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• Software Design Review - In designing IMDL robots you will develop three types of software, mainly, low-level, sensor and motor routines

• Low-Level Routines
  – Perform housekeeping functions within the robot
  – Do not perform logic or decision-making
  – DO perform basic tasks in support of higher-level processes (e.g., read a digital compass and return the robot direction value)
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- Sensor Routines
  - Sensor control (e.g., controlling the frequency on an IR cannon mounted on a servo)
  - Collect data and fill global variable slots for essential external communication
  - Error correction
  - Default values
  - Filtering
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• Motor Routines
  – Independent of behaviors (No behavior ever controls the motors directly)
  – Facilitate smooth motor control
    • Non-smooth behavior may be caused by two or more behaviors competing for control
    • “Jerky behaviors” are not physical or biological and cause mechanical difficulties
    • Switching motor direction or large speed changes can cause “spikes,” high currents and place high demand on battery packs
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- Speed Control

\[
\text{Speed} = \frac{K \times \text{Old\_value} + \text{New\_value}}{K+1}
\]
- Collecting Sensor Data
  - Make an array, say DEBUG[20] and use it to record 20 readings of a global sensor value, etc. Now you can print all 20 values with a single `printf` statement.
  - Smooth the sensor data
    If you have, say, 20 values stored in S[20] then let
    \[
    S_{\text{now}} = \frac{1}{20} \sum_{i=1}^{20} S[i]
    \]
    - Filter and/or correct the sensor data