CPET 491/ECET 491
Senior Design Project Phase II
Lecture 2

Spring 2013
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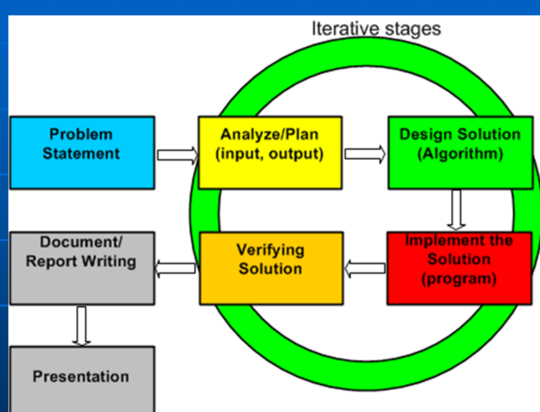
Senior Design Project Activities and Milestones



Senior Design Project Activities & Milestones

- Problem Statement
  - Need identification
  - Research
  - Market and Competitor Analysis
  - Predicted return on Investment
  - SWOT (Strength, Weaknesses, Opportunities, Threats) Analysis

Senior Design Project Activities & Milestones

- Analysis & Plan (Conceptual Design)
  - Requirements analysis
  - Operational Requirements and Functional Analysis
  - Requirements allocation
  - Risk analysis revisited
  - Evaluation of feasible technology applications
  - Trade-off study
  - Regulatory standards, Safety and Quality Issues
  - Proposed system requirements and specifications
  - System description with block diagrams
  - Project schedules: Tasks, Subtasks, Who, budgeted time,
  - Design review

Movable High-Power Senior Design Project Activities & Milestones

- Design Solution
  - Preliminary Design
    - Refined Functional Analysis
    - Refined Requirements Allocation
    - Detailed Trade-off Study
    - Test and Evaluation of Design Concepts
    - Early Prototyping
    - Acquisition Plan
    - Subsystem Design Diagrams, Testing Plan
    - System Integration and Testing Plan
    - Design Reviews
  - Detailed Design & Development

Trade-Off Analysis Examples

- Zigbee Transceiver Trade-off Analysis table
- Wireless Dog Fence, 2009, Brian J. Hauer

Chip	Operating Freq	Transmit Power (dBm)	Sensitivity (dBm)	Receive Current Consumption (mA)	Price ($ per unit)
CC1020 Transceiver	Sub 1GHz	10	-118	19.9	4.35
CC1111F8 System-on-chip	Sub 1 GHz	10	-110	16.2	5.85
CC2430 Transceiver	2.4 GHz	0	-92	19.7	4.50
CC2500 Transceiver	2.4 GHz	1	-104	12.8	2.15

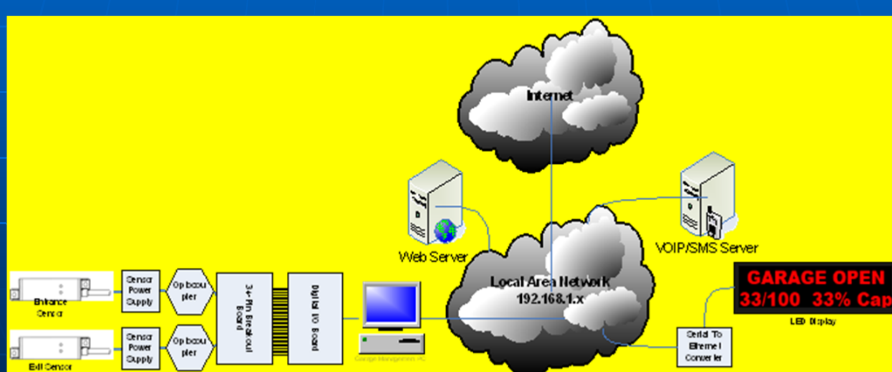
Risk Analysis – Revisited
(Wireless Dog Fence, 2009, Brian J. Hauer)

Severity of Consequences	F Impossible	E Improbable	D Remote	C Occasional	B Probable	A Frequent
I Catastrophic			2			
II Critical		3,7	6			
III Marginal		4	5		1	
IV Negligible						

1. Problems Writing Microcontroller Code
2. No Communication Between Transceivers
3. Part Failure
4. To High of Budget
5. Insufficient Range
6. Transmission Ineffective due to environmental conditions.
7. RSSI output not effective for ranging a signal.

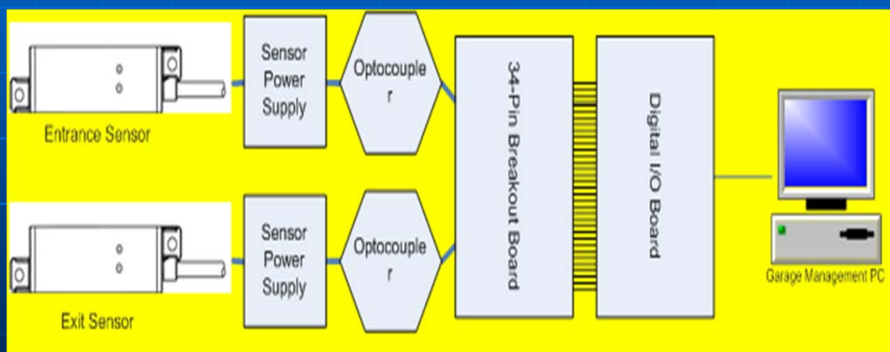
Web-Based Parking Garage Monitoring System for Real-Time Data & Trend Analysis

- Jacob Pitcher and Andrew White, 2009



Web-Based Parking Garage Monitoring System for Real-Time Data & Trend Analysis

- Sensor Interface
- Jacob Pitcher and Andrew White, 2009



Web-Based Parking Garage Monitoring System for Real-Time Data & Trend Analysis

- Specifications

Supply Voltage	10 to 30V dc (10% max. ripple) at 43 mA, exclusive of load Above +50° C, supply voltage is 10 to 24V dc (10% max. ripple)
Sensing Range	See Figure 4 and Figure 5.
Sensing Technology	Passive 3-axis magnetoresistive transducer
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Two SPST solid-state outputs conduct when object is sensed; one NPN (current sinking) and one PNP (current sourcing).
Output Protection	Protected against short-circuit conditions
Output Ratings	100 mA maximum (each output) NPN saturation: < 200 mV @ 10 mA and < 600 mV @ 100 mA; OFF-state leakage current: < 200 microamps PNP saturation: < 1.2V @ 10 mA and < 1.6V @ 100 mA; OFF-state leakage current: < 5 microamps

Web-Based Parking Garage Monitoring System for Real-Time Data & Trend Analysis

- Specifications

Output Response Time	20 milliseconds
Delay at Power-Up	0.5 seconds
Temperature Effect	< 0.5 milligauss/°C
Adjustments	Configuration of Background Condition and Sensitivity Level may be set by pulsing the gray wire remotely via the portable programming box (see page 3).
Indicators	Two Indicators (see Figure 2 and instructions on page 3):Power Indicator (Green)Configuration/ Output Indicator (Red/Yellow)
Remote TEACH Input	Impedance 12K ohms (low = < 2V dc)
Construction	Housing: Anodized aluminum End Caps: Thermoplastic polyester
Operating Conditions	-40° to +70°C (-40° to +158° F); 100% max. rel. humidity

Web-Based Parking Garage Monitoring System for Real-Time Data & Trend Analysis

- Specifications

Connections	Shielded 5-conductor (with drain) polyethylene jacketed attached cable or 5-pin Euro-style quick-disconnect PVC pigtail (see page 8 for quick-disconnect cable options)
Environmental Rating	Leak proof design is rated IEC IP69K; NEMA 6P
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2; 30G 11 ms duration, half sine wave.

Movable High-Power LED Lighting System

- Michael Bracht, 2009

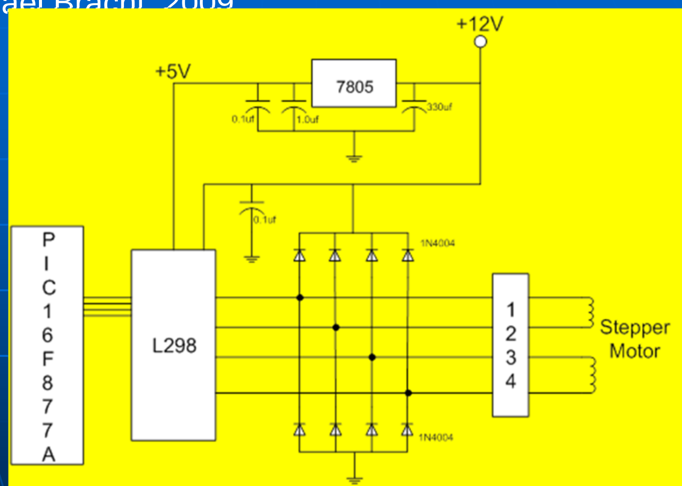


Figure n. Block Diagram of Stepper Motor Control Circuit

2013 Computer Engineering Technology Project

CPET 491	Project Title	Advisor
Amnah Allboani	Modular Biometric Monitoring System	Hack & Momoh
Eric C. Kinzie	Modular Biometric Monitoring System	Hack & Momoh
Mathew C. Andrews	Android Game	Steffen & Hack
Joshua M. Anthony	Android Game	Steffen & Hack
Robert S. Burtnett	iOS Puzzle Game	Luo
Brent D. Clark	Android-based Automatic Vehicle Location System	Lin
Adam R. Flagg	Automatic Guita Tuner	Laverghetta
Christopher R. Frey	Auto Lynk OBD-II Scanning System	Lin
James A. Schurger	Integrated Hydrometer System for Fermentation Testing and Control	Hack & Lin

2013 Computer Engineering Technology Project

ECET 491	Project Title	Advisor
David A. Campbell	Digital Spring Tester	Broberg
Christopher A. Stump	Digital Spring Tester	Broberg
Michael A. Denney	Automated Sandblaster	Steffen
Basel J. Hale	Solar Tracker	Lavergetta
Brett J. Mitchell	Solar Tracker	Lavergetta
Honore' M Hodary		
Tuyen H. Le	Green House Environment	Broberg
Patric M. Mania	Green House Environment	Broberg

Prof. Paul Lin 15