

An Introduction to L^AT_EX

Make Documents Like A PROgrammer

Wesley T. Honeycutt

University of Oklahoma

October 9, 2018

History

In 1978, Donald Knuth created the $\text{T}_{\text{E}}\text{X}$ programming language in a fit of frustration with how ugly photoprinting looked.

In 1983, Leslie Lamport released \LaTeX (Layman's $\text{T}_{\text{E}}\text{X}$), a set of macros which made $\text{T}_{\text{E}}\text{X}$ usable by mortals.

There are many other variants such as :

$\text{BibT}_{\text{E}}\text{X}$ $\text{ConT}_{\text{E}}\text{Xt}$ $\text{LuaT}_{\text{E}}\text{X}$ LyX $\text{pdf}\text{\LaTeX}$ $\text{X}_{\text{Y}}\text{\LaTeX}$

L^AT_EX is...

... a sophisticated document preparation sytem.

L^AT_EX has...

- ▶ Stylistic uniformity
- ▶ Bibliography support
- ▶ Sophisticated structuring abilities
- ▶ Reference tracking
- ▶ Highly extendible capabilities

L^AT_EX is not...

... a word processor.

L^AT_EX does not...

- ▶ Spell-check your documents
- ▶ Give you complete control over formatting
- ▶ Provide a graphical interface for editing

“You take care of writing, and we’ll take care of presentation.”

You might be used to WYSIWYG

What

You

See

Is

What

You

Get

L^AT_EX is WYSIWYM

What

You

See

Is

What

You

Mean

Presentation matching what you wrote, not how it was written

This text is spaced specially.

```
1 This    text is
2 spaced    specially.
```

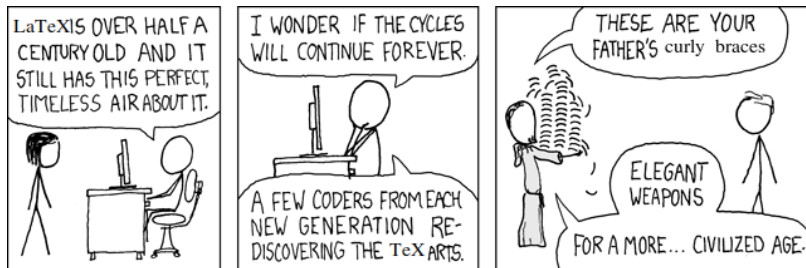
Paragraphs are easy.
Use double line breaks.

```
1 Paragraphs are easy.
2
3 Use double line breaks.
```

Never break the unbreakable unless you want to.
You can force connections of words in a line or force spaces and linebreaks.

```
1 Never break the unbreakable
   unless you want to.
2
3 You~can~force~connections~of~
   words~in~a~line~or\ force
   \ spaces and\\linebreaks.
```

Learn to love braces



Commands and Environments

Uncentered

```
1  Uncentered
```

Centered Environment

```
1  \begin{center}  
2    Centered Environment  
3  \end{center}
```

Command Centered

```
1  \centering  
2  Command Centered
```

The Logical Structure of a \LaTeX Document

Preamble

- ▶ Declare the document type you will be making:
`\documentclass[options]{class}`

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- ▶ Declare what packages you will need:
`\usepackage[options]{package}`

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`\usepackage[options]{package}`
- ▶ Define any custom functions or environments

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`\documentclass[options]{class}`
- ▶ Declare what packages you will need:
`\usepackage[options]{package}`
- ▶ Define any custom functions or environments
- ▶ Declare important variables

The Logical Structure of a \LaTeX Document cont'd

Body

- ▶ Initialize the document in an environment

```
\begin{document}
```

...

```
\end{document}
```

The Logical Structure of a \LaTeX Document cont'd

Body

- ▶ Initialize the document in an environment
`\begin{document}`
...
`\end{document}`
- ▶ Within this environment you will:

The Logical Structure of a \LaTeX Document cont'd

Body

- ▶ Initialize the document in an environment
 - `\begin{document}`
 - ...
 - `\end{document}`
- ▶ Within this environment you will:
 - ▶ Create the title page or section:
 - `\maketitle`

The Logical Structure of a \LaTeX Document cont'd

Body

- ▶ Initialize the document in an environment
 - `\begin{document}`
 - ...
 - `\end{document}`
- ▶ Within this environment you will:
 - ▶ Create the title page or section:
 - `\maketitle`
 - ▶ Write your document

The simplest document

The simplest

Wes Honeycutt

October 9, 2018

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam acra libero, semummy eget, consectetur id, vulpitate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra nunc rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean dapibus. Morbi dolor nulla, malesuada eu, pulvinar at, nulla ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

```
\documentclass{article}
\usepackage{lipsum}
\title{The simplest}
\author{Wes Honeycutt}
\begin{document}
  \maketitle
  \lipsum[1]
\end{document}
```

Making the `\maketitle`

The title can include several elements, which are declared by the user.

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- ▶ `\title{The Title}`

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- ▶ `\title{The Title}`
- ▶ `\author{The Author's Name}`

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- ▶ `\title{The Title}`
- ▶ `\author{The Author's Name}`
 - ▶ This can include `\thanks{Some Institution}`

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- ▶ `\title{The Title}`
- ▶ `\author{The Author's Name}`
 - ▶ This can include `\thanks{Some Institution}`
- ▶ `\subtitle{A Clever Subtitle}`

Making the \maketitle

The title can include several elements, which are declared by the user.

- ▶ `\title{The Title}`
- ▶ `\author{The Author's Name}`
 - ▶ This can include `\thanks{Some Institution}`
- ▶ `\subtitle{A Clever Subtitle}`
- ▶ `\subject{A Subject Heading}`

Our Sample Title Page

```
\title{The Pitfalls of LaTeX}

\author{
  Wesley T. Honeycutt
  \thanks{University of Oklahoma Department of Biology}
  \and Leon the Cat}

\subtitle{Stackexchange was down and other horror stories}

\subject{A Joke Paper}
```

Wesley T. Homervutt * Leon the Cat

Leon the Cat

Lerena ipsam ducit sit anset, consecretur adspiciens etc. Ut parus est,
 vultusque sit, placenter at, adspiciens vultu, felle. Cumbuliter dictum gravida
 maris. Nam arcu litoris, accensum eger, consecretur etc. vulpente a, usque
 Dens veldica usque eo usque. Pellenesque habitant morbi tritipite secretis
 et tectis et maledicta fana at turpis agens. Maris et lo. Cras vultura
 metus rheucus sui. Nulla et lectus vultusque una fragilla ultoris. Phasidus
 et tollis et anset tector gravida placenter. Integre sapient et, larule in, protinus
 que, vultura at, mox. Praesent eger seu vel lo ultoris habundant. Amens
 haereticus. Morbi ducit nulla, maledicta et, pulvis at, molle at, nulla. Cras
 cubiter anset semper nulla. Dens vultus etc. eger rurs. Dux nihil m, conque
 et, accensum obediunt, sagittis que, diam. Dux eger cecit sit anset cecit dignitas
 retrum.

\documentclass{scrbook}

A Joke Paper

The Pitfalls of LaTeX

Stack Exchange was down and other horror stories

Wesley T. Honeycutt * Leon the Cat

October 9, 2018

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, pharetra ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

*University of Oklahoma Department of Biology

\documentclass{report}

Stack Exchange was down and other horror stories A Joke Paper

The Pitfalls of LaTeX

Wesley T. Honeycutt¹ Learn the Cat

October 9, 2018

¹University of Oklahoma Department of Biology

Stack Exchange was down and other horror stories A Jobe Paper

The Pitfalls of LaTeX

Wesley T. Haseyett¹ Leon the Cat, Lorem ipsum dolor

et amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat
ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero,
nunciatum eget, consectetur id, vulpate a, magna. Donec viverra augue eu
nunc. Pellentesque habitant morbi tristique senectus et netus et malesuada
fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla
et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor
gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc.
Praesent eget sem vel leo ultrices bibendum. Aenean lacinia. Morbi dolor
nulla, malesuada eu, pulcrum at, nulla ac, nulla. Curabitur auctor semper
nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend,
sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Publisher Distributed Classes

The previous example shows how different classes rearrange the same elements.

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Academic Publishers

Elsevier - *elsarticle*

Springer - *lncs*

IEEE - *IEEEtran*

AMS - *amscls*

Some More Academic Publishers With Classes

- ▶ aaai www.aaai.org
- ▶ AAAS/science www.sciencemag.org
- ▶ American Chemical Society Publications
- ▶ Addison-Wesley
- ▶ algebra universalis
- ▶ American Institute of Physics www.aip.org
- ▶ American Meteorological Society www.ametsoc.org
- ▶ American Physical Society authors.aps.org
- ▶ Beech Stave Press
- ▶ Birkhuser
- ▶ Cambridge University Press
- ▶ CRC
- ▶ Documenta Mathematica www.math.uiuc.edu
- ▶ Docscape
- ▶ Engine House Books

Some More Academic Publishers With Classes

- ▶ Fondo de Cultura Econmica
- ▶ Informs joc.pubs.informs.org
- ▶ Institut Mittag-Leffler (Royal Swedish Academy of Sciences)
- ▶ www.arkivformatematik.org
- ▶ IOP (institute of physics) authors.iop.org
- ▶ John Benjamins Publishing Company
- ▶ London Mathematical Society books www.lms.ac.uk
- ▶ Louisiana State University Press
- ▶ Mathematical Association of America www.maa.org
- ▶ National Research Council of Canada
- ▶ Oxford University Press www.oup.co.uk
- ▶ Princeton University Press press.princeton.edu
- ▶ Publications de l'Institut Mathmatique (Beograd)
www.emis.de

Some More Academic Publishers With Classes

- ▶ SAS Institute
- ▶ SIAM books www.siam.org
- ▶ Springer math www.springer.com
- ▶ Springer physics www.springer.com
- ▶ Thomson Delmar Learning
- ▶ UIT Cambridge
- ▶ Unipress (Institute of High Pressure Physics, Polish Academy of Sciences)
- ▶ www.unipress.waw.pl
- ▶ University of California Press
- ▶ Wiley www.wiley.com
- ▶ William Andrew Publishing
- ▶ World Scientific
- ▶ WordTech

Section Hierarchy

```
\section{The Topmost}
  \subsection{A Little Deeper}
    \subsubsection{Deeper Still}
      ...
```

Text Formats

Be **Bold**!

Italicize!

Underline to accentuate!

Write with *emphasis*!

```
1 Be \textbf{Bold}!\\
2 \textit{Italicize}!\\
3 \underline{Underline} to
   accentuate!\\
4 Write with \emph{emphasis}!\\
```

Font Size

I'm shrinking

I'm shrinking

I'm shrinking

I'm shrinking

I'm shrinking

I'm shrinking

I'm shrinking

I'm shrinking

I'm shrinking

I'm shrinking

```
1 {\Huge I'm shrinking}\\
2 {\huge I'm shrinking}\\
3 {\LARGE I'm shrinking}\\
4 {\Large I'm shrinking}\\
5 {\large I'm shrinking}\\
6 {\normalsize I'm shrinking}\\
7 {\small I'm shrinking}\\
8 {\footnotesize I'm shrinking
   }\\
9 {\scriptsize I'm shrinking}\\
10 {\tiny I'm shrinking}\\
```

Lists

- ▶ Boomer
- ▶ Sooner
- ▶ Oklahoma

```
1 \begin{itemize}
2   \item Boomer
3   \item Sooner
4   \item Oklahoma
5 \end{itemize}
```

1. Boomer
2. Sooner
3. Oklahoma

```
1 \begin{enumerate}
2   \item Boomer
3   \item Sooner
4   \item Oklahoma
5 \end{enumerate}
```

Nested Lists

- ▶ Boomer
 - ▶ Sooner
- ▶ Oklahoma

1. Boomer
 - 1.1 Sooner
2. Oklahoma

```
1 \begin{itemize}
2   \item Boomer
3   \begin{itemize}
4     \item Sooner
5   \end{itemize}
6   \item Oklahoma
7 \end{itemize}
```

```
1 \begin{enumerate}
2   \item Boomer
3   \begin{enumerate}
4     \item Sooner
5   \end{enumerate}
6   \item Oklahoma
7 \end{enumerate}
```

Graphics Generation with TikZ

High quality vector images can be produced from within LaTeX using a package called TikZ.

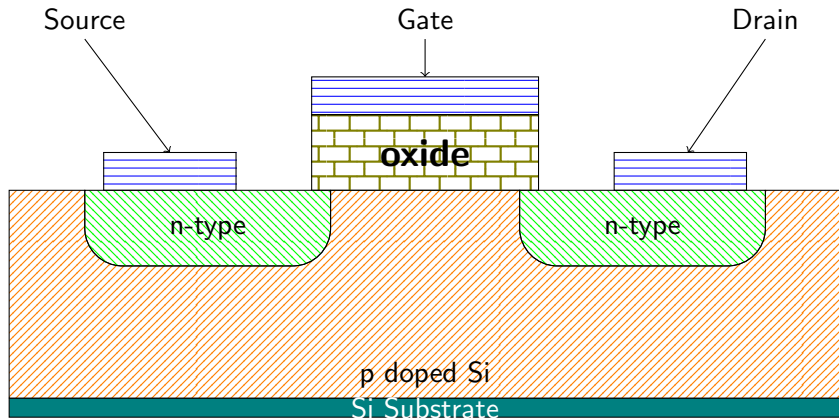
Additionally, Inkscape can export TikZ directly.


```

\begin{tikzpicture}
\draw \pdiff (0,.25) -- (0,3) -- (1,3) -- (1,2.5) to [out=270,in=180] (1.5,2) -- (3.75,2) to [out=0,in=270] (4.25,2.5) -- (4.25,3) -- (6.75,3) -- (6.75,2.5) to [out=270,in=180] (7.25,2) -- (9.5,2) to [out=0,in=270] (10,2.5) -- (10,3) -- (11,3) -- (11,.25) -- (0,.25) node [midway,above] {p doped Si};
\draw \metalthree (0,0) rectangle (11,.25) node [midway,color=white] {Si Substrate};
\draw \oxide (4,3) rectangle (7,4) node [pos=.5,font=\bf\Large] {oxide};
\draw \metalone (4,4) rectangle (7,4.5);
\draw \ndiff (4.25,3) -- (1,3) -- (1,2.5) to [out=270,in=180] (1.5,2) -- (3.75,2) to [out=0,in=270] (4.25,2.5) -- (4.25,3) node at (2.625,2.5) [align=center] {n-type};
\draw \ndiff (10,3) -- (6.75,3) -- (6.75,2.5) to [out=270,in=180] (7.25,2) -- (9.5,2) to [out=0,in=270] (10,2.5) -- (10,3) node at (8.375,2.5) [align=center] {n-type};
\draw \metalone (1.25,3) rectangle (3,3.5);
\draw \metalone (8,3) rectangle (9.75,3.5);
\draw [->] (1,5) node [above] {Source} -- (2.125,3.5);
\draw [->] (10,5) node [above] {Drain} -- (8.975,3.5);
\draw [->] (5.5,5) node [above] {Gate} -- (5.5,4.5);
\node at (5.5,-.5) [align=center] {$V_{GS} < V_{threshold}$};
\end{tikzpicture}

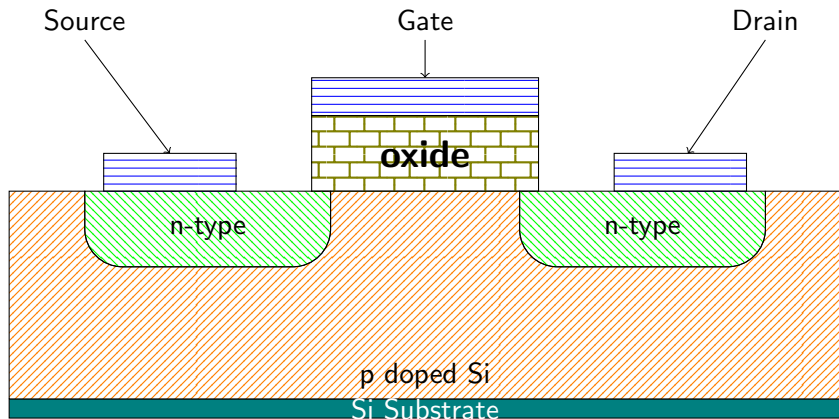
```

MOSFET



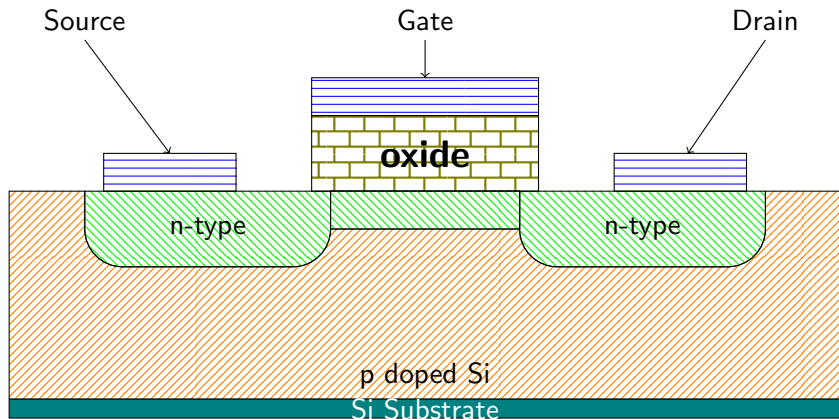
$$V_{GS} < V_{threshold}$$

MOSFET



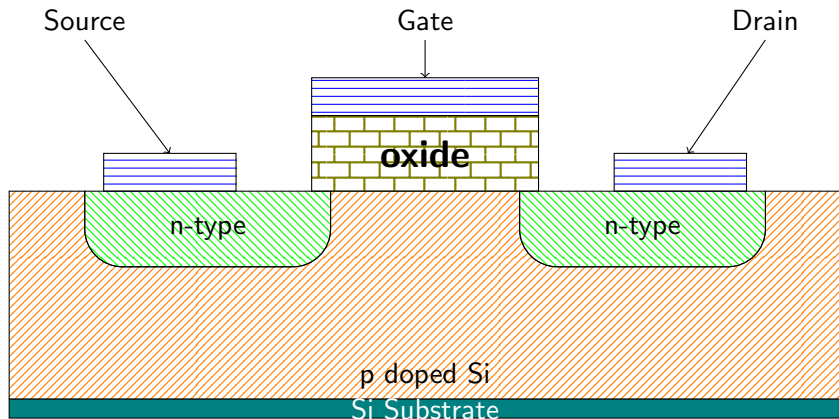
$$V_{GS} \geq V_{threshold}$$
$$V_{DS} < V_{GS} - V_{threshold}$$

MOSFET



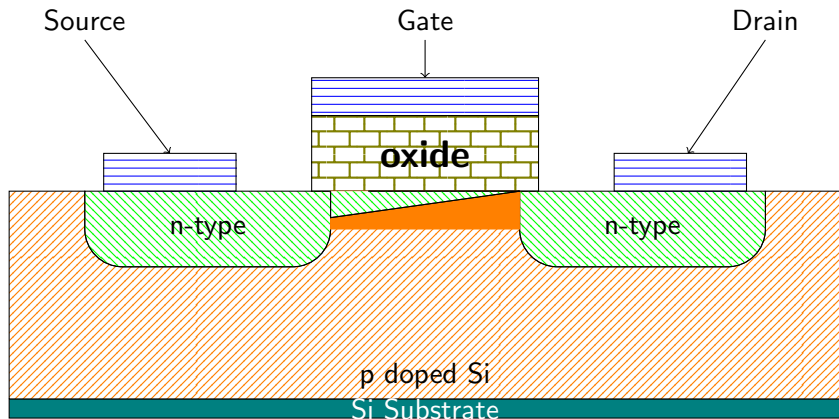
$$V_{GS} \geq V_{threshold}$$
$$V_{DS} < V_{GS} - V_{threshold}$$

MOSFET



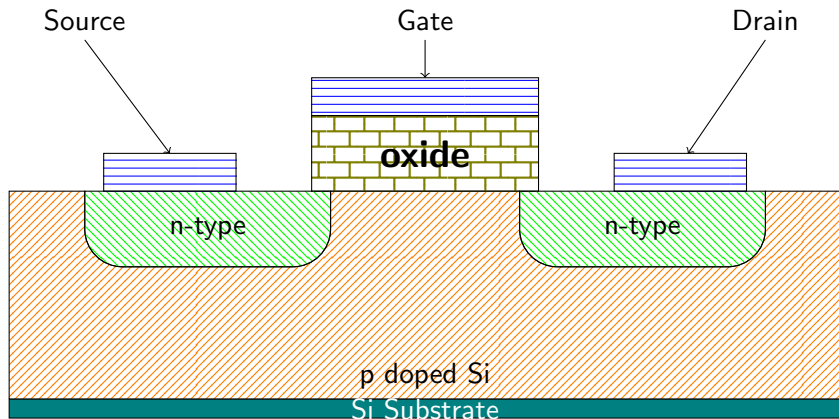
$$V_{GS} \geq V_{threshold}$$
$$V_{DS} = V_{GS} - V_{threshold}$$

MOSFET



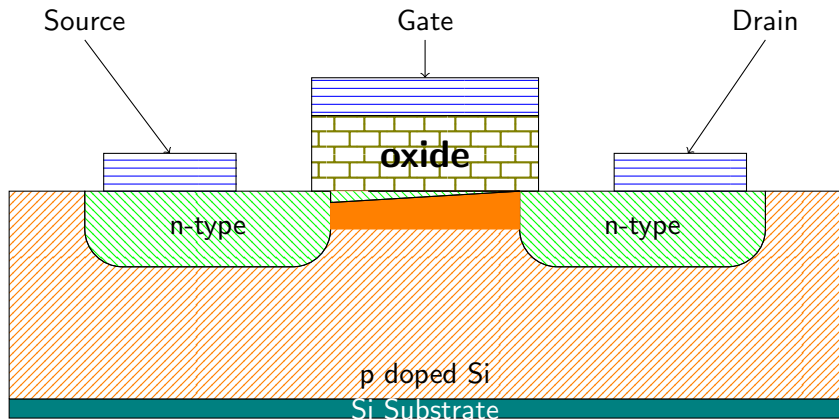
$$V_{GS} \geq V_{threshold}$$
$$V_{DS} = V_{GS} - V_{threshold}$$

MOSFET



$$V_{GS} \geq V_{threshold}$$
$$V_{DS} > V_{GS} - V_{threshold}$$

MOSFET



$$V_{GS} \geq V_{threshold}$$
$$V_{DS} > V_{GS} - V_{threshold}$$

Super Powerful for Theses

The Comprehensive T_EX
Archive Network is a package
repository

This also includes manuals
and examples

The screenshot shows the CTAN Comprehensive T_EX Archive Network homepage. At the top, there's a navigation bar with links for Login, Join, Settings, and Help. Below this is a search bar and a location dropdown set to 'CTAN - Comprehensive T_EX Archive Network'. The main heading is 'The Comprehensive T_EX Archive Network'. A paragraph describes CTAN as the central place for all kinds of material around T_EX, mentioning 5581 packages and 2542 contributors. There are three main sections: 'Announcements on CTAN-announce' with a list of recent updates (e.g., '2018-10-06 CTAN Update: hanporcsthesis'), 'Did you know?' with a tip about the Bookhand Font, and 'Activity on CTAN' which includes a line graph showing upload activity over time. The bottom right features a 'T_EX' logo and a brief history of the typesetting program.

When in doubt: Google

$\text{T}_{\text{E}}\text{X}$ is older than the Happy Meal.

When in doubt: Google

\TeX is older than the Happy Meal.

Someone has likely experienced your pain.

When in doubt: Google

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Someone has likely experienced your pain.

<https://tex.stackexchange.com/>

At your local library

OU libraries has a \LaTeX expert:

Amanda Schilling

🔗: [Stem Services](#)

☎: (405) 325-6126

✉: amanda.schilling@ou.edu




Or contact me

I'm just a \LaTeX junkie:

Wesley T. Honeycutt

: [Personal Site](#)

: *I have an office phone?*

: honeycutt@ou.edu

: <https://github.com/BlueNalgene>



- ▶ First.
- ▶ Second.
- ▶ Third.

```
1 \begin{itemize}
2   \item First.
3   \item Second.
4   \item Third.
5 \end{itemize}
```

$$x^2 + y^2 = z^2. \quad (1)$$

```
1 \begin{equation}
2   x^2 + y^2 = z^2.
3 \end{equation}
```