

Wiki-based Learning in the Mechanical Engineering Classroom

The screenshot shows a MediaWiki interface for the 'design decisions WIKI'. The page title is 'Wiki-based learning in the classroom'. It displays a difference between two revisions. The left revision is from 15:57 on 16 January 2008 by Amcgaughey. The right revision is from 16:58 on 16 January 2008 by Jeremy Michalek. The diff shows changes to the text of 'Line 13', which discusses Wiki software. The left version has a yellow background, and the right version has a green background. The navigation menu on the left includes links to Main Page, Community portal, Current events, Recent changes, Random page, Help, and Donations. The search bar and toolbox are also visible.

design decisions WIKI

navigation

- Main Page
- Community portal
- Current events
- Recent changes
- Random page
- Help
- Donations

search

Go Search

toolbox

- What links here
- Related changes

article discussion edit history move unwatch

Wiki-based learning in the classroom

(Difference between revisions)

Revision as of 15:57, 16 January 2008 (edit)

Amcgaughey (Talk | contribs)

← Previous diff

Line 13:

=Wiki software=

Most wiki software is open source code and numerous wiki engines are freely available. The most popular one is **MediaWiki** (ref <http://www.mediawiki.org>), the same **program** used for Wikipedia. MediaWiki is written in the hypertext scripting language **PHP** (ref <http://www.php.net>), incorporating database management system. We choose and also recommend using MediaWiki to setup a classroom wiki for several reasons. **First, it has large-scale database capability and high operation reliability. Second, the installation and maintenance processes are simple and friendly. Third, MediaWiki has its own wiki, offering users comprehensive instructions about installation, maintenance, and updating. Fourth, MediaWiki offers integrated math-formula display function similar to the LaTeX math syntax. This important feature, especially**

Revision as of 16:58, 16 January 2008 (edit) (undo)

Jeremy Michalek (Talk | contribs)


(→ Wiki software)

Next diff →

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 Nanoscale Transport Phenomena Laboratory
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What is a Wiki?

- Wiki: a type of website that provides a framework for users to interactively and collaboratively build a database of interrelated information quickly and easily.
- Wikipedia for general knowledge
- Specialized wiki for domain-specific material and for teaching

Wikis in the Classroom

- **Experience:** 3 classes taught with wikis:
 - Capstone Senior Design (Michalek)
 - Small Scale Heat Transfer (McGaughey)
 - Optimization in Product Development (Michalek)

- **Findings:** 2 areas for general discussion:
 1. **Course Management**
 2. **Student Interaction**

1. Course Management

Course management benefits include

- ease of use (compared to html)
- layered, linked, accessible, and reusable course notes;
- improved information dissemination with customizable student interfaces;
- the ability to monitor student progress in real time;
- support for scheduling and team formation; and
- support for course co-development.

1. Course Management

■ Interlinked content – lecture notes

4 Winter 2008 Schedule

[edit]

Schedule is subject to change - s

Wk	Date	Topic
1	Jan 14	B: Course introduction and scope
	Jan 16	F: Engineering economic money, NPV, discount
2	Jan 21	MLK Jr. Day - no class
	Jan 23	F: Production economic regions, production functions, marginal products, marginal scale and scope
3	Jan 28	S: Mini project presentation and scope
	Jan 30	M: Introduction to optimization formulation, problem classification, global optima, Excel Solver
4	Feb 4	M: Optimization 2 - unconstrained nonlinear programming: optimality conditions, numerical methods
	Feb 6	M: Optimization 3 - constrained nonlinear programming: optimality conditions, numerical methods, sensitivity analysis
	Feb 11	M: Optimization 4 - overview of advanced topics: integer programming, nonconvexities, dynamic programming, stochastic algorithms, global

Local minimum

In an optimization problem of the form

$$\text{maximize } f(\mathbf{x})$$

with respect to \mathbf{x}

$$\text{subject to } \mathbf{g}(\mathbf{x}) \leq \mathbf{0}$$

$$\mathbf{h}(\mathbf{x}) = \mathbf{0}$$

$$\mathbf{x} \in \mathcal{X}$$

a local minimum is conceptually the objective function value of a feasible point that is not inferior to any of its immediate feasible neighbors. If the problem is continuous ($\mathcal{X} = \mathbb{R}^n$), a local minimizer is a point \mathbf{x}^* such that $\exists \epsilon > 0 : f(\mathbf{x} + \partial \mathbf{x}) \geq f(\mathbf{x}^*) ; \forall \partial \mathbf{x} : ||\partial \mathbf{x}|| \leq \epsilon$. The objective function value $f(\mathbf{x}^*)$ of the local minimizer is called

$$\mathbf{x} \subseteq \mathbb{R}^n$$

a global minimum is a point such that no other feasible point has a lower objective function value. A local minimum is a point such that all feasible points in the neighborhood immediately surrounding the point have higher objective function values.

Because local optimality depends only on the small neighborhood surrounding the point, it is possible to derive necessary and sufficient conditions for local optimality using a Taylor series expansion. NLP algorithms in general search for points that satisfy

optimality conditions

<- Wiki pages on topics

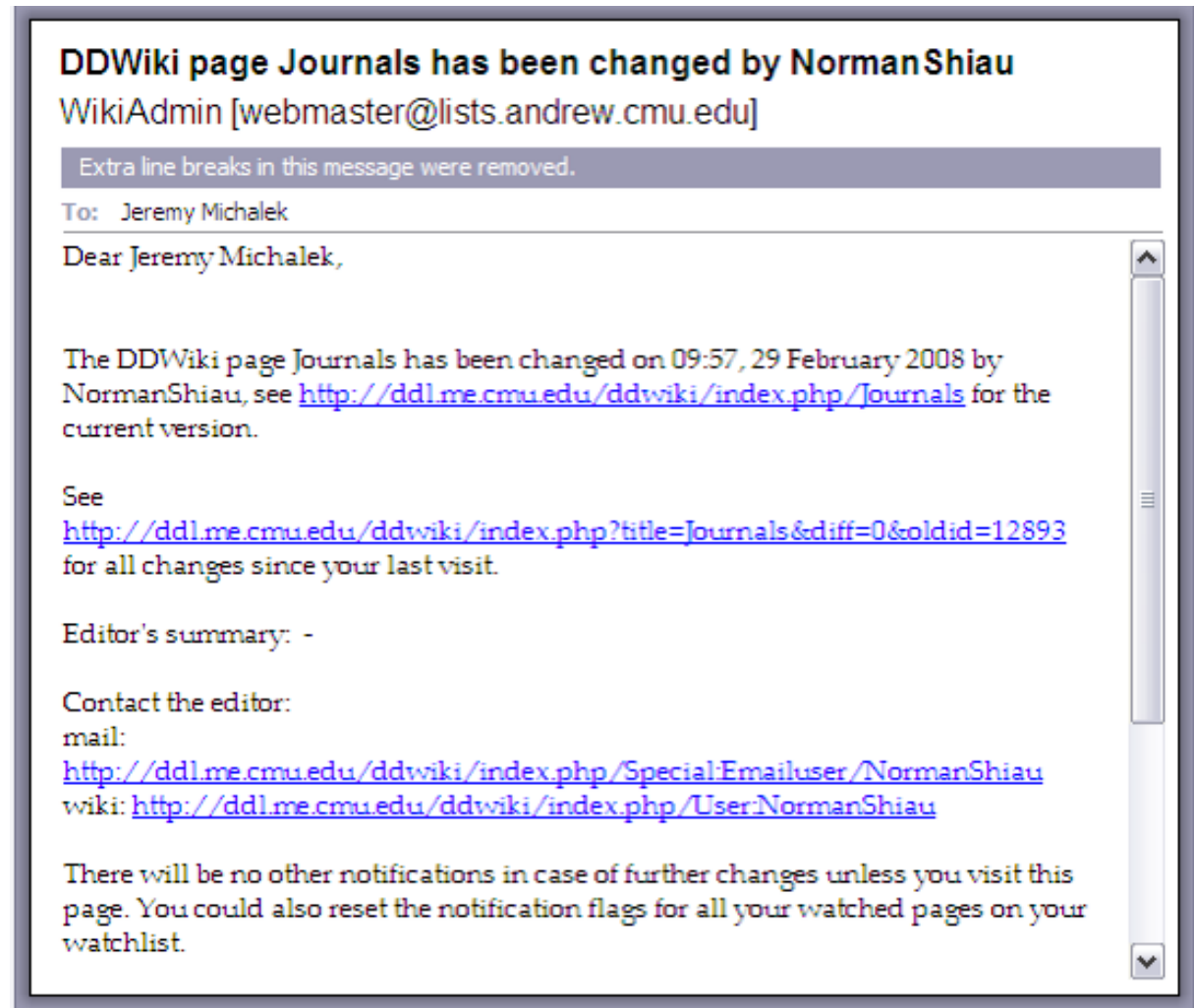
Report: project proposal

Ch3; Optional: Rao Ch.2,5-7

1. Course Management

Customized information management

- Users can receive email alerts when “watched” pages are edited
- RSS feeds alert the instructor to new content in customizable format (e.g. scrolling “ticker tape” of recent wiki edits)



2. Student Interaction

Student interaction benefits include

- increased peer to peer interaction;
- increased student-instructor interaction;
- support for collaborative writing;
- full historical records of individual contributions to group assignments;
- accessibility of all work in the public domain;
- growth and reuse of information over time, across courses, and across multiple offerings of a course.

2. Student Interaction

Peer to peer interaction

- Task 1: Make a wiki page appropriate for an undergraduate ME student
 - students worked individually, instructor provided feedback
- Task 2: Revise another's page to include more advanced information
 - pairs of students interacted online through the wiki, but also offline before and after class
 - other students got involved

2. Student Interaction

- Keeps history of student contributions to team projects
- Tracks changes made by individual students

Conduction

[Revision history](#)
[View logs for this page](#)

(Latest | Earliest) View (previous 50) (next 50) (20 | 50 | 100 | 250 | 500).

Diff selection: mark the radio boxes of the versions to compare and hit enter or the button at the bottom.

Legend: (cur) = difference with current version, (last) = difference with preceding version, M = minor edit.

Compare selected versions

▪ (cur) (last)	<input checked="" type="radio"/>	02:10, 23 April 2007 Jathomas (Talk contribs)
▪ (cur) (last)	<input checked="" type="radio"/>	16:51, 19 April 2007 Eryan (Talk contribs) m
▪ (cur) (last)	<input type="radio"/>	21:05, 4 April 2007 Jathomas (Talk contribs)
▪ (cur) (last)	<input type="radio"/>	12:53, 4 April 2007 Elandry (Talk contribs) (→Problems with the Fourier law)
▪ (cur) (last)	<input type="radio"/>	12:52, 4 April 2007 Elandry (Talk contribs) (→Introduction)
▪ (cur) (last)	<input type="radio"/>	21:39, 3 April 2007 Vmiller (Talk contribs) (→Governing Equations)
▪ (cur) (last)	<input type="radio"/>	21:39, 3 April 2007 Vmiller (Talk contribs) (→Introduction)
▪ (cur) (last)	<input type="radio"/>	12:53, 3 April 2007 Elandry (Talk contribs)
▪ (cur) (last)	<input type="radio"/>	16:46, 30 March 2007 Elandry (Talk contribs)
▪ (cur) (last)	<input type="radio"/>	16:45, 30 March 2007 Elandry (Talk contribs)
▪ (cur) (last)	<input type="radio"/>	16:31, 30 March 2007 Elandry (Talk contribs)
▪ (cur) (last)	<input type="radio"/>	16:21, 30 March 2007 Elandry (Talk contribs)
▪ (cur) (last)	<input type="radio"/>	16:21, 30 March 2007 Elandry (Talk contribs)
▪ (cur) (last)	<input type="radio"/>	16:19, 30 March 2007 Elandry (Talk contribs)
▪ (cur) (last)	<input type="radio"/>	16:11, 30 March 2007 Elandry (Talk contribs)

n== "Conduction" or
nsfer is due to "molecular

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[About NTPWiki](#)

[Disclaimers](#)



2. Student Interaction

stress. They will displace a finite amount when a constant shear stress is applied.

- *Solids generally have high densities.

* Solids can resist a shear stress. They will displace a finite amount when a constant shear stress is applied.

+ *Solids generally have high densities.

::* Some solids, such as aerogels <ref>

+ <http://en.wikipedia.org/wiki/Aerogel></ref>, can have very low densities.

+ :::* Their low density is caused by a porous structure containing numerous air gaps. The stagnant air in an aerogel acts as an insulator, inhibiting convective heat transfer. Additionally the properties of the materials used to make aerogels are typically not good conductors and can inhibit radiation, making aerogels extremely good insulators.

+ :::* Despite their very low density, aerogels are very structurally strong, they are able to support over 2000 times their own weight

+

; "Micro"scopic Characteristics

; "Micro"scopic Characteristics

2. Student Interaction

- Instructor can provide realtime feedback

6 Mechanical Analysis

[edit]

Assumptions:

article

discussion

edit

+

history

move

watch

Talk:Airsoft gun

We received your [report](#), and you have some interesting results. Typically we expect more findings and conclusions to be summarized in the executive summary - we need clear conclusions to work with, and it is difficult to dig for them. Overall, the detailed documentation of components is impressive, although it would be helpful to have more professional documentation introducing each section and helping the report to flow. Detailed comments follow:

- **One major customer need is to emulate an actual gun - which attributes are important in this regard?**
 - The appearance is typically the most important attribute that users will look for. The most common airsoft guns are automatic electric guns (AEGs), which are powered by a motor that drives a gearbox. Because many guns are approximately the same shape, in terms of having a handle and a trigger, though a few have variations, most gearboxes are about the same shape, and for the different variants of guns, the new gearbox can be made to fit. Gearboxes generally all function the same way, and their power and durability relies on the internal components, like what material the gears are made of or how strong the spring is. Because of this, the determining factor for airsoft guns is generally what "real steel" gun it is modeled after. Another common attribute, though not as important, is usually the weight or "feel" of the gun. People will buy airsoft guns sometimes to have the feel of holding and shooting something that looks like a real rifle, while not needing a gun licence.
- **The description of functionality is quite clear, but it would help to include a figure with labeled components**
 - Added Some diagrams to show how some of the pieces fit together.
- **You mention child users - please discuss this further and address safety issues.**
 - A bit was added in the user groups in terms of younger users. One concern with safety and younger users is that they may

Spring Constant (k) calculations

Beyond the Classroom

- pedagogy in research group
 - students write literature review pages
- community portal
 - open source course material, textbooks, shared education modules
- security
 - managed access vs. open access / avoiding spam
- accuracy of content
 - Instructional oversight for wiki assignments
 - Pride and peer pressure to contribute good content

Walking the walk

- We wrote this ASEE paper collaboratively on our wiki
- “... even though our offices are next door, collaborative wiki writing gave us
 - instant access to the latest version from anywhere;
 - synchronized, continuous, and automatic version control;
 - ease of adding links to relevant material; and
 - helpful alerts to let us track the latest changes.”

The screenshot shows a MediaWiki interface for a page titled "Wiki-based learning in the classroom". The page is in "diff" mode, comparing two revisions. The left revision is from 15:57 on 16 January 2008 by Amcgaughey. The right revision is from 16:58 on the same date by Jeremy Michalek. The diff highlights changes in the text, with additions in green and deletions in red. The page includes a navigation sidebar on the left with links like "Main Page", "Community portal", and "Recent changes". The top of the page has a user menu for Jeremy Michalek and tabs for "article", "discussion", "edit", "history", "move", and "unwatch".

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Summary

- Design Decisions Wiki:
<http://ddl.me.cmu.edu/ddwiki> (Michalek)
- Nanoscale Transport Phenomena Wiki:
<http://ntpl.me.cmu.edu/ntpwiki/> (McGaughey)