Project Title

Evaluation and Design Tools for Mechatronic Systems

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Need and Industrial Relevance

Robotics and Sensor Integration, STEM education and training

Modern Design Challenge: Technology and analysis requirements

- ubiquitous motion control, automation, and computer interfacing
- identify sensor, motion control, and computer components
- choose simulation and analysis tools
Project Goals

- **Framework for technology design decisions**
  Develop an overview of the motion-control and sensing design

- **Identify trade-offs for common challenges:**
  motion control components
  microprocessor and software needs
  simulation tools

- **Examine trade-offs on performance and sophistication**
  technical skills
  hardware
  software

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*Strategic Planning Meeting at Iowa State University – Feb 2012*
Objectives

- Develop the framework for the system designer to choose software and hardware that is appropriate for the task. Determine the technical expertise required, and the analysis tools, computer interface platforms, available sensor and interface hardware.
Approach and Methods

- **Robot system as an advanced technology design process:**
  - define goals and performance
  - identify necessary components and analysis
  - determining required technology
  - predict effects trade-offs on performance goals
Approach and Methods

- Semi-autonomous vehicle testbed:
  - remote mapping system for use in exploring indoor spaces
  - build an immersive Virtual Reality replica for display

Operator interaction
Map building
Approach and Methods

- **Analyze unknown space:**
  - determine important features for the virtual model
  - augment unknown model with new, current information
  - identify new attributes for inclusion in the virtual representation
Outcome/Deliverables

- Develop specific guidelines to identify sensors and actuation necessary to meet design goals
- Provide guidance on choices for analysis and implementation tools
- Define attributes for analysis software, microprocessor platforms, actuation and sensors.
Impact

- Assessment of appropriate technology and the impact of available options on performance goals is critical to advanced global design.
Project Duration & Proposed Budget

- One year project with two graduate students
- undergraduate hourly help
- software and hardware components, computing, publication and travel
- $120,000