Subdivided into the 3 main areas:

- **Software** presented by Prof. Bagchi
- **Architecture** presented by Prof. Thottethodi
- **Intelligent Systems** presented by Prof. Givan

Computer Area includes some 18 primary area faculty members

Presentation available at: [http://www.ece.purdue.edu/~sbagchi/Presentations/OpenHouse_040403.pdf](http://www.ece.purdue.edu/~sbagchi/Presentations/OpenHouse_040403.pdf)

---

**Dependable Computing Systems Research**

- Faculty Member: Saurabh Bagchi (sbagchi@purdue.edu)
- We need computer systems that we can depend on in the face of:
  - Naturally occurring faults – hardware malfunction, software bugs
  - Malicious intrusions – insider attack or external hackers
- Downtime costs money, loss of prestige and possibly life

---

<table>
<thead>
<tr>
<th>Percent of Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

- Large Insurance Carriers
- Major Airlines
- Trading / Investment Banking
- Downtime costs ($/hour)
  - $20k/hour
  - $2.5M/hour
  - $6M/hour
System Perspective on Design of Dependable Systems

End-to-end Dependability = Node-level issues + Network-level issues

Applications
Middleware
Reliable communications
Operating system
Hardware

Research in Dependable Computing Systems Lab

- Framework for distributed disruption tolerant system
  - How to build an adaptive infrastructure for detecting, diagnosing and recovering from errors and attacks in a distributed platform?
- Self-checking network protocols
  - How to design network protocol components to be fail-silent?
- Dependable ad-hoc and sensor networks
  - How to build dependable network out of inherently unreliable components with resource constraints?
- Computation, communication and mobility scheduling in sensor networks
  - How to maximize goodput per unit power?
- Hardware architecture support for enhancing software reliability
  - How to check for software defects without crippling performance losses?
Selected Compiler Projects

- Faculty member: Sam Midkiff
- URL: [www.ece.purdue.edu/~smidkiff/research.htm](http://www.ece.purdue.edu/~smidkiff/research.htm)

- Compilation for more efficient, easier, safer programming
  - Optimization of programs to safely run as untrusted applications
  - Optimization of programs with high level user-specified parallelism
  - Compiler instrumentation of programs to detect and characterize errors
- Compilation for high performance
  - Hybrid compile-time/run-time analysis and optimization methods
  - Optimization of code for multithreaded processors
  - Optimization of code for reduced power consumption

I’m interested in smart, creative students with good programming skills.

Peer-to-Peer Computing: A new foundation for distributed applications

- Faculty member: Charlie Hu
- Pioneers: Napster, Gnutella, FreeNet (1st generation)
- 2nd-generation p2p (CAN, Chord, Pastry, Tapestry)
  - fully decentralized
  - Self-organizing
  - efficient routing
- We are building 2nd-generation P2P systems
  - The routing substrate
  - P2p applications
    - P2p-based file systems (Poster 1: Hoard)
    - Scalable application-level multicast (Poster 2: Borg)
  - Synergy with other research areas:
    - Grid computing: p2p-based resource management
    - Mobile Ad Hoc Networks: (Poster 3: DPSR)
- Caching in p2p overlay networks (Poster 4: transparent p2p caching)
Computer Graphics & Visualization Research
Professor David S. Ebert (ebertd@purdue.edu)

- Procedural Models of Natural Phenomena
- Real-time Photorealistic Rendering
- Computer Animation
- Volume Visualization
- Minimally-immersive Visualization

Data Mining, Computer Security

- Faculty Member: Carla Brodley (brodley@purdue.edu)
- Research Interests
  - Computer Security
    » intrusion detection
    » threat analysis
    » user modeling
  - Data Mining
    » unsupervised learning
    » anomaly detection
- Courses Taught: - Computer Security (EE495), Machine Learning and Data Mining (EE632), Upcoming new grad course on Security in Spring 04
- Background Needed to be an RA with Prof. Brodley - Computer Security: Compilers, O.S., Networking, Programming Languages - Data Mining: AI, Pattern Recognition, Statistics