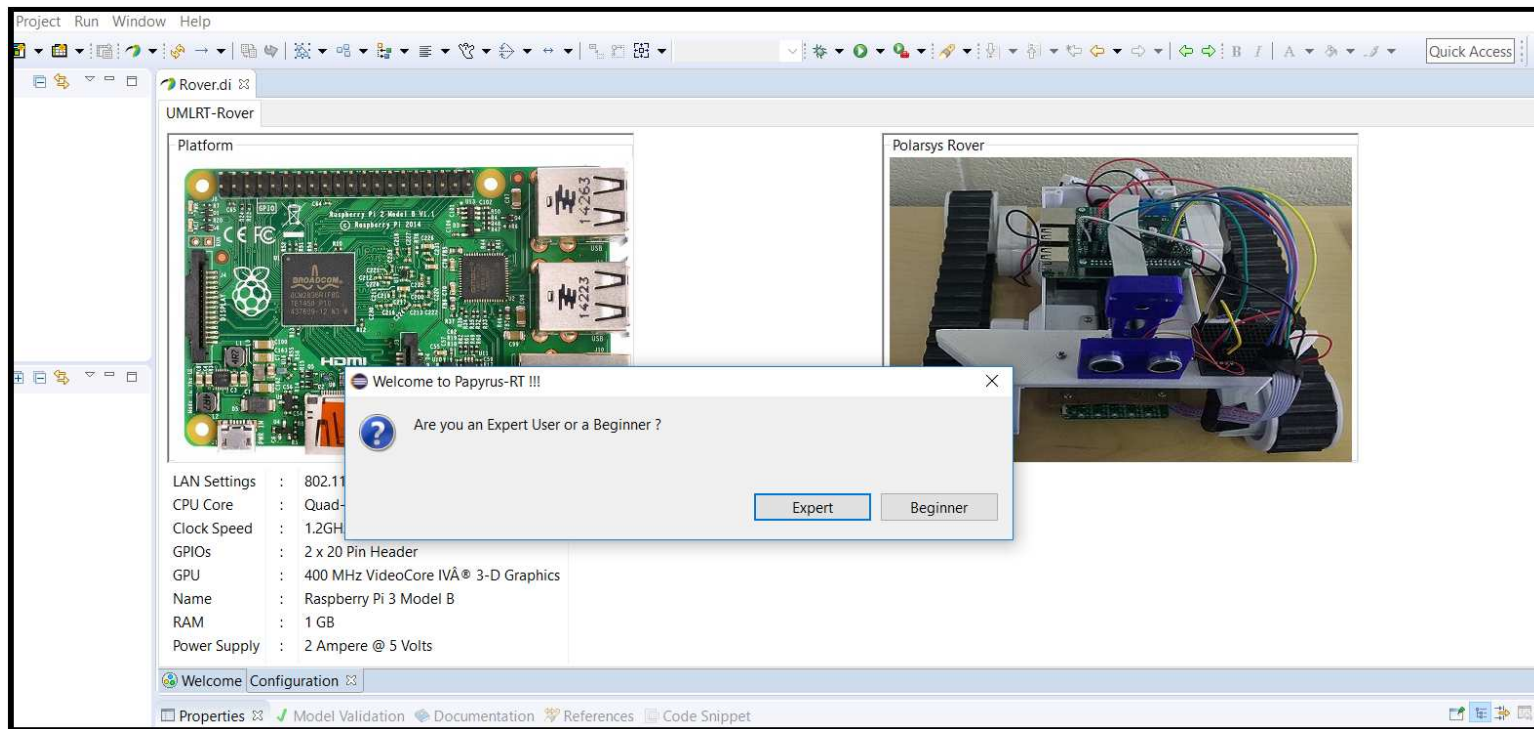
Since Then ..



- Providing a base Rover template within Papyrus-RT
- Creating component specific configuration pages
- Dynamically creating & disposing new tabs within the configuration page depending on the loaded package

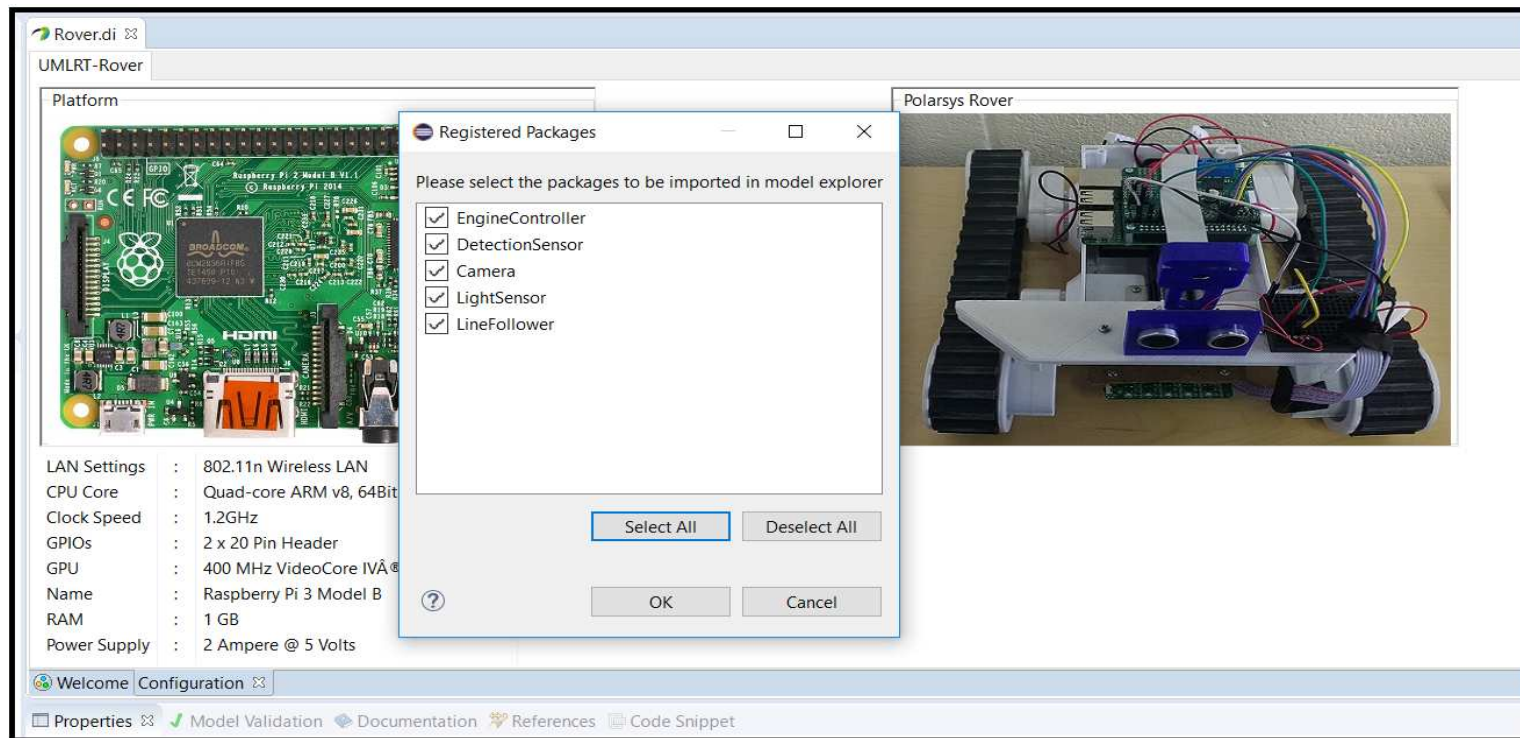
And Many More !!!

Current Implementation



Montreal, Dec 2017

Current Implementation – Expert Mode



Montreal, Dec 2017

Current Implementation – Expert Mode



Line Follower Sensor

Tracker Sensor HY STUDIO

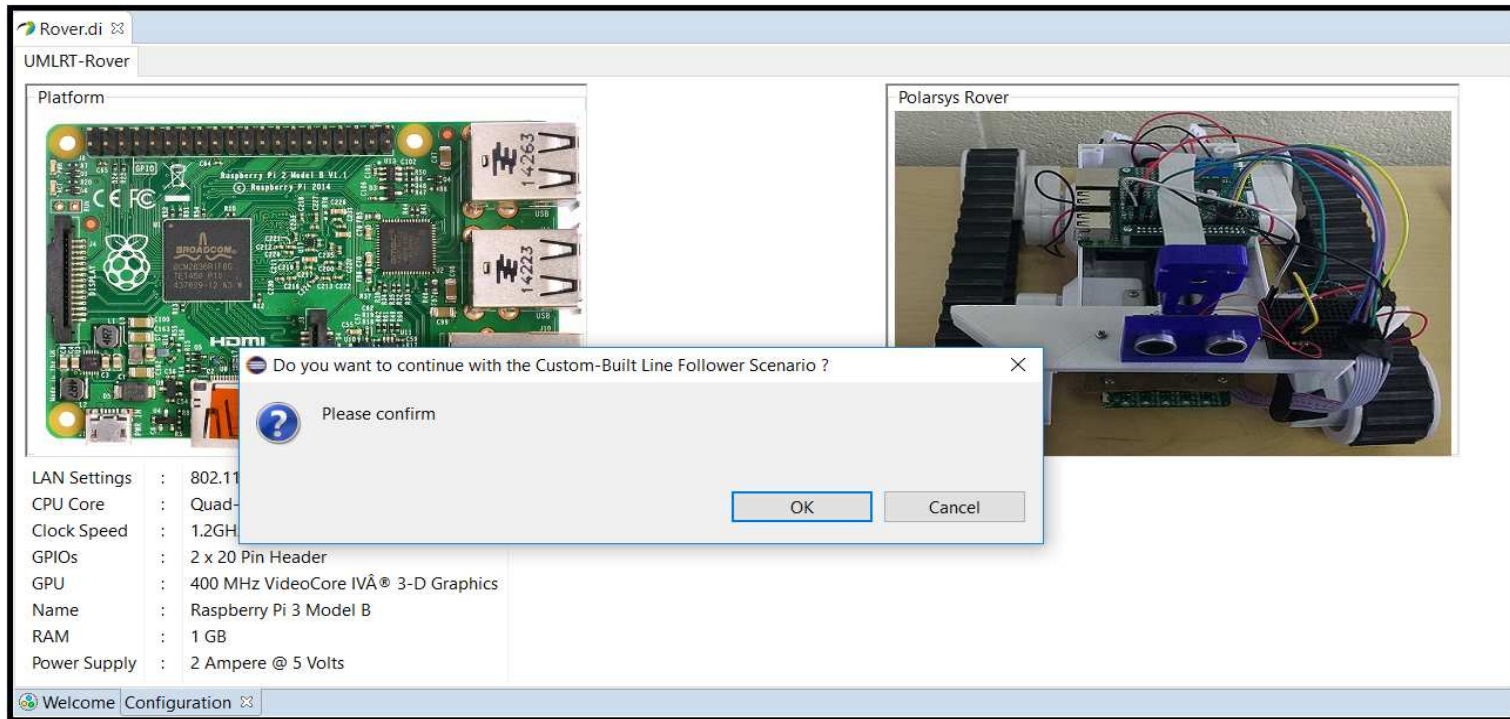
Optimal line thickness : black electric tape is ideal (~17mm)
 Optimal sensing distance : 3mm (0.125")
 Interface type : 0-5V Analog x3
 Operating voltage : 5V (Nominal)
 Supply current : 75 mA for the entire module
 Sensing range : 3mm (0.125") to ~6mm (0.25")

PROPERTY	CAPSULE	VALUES
Calibrate	LineSensor	16
motorLeftEnable	LineSensor	3
motorRightEnable	LineSensor	4
LeftSen	LineSensor	5
motorRightDirection	LineSensor	6
motorRightPWM	LineSensor	23
LeftMSen	LineSensor	7
MidSen	LineSensor	8
RightSen	LineSensor	9
motorLeftPWM	LineSensor	26

LO LOLO HIHI HI

0 10 20 30 40 50 60 70 80 90 100

Current Implementation – Beginner Mode



Future Work



- Extending the concept of Configuration pages to more than run-time configurations, and to include some compile time customizations
- Detailed analysing of the Rover Case Study to define a feature models for the same

Thank You !!

