The tikzdotncross Package
Marking Coordinates and Crossing Paths
Version 1.3b

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Abstract

This package offers a few alternative ways for declaring and marking coordinates and drawing a line with "jumps over" an already given path, which is a quite common issue when drawing, for instance, Electronics Circuits, e.g. *CircuiTikZ*[2].

Contents

1 Introduction

One recurring problem when drawing circuits in general is how to interpret a crossing line. There are many conventions, notably, for the old school (like the author of this) a jump denotes "non touching lines" while a simple cross is a connection, more recently (like the past 25 years), the winning convention has been that a dot marks a connection, whilst a simple cross denotes "non touching lines". Many, for the sake of staying in the safe side of the wall, mark a connection with dots and non touching lines with a jump, which is a bit overkill, but at least there is no margin for interpretation errors.

And that's it, this package defines some commands to mark/pin a connection, declaring a coordinate and node at the same spot, for later reference, and a command to draw a line jumping over crossing lines of a pre-existent path.

2 Requirements

The user has to load *tikz*[3] (directly, or indirectly, for instance loading *circuitikz*[2]) before using this package.

Keep in mind, as well, that this package loads some Ti*k*Z libraries (*math* and *intersections*) and the *etoolbox*[1] package.

```
\usepackage{tikz}
\usepackage{tikzdotncross}
```

```
\usepackage[american,siunitx]{circuitikz}
\usepackage{tikzdotncross}
```

*https://github.com/alceu-frigeri/tikzdotncross

3 Package Options

pinsize	pin (circle) size (default: 1.2), in pt.
pinang	pin angle (default: 45).
pincolor	pin color (default: blue).
pinlength	pin length (default: 4), in pt.
coordcolor	coordinate color (default: red), used if \showcoordstrue.

Those can also be set, middle code, via:

\setpindefaults `\setpindefaults {⟨options as above⟩}`

new: 2024/10/22

4 Declaring and Marking Coordinates/Nodes

Those are based on some ideas from Redaelli et al. (*CircuiTikZ*). Main differences: a variable number of parameters (see below) and it always also adds an empty node n⟨coord⟩.

\showcoordstrue `\showcoordstrue`
\shoocoordsfalse `\showcoordsfalse`

These will affect how \ncoord, \dotcoord and \odotcoord will behave, with \showcoordstrue a red pin will also be added to the newly defined coordinate/node. The initial state is \showcoordsfalse. It can be turned on/off as needed.

\showcoords `\showcoords {⟨val⟩}`

new: 2025/10/29

Alternative form to set newly defined coordinates visibility. If ⟨val⟩ is either on or true this will be equivalent to \showcoordstrue, otherwise if ⟨val⟩ is either off or false this will be equivalent to \showcoordsfalse.

\ncoord `\ncoord(⟨coord⟩)`
\pincoord `\pincoord(⟨coord⟩)`
`\pincoord(⟨coord⟩, ⟨color⟩)`
`\pincoord(⟨coord⟩, ⟨color⟩, ⟨angle⟩)`
`\pincoord(⟨coord⟩, ⟨color⟩, ⟨angle⟩, ⟨length⟩)`

The \ncoord always expects a single parameter ⟨coord⟩. A coordinate named ⟨coord⟩ and node named n⟨coord⟩ (a "n" is added as a prefix) will be created for later use/reference. If \showcoordstrue is en force, it will also add a pin.
The \pincoord always draws a pin, besides declaring a coordinate and node as \ncoord. It expects one to 4 parameters, as listed. If omitted, the default length is 4 (unit: pt), the default angle is -45 (degrees), the default color is blue. Likewise, if \showcoordstrue, \ncoord(name) is just a short cut for \pincoord (name,red,45).

Note: Those defaults can be changed via package options, see 3, or \setpindefaults.

\dotcoord `\dotcoord(⟨coord⟩)`
\dotpincoord `\dotpincoord(⟨coord⟩)`
`\dotpincoord(⟨coord⟩, ⟨color⟩)`
`\dotpincoord(⟨coord⟩, ⟨color⟩, ⟨angle⟩)`
`\dotpincoord(⟨coord⟩, ⟨color⟩, ⟨angle⟩, ⟨length⟩)`

These are the same as \ncoord and friends, just adding a dot (a filled in, small circle) at the coordinate.

\odotcoord `\odotcoord(⟨coord⟩)`
\odotpincoord `\odotpincoord(⟨coord⟩)`
`\odotpincoord(⟨coord⟩, ⟨color⟩)`
`\odotpincoord(⟨coord⟩, ⟨color⟩, ⟨angle⟩)`
`\odotpincoord(⟨coord⟩, ⟨color⟩, ⟨angle⟩, ⟨length⟩)`

These are the same as \ncoord and friends, just adding an open dot (a small circle filled with white) at the coordinate.

5 Crossing Paths

\pathcross `\pathcross*` [⟨cross-name⟩] {⟨coordA⟩} {⟨coordB⟩} {⟨path-name⟩} [⟨width⟩]

This will draw a line from ⟨coordA⟩ to ⟨coordB⟩ "jumping over" any pre-existent (soft) path named ⟨path-name⟩. First of, the reference path ⟨path-name⟩ has to be defined using the *name path* key (*name path*=⟨path-name⟩).
Then this will "calculate" the intersections between the line (defined by the coordinates (⟨coordA⟩) and (⟨coordB⟩) and the path named ⟨path-name⟩. At each intersection a coordinate named (⟨cross-name⟩-i) and a node (n⟨cross-name⟩-i) will be defined (i goes from 1 up to the number of crossings detected.) A macro named ⟨cross-name⟩T will have the number of crossings found.
At each intersection a semi-circle will be drawn, and finally a line will be draw connecting ⟨coordA⟩ to ⟨coordB⟩ over all intermediate nodes.
The star version flips the semi-circles orientation.

> ***Note:*** The default ⟨cross-name⟩ is "cross". It may contain only characters, as any valid TEX macro name. The default ⟨width⟩ of the semi-circle is 7pt.
>
> ***Note:*** This is based on the *tikz* library *intersetions*, inheriting it's limitations. The main one: It only detects crossings over "soft paths", this means, if the line defined by ⟨coordA⟩ and ⟨coordB⟩ crosses over a node, it will, in most cases, miss it (depends on how the node is draw and interacts with the soft path system).
>
> ***Note:*** When using the crossing coordinates, like (⟨cross-name⟩-i), be aware that in some ill-defined cases, *intersections* might detect a crossing either at the starting and/or ending points. \pathcross accounts for that, but you will be left with some extra reference coordinates, either the first one, last one or both.

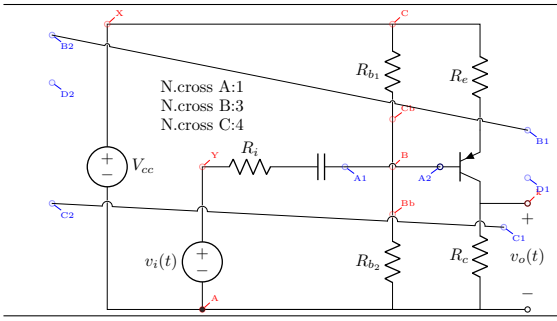
6 Some Examples

Note: In the examples below, the circuit doesn't make much/any sense, it is just a way to show the commands possibilities.

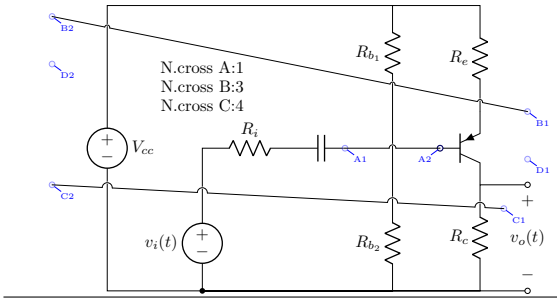
```
\resizebox{0.45\textwidth}{!}{
\begin{tikzpicture}
      %% This is the reference, named path
      %%
      \draw[name path=base circ]
    (0,0) \dotcoord(A) to[V,invert,l=$v_i(t)$] ++(0,2) -- ++(0,1) \ncoord(Y)
      to[R=$R_i$] ++(2,0)
      to[C] ++(1,0) \pincoord(A1) ++(1,0) \ncoord(B)
       ++(1,0) node[pnp,anchor=B] (T1){}
    (A) -- (A -| B)  to[R=$R_{b_2}$] ++(0,2) \ncoord(Bb) (B) ++(0,1) \ncoord(Cb) to[R=$R_{b_1}$]
      ++(0,2) \ncoord(C)
    (T1.C) to[R,l_=$R_c$] (T1.C |- A) -- (A)
    (T1.E) to[R,l=$R_e$] (T1.E |- C) -- (C -| A) -- ++(-2,0) \ncoord(X) to[V,l=$V_{cc}$] (X |- A) --
       (A)
    (T1.C) -- ++(1,0) node[ocirc]{} \ncoord(k) to[open,v=$v_o(t)$] (k |- A) node[ocirc]{} -- (A)
    (Bb) -- (Cb)
    ;
    %% These are just a few, marked, coords (they could be part of the previous path
    %%
  \path (T1.E)  ++(1,0)      \pincoord(B1)    ++(-10,2)    \pincoord(B2)
        (B1) ++(0,-1)        \pincoord(D1) (B2) ++(0,-1)   \pincoord(D2)
        (T1.C)  ++(0.5,-0.5) \pincoord(C1) (T1.C) ++(-9,0) \pincoord(C2)
        (T1.B) \odotpincoord(A2,blue,225)
  ;
  %% And that's all, a few crossing lines
  %%
  \pathcross{A1}{A2}{base circ}[4pt] \draw (Y) +(0,1.7) node(){N.cross A:\crossT};
  \pathcross*{B1}{B2}{base circ}[3pt]  \draw (Y) +(0,1.3) node(){N.cross B:\crossT};
  \pathcross*[sec]{C1}{C2}{base circ}[6pt] \draw (Y) +(0,0.9) node(){N.cross C:\secT};

\end{tikzpicture}
}
```

A first example with `\showcoords{true}` (showing all coordinates defined with `\ncoord`):

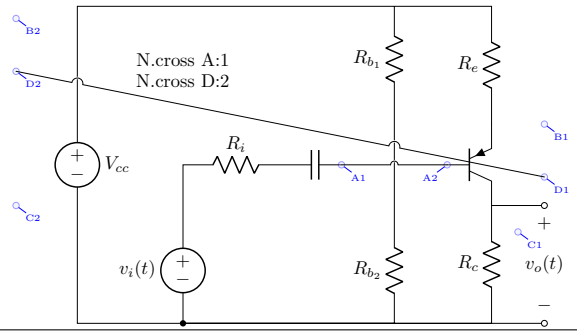


And the same with `\showcoords{false}`



The main limitation (derived from how *intersections* works) is that crossings between the line and nodes might not be detected at all. For example, if someone tries to connect the nodes *D1* and *D2*, it will, unfortunately, fail detecting the node (pnp transistor) entirely:

```
\resizebox{0.5\textwidth}{!}{
\begin{tikzpicture}
      %% This is the reference, named path
      %%
      \draw[name path=base circ]
    (0,0) \dotcoord(A) to[V,invert,l=$v_i(t)$] ++(0,2) -- ++(0,1) \ncoord(Y)
      to[R=$R_i$] ++(2,0)
      to[C] ++(1,0) \pincoord(A1) ++(1,0) \ncoord(B)
       ++(1,0) node[pnp,anchor=B] (T1){}
    (A) -- (A -| B)  to[R=$R_{b_2}$] ++(0,2) \ncoord(Bb) (B) ++(0,1) \ncoord(Cb) to[R=$R_{b_1}$]
      ++(0,2) \ncoord(C)
    (T1.C) to[R,l_=$R_c$] (T1.C |- A) -- (A)
    (T1.E) to[R,l=$R_e$] (T1.E |- C) -- (C -| A) -- ++(-2,0) \ncoord(X) to[V,l=$V_{cc}$] (X |- A) --
       (A)
    (T1.C) -- ++(1,0) node[ocirc]{} \ncoord(k) to[open,v=$v_o(t)$] (k |- A) node[ocirc]{} -- (A)
    (Bb) -- (Cb)
    ;
    %% These are just a few, marked, coords (they could be part of the previous path
    %%
  \path (T1.E)  ++(1,0)      \pincoord(B1)    ++(-10,2)    \pincoord(B2)
        (B1) ++(0,-1)        \pincoord(D1) (B2) ++(0,-1)   \pincoord(D2)
        (T1.C)  ++(0.5,-0.5) \pincoord(C1) (T1.C) ++(-9,0) \pincoord(C2)
        (T1.B) \pincoord(A2,blue,225)
  ;
  %% And that's all, a few crossing lines
  %%
  \pathcross{A1}{A2}{base circ}[4pt]          \draw (Y) +(0,2) node(){N.cross A:\crossT};
  \pathcross[sec]{D2}{D1}{base circ}[6pt]     \draw (Y) +(0,1.6) node(){N.cross D:\secT};
\end{tikzpicture}
}
```



References

[1] Philipp Lehman and Joseph Wright. *The etoolbox Package*. 2025, p. 40. URL: `https://mirrors.ctan.org/macros/latex/contrib/etoolbox/etoolbox.pdf` (visited on 11/09/2025).

[2] Massimo A. Redaelli et al. *CircuiTikZ*. 2025, p. 293. URL: `http://mirrors.ctan.org/graphics/pgf/contrib/circuitikz/doc/circuitikzmanual.pdf` (visited on 11/09/2025).

[3] Till Tantau, Mark Wibrow, and Christian Feuersänger. *The TikZ and PGF Packages*. Institut für Theoretische Informatik / Universität zu Lübeck. 2023, p. 1321. URL: `http://mirrors.ctan.org/graphics/pgf/base/doc/pgfmanual.pdf` (visited on 03/10/2025).