

CircuitikZ

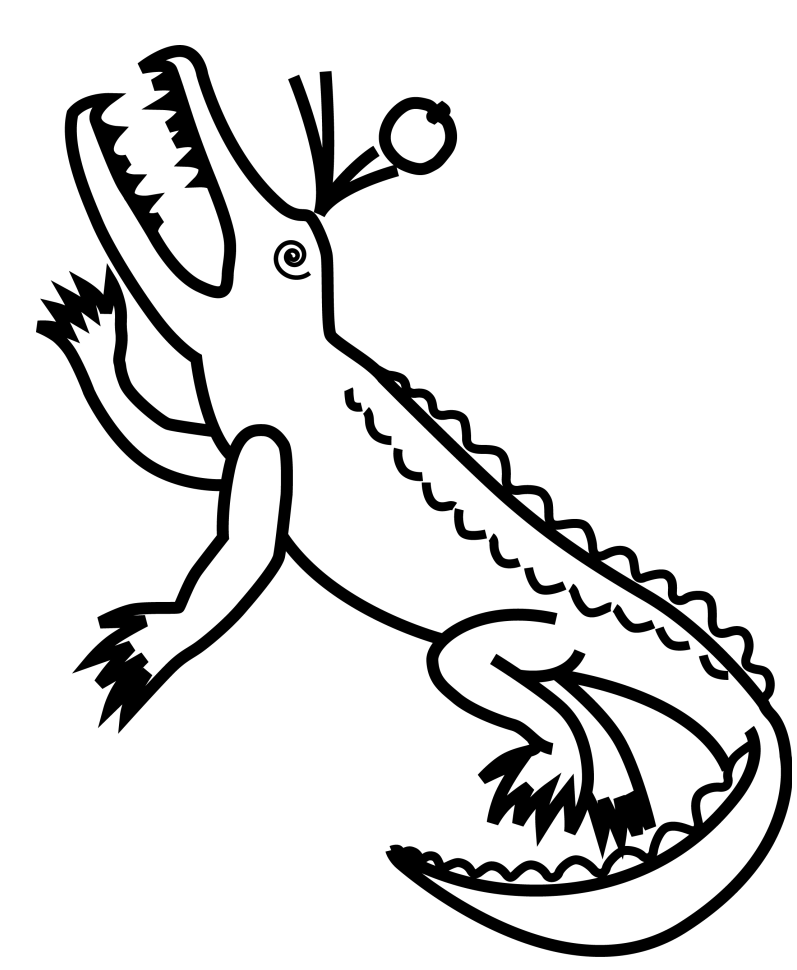
`\usepackage{circuitikz}`

Part of the cheat sheet series in partnership with CUPS

CamTeX 2020, CUPS 2020, Contributors: Oscar Emil Sommer

co-chairs@camphysoc.co.uk

camtexsoc@gmail.com

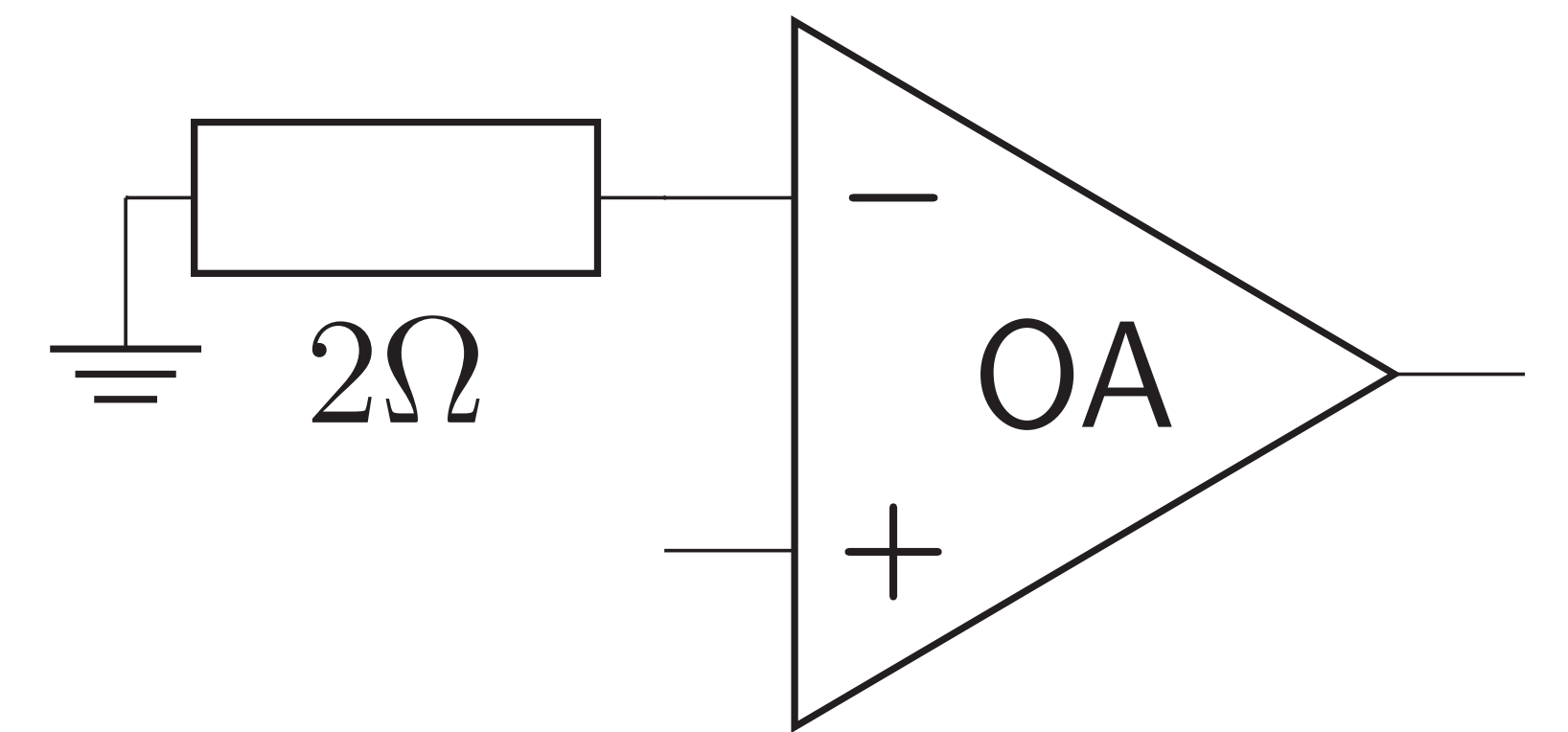


CAMTEX

Features of CircuitikZ

- Create publication-worthy circuit diagrams consistent with document style.
- Diagrams can easily be modified for other styles and extended with more components.
- In-built options for different graphical conventions of circuit components.
- Create graphics directly in LaTeX.

Simple Example



Code for simple example

By using `\draw` commands followed by a line of instructions, we are able to specify how the circuit diagram should look.

```
% Using european style components and cute inductors (recommended conventions)
\begin{circuitikz}[european, cute inductors]

% Draw op amp node called oa, displaying OA on top
\draw node[op amp](oa){OA};

% Draw 2 Ohm resistor from - terminal of oa 1.5 unit left to a ground node GND.
\draw (oa.-) to[R=$2\Omega$] +(-1.5,0) node[ground](GND){};

\end{circuitikz}
```

Logic for drawing a circuit

The circuit is built of node components connected by path components. The type of node/path is indicated inside `[]`.

A `\draw` should start with an initial position, followed by a series of node components, and path components, and finished with `;`.

Node components can be things like op amps, ground, or simply intersections between paths.

Path components can be wires, resistors, inductor etc. and have currents and voltages indicated.

Positions can be specified by absolute value (x,y) , relative to previous point $+(x,y)$, or reference to some node (node).

Positions can be formed of x, y from two different nodes (node1|-node2), this is *very useful!*.

Node syntax

To place a node at current position write

```
node[type](name){displayname}
```

The name will be used to refer to this node, and `displayname` will be shown over it. Some nodes have `anchor`, which usually corresponds to the various ports of the node. When referring to the position of a node, you can optionally specify an anchor (name.anchor).

Node components

`ocirc`: Open port
`ground`: Ground connection
`op amp`: op amp, has anchors `-`, `+`, `out`

Path syntax

To place path between current position and (newpos) write

```
to[type=displayname](newpos)
```

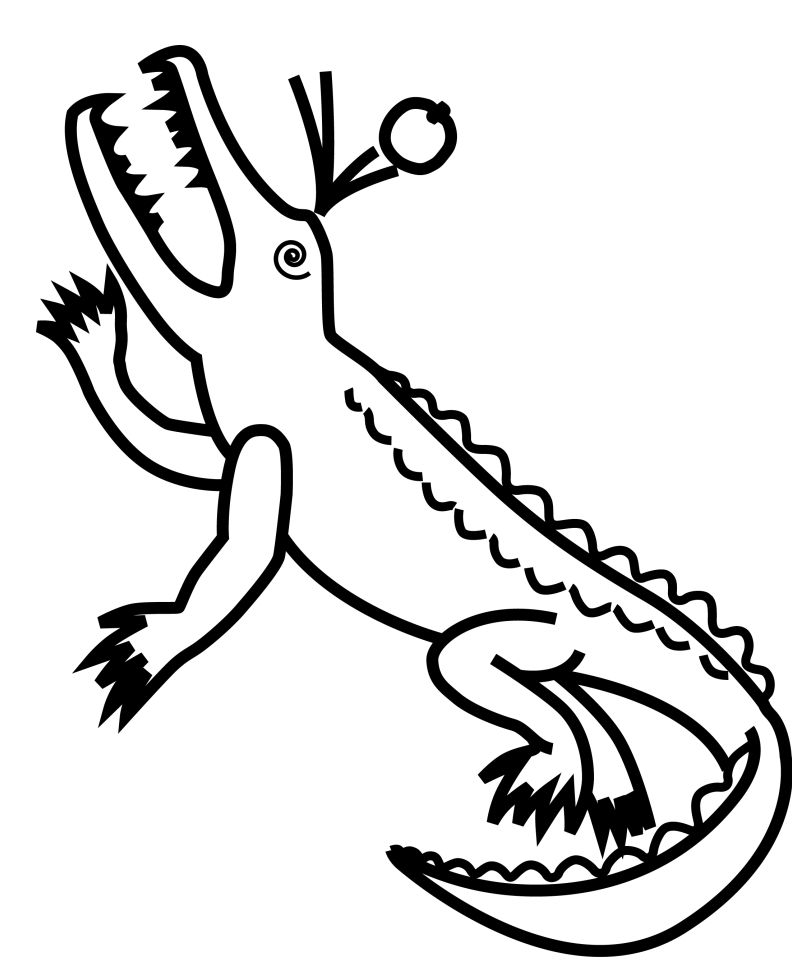
Note that *multiple components may be chosen for each path*. This is useful when you want to have path with both resistor and voltage indicator on it.

Path components

`open`: Invisible
`short`: Wire
`R`: Resistor
`L`: Inductor
`C`: Capacitor
`i`: Current annotation
`V`: Voltage annotation

Other resources

More detailed manual and components of nodes/paths can be found <https://ctan.org/pkg/circuitikz>



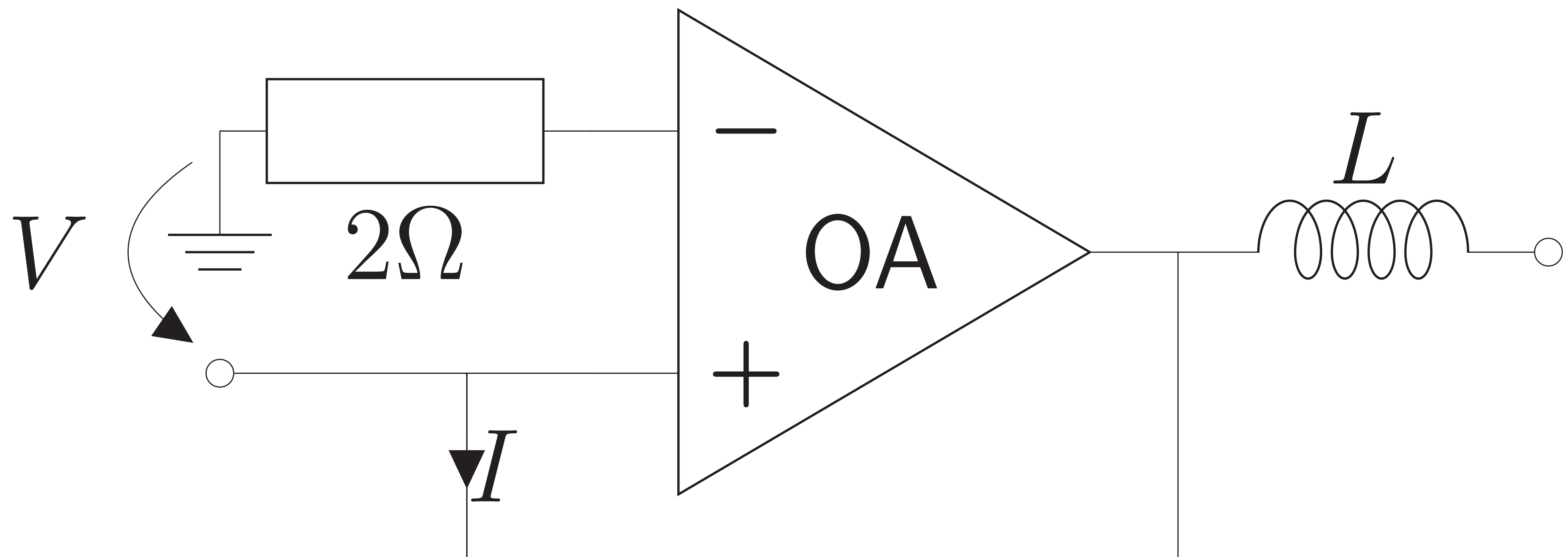
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Detailed example



Code for detailed example

```
\begin{circuitikz}[european,cute inductors]

%Create op amp node called oa, displaying OA on top
\draw node[op amp](oa){OA};

% Draw resistor from - terminal of oa 1.5 unit left to a ground node GND.
\draw (oa.-) to[R=$2\Omega$] +(-1.5,0) node[ground](GND){};

% Draw wire from + terminal to open circle node 1.5 unit left, naming the point
% 0.5 units left split
\draw (oa.+) to[short] +(-0.5,0) node[split]{} to[short] +(-1,0) node[ocirc](input){};

% From split draw wire going down 0.75 units, to a point bot.
\draw (split) to[short,i=$I$] +(0,-0.75) node[bot]{};

% From bot draw wire to point with x coord of oa.out, y coord of bot, continue
% to oa.out
\draw (bot) to[short] (oa.out|-bot) to[short] (oa.out);

% Draw inductor from oa output 1.5 unit right to open circle node output
\draw (oa.out) to[inductor=$L$] +(1.5,0) node[ocirc](output){};

% Label voltage difference between GND and input node
\draw(GND) to[open,v=$V$] (input);

\end{circuitikz}
```