P09204 Robotic Platform (RP1)

- Project Overview
  - Robotic Platform for 1kg Loads (2nd Generation)
  - One or More scalable Motor Modules
  - Controller System (what we design)
    - Motor Controller
    - Encoder Feedback
    - Autonomous intelligence, navigation (dead reckoning)
  - Optional/Additional Sensors
Concept Generation – Size

- System Miniaturization
  - Commercial Off-The-Shelf (COTS)
  - Wire width reduction
  - PCB layering Techniques
  - Heat Dissipation
  - Connectors/Switches
  - Battery Placement
  - PAL (Programmable Array Logic)
Concept Generation – Processor and Motor Concepts

- Microprocessor (Microcontroller)
  - HCS12 (Freescale Development Boards)
  - ATmega168 (Arduino Nano)
  - Atmega128 (BDMicro Boards)

- Motor
  - AC or DC motor
  - Stepper Motor
  - Torque Concerns
  - Current and Voltage
  - Brushed/Brushless
Concept Generation – Bus Type and Software Language

- **Bus Type**
  - I²C (Inter-Integrated Circuit)
  - SPI (Serial Peripheral Interface)
  - CAN (Controller Area Network)
  - Microcontroller IO Ports

- **Language**
  - For GUI/Operational Software
    - Java
    - C / C++
    - Assembly (Atmel, Freescale, other...)
Concept Generation – Power and Sensors

- **Power (Battery)**
  - 9V, 12V, 24V
  - Lead-acid vs Ni
  - Target Number of Batteries
  - Required Battery Charge
  - Optional Wall Power

- **Sensors**
  - Motor Module Encoders
  - Emergency Off (EMO) Switch
  - Future Additions
Concept Generation – Modularity and Sensors

- Modularity
  - Module "Plug'n'Play"
  - Circuit Grouping
  - Wiring Concerns

- Wireless
  - Infrared
  - Bluetooth
  - Crossbow