Anti Bicycle Theft

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Practical Course on Wireless Sensor Networks
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Introduction

Bicycle theft is a major problem in many cities, especially university towns. Our aim was to create a system that enables a bike owner to track a stolen bike. While other systems already on the market are trying to accomplish this by using GSM modules we tried to use a minimalistic approach: A tracking GPS module that can be turned on when a bike has been stolen, tracks positions and retransmits them using a long distance wireless interface.
Start with the following document:

```
...
```

Macro for creating a block node:

\blocknode{Block Title}{Block Content}

Macro \blocknode has three parameters. The first one is optional and it is the position of the block. The first block will be automatically placed to ($(firstrow)-(xshift)-(yshift)$), which is the left corner below the title block. In most of the templates, (firstrow) is set to (title.south), where *title* is the

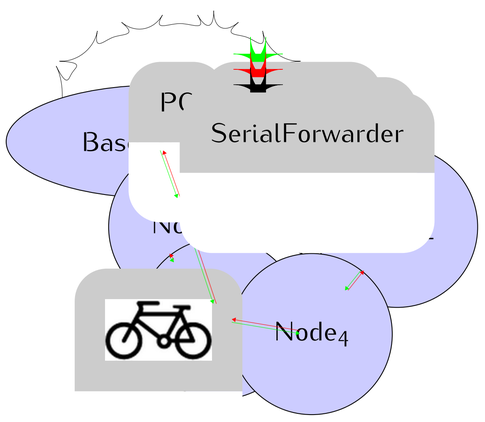
Used hardware / environment / Software

The system we proposed an implemented prototypically allows a user to remotely turn on a location tracking device, collect data over extended periods of time. This works even if his bike is not in range of a network after it has been activated. Using a easy to use webinterface bikes and be quickly reported as stolen and location data can be conveniently displayed on a digital map.
Future work is needed to determine how battery usage can be minimized (e.g. by replacing GPS with WiFi positioning) and whether a sufficient relay network can be established at reasonable costs.

System Description

The system consits of a PC running a webserver, a iris mote connected to the PC via USB, a set of relay IRIS motes and so called bike iris motes. The process begins with a user marking his bike as stolen using the system's webapp using an ID. The webserver will relay this ID to the basestation which broadcasts it to all relay motes via dissemination. When a bike passes a relay mote it will establish a connection and check whether its ID was disseminated. If this was the case the bike mote will turn on its GPS module and start recording its position in combination with a timestamp.
The next time the bike passes a relay mote the position data will be transfered, collected at the base station and made available to the user on the webapp

Topology



Conclusion

The system we proposed an implemented prototypically allows a user to remotely turn on a location tracking device, collect data over extended periods of time. This works even if his bike is not in range of a network after it has been activated. Using a easy to use webinterface bikes and be quickly reported as stolen and location data can be conveniently displayed on a digital map.
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Variable Width Block Nodes

You can also create blocks of arbitrary width

\blocknodew[coordinate]{Block width}{Block Title}{Block Content}

In this case it is better to specify coordinate manually if you want to have blocks aligned vertically.

Note that (xshift) and (yshift) are coordinates created in macro \initial

Block Nodes in the Second Column

To start the second column or the third column use commands

\startsecondcolumn, and \startthirdcolumn.

If the number of columns is 2, then the last command will not have effect.

You can also start a new column with an arbitrary x-coordinate by specifying explicitly the coordinate of the new block node as follows:

\blocknode[($(firstrow)-(yshift)+(x,0)$)]{Block Title}{Block Content}

Useful Macro Within Block Nodes

There are three types of colored boxes/blocks that you can use inside block nodes to highlight information.

Theorem
Statement

\innerblock{Theorem}{Statement}

Text

\innerblockplain[colorone!80!]{Text}

Text

\coloredbox{colorthree!50!}{Text}

The default figure environment does not work within a tikzpicture. I created a new figure environment that can be used instead, based on the code sent by Stephan Thober.

```
\begin{tikzfigure}[Caption]
...
\end{tikzfigure}
```

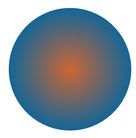

Fig. 1: A shaded circle

There are also callout blocks that allow for a more interesting layout of the poster.

\calloutblock[rotate angle]{from coordinate}{coordinate}{Block Width}{Block Content}

The alias for such blocks is *note*.

Plain blocks These blocks are similar to callout blocks. They allow for specifying the title of the block.

\plainblock[rotate angle]{coordinate}{Block Width}{Block Title}{Block Content}

Personalizing the Poster

It is possible to adjust the layout of the poster. To impose your own setting, you can use these macros:

- Macros for changing sizes

  \setmargin{4}, \setheaddrawingheight{14}, \setinstituteshift{10}, \setblockspacing{2}, \setblocktitleheight{3}

- Other structural macros

  \setcolumnnumber{3}, \usetemplate{6}, \usecolortemplate{4}, \usebackgroundtemplate{5}, \usetitletemplate{2}, \useblocknodetemplate{5}, \useinnerblocktemplate{3}, \useplainblocktemplate{4}

- Macro for adding logos to the title block

  \addlogo[south west]{(0,0)}{6cm}{filename}

- Macros for the basic colors

  \setfirstcolor{green!70!}, \setsecondcolor{gray!80!}, \setthirdcolor{red!80!black}

- Macros for specific colors:

  \setbackgrounddarkcolor{colorone!70!black}, \setbackgroundlightcolor{colorone!70!}, \settitletextcolor{textcolor}, \settitlefillcolor{white}, \settitledrawcolor{colortwo}, \setblocktextcolor{textcolor}, \setblockfillcolor{white}, \setblocktitletextcolor{colorone}, \setblocktitlefillcolor{colortwo}, \setplainblocktextcolor{textcolor}, \setplainblockfillcolor{colorthree!40}, \setplainblocktitletextcolor{textcolor}, \setplainblocktitlefillcolor{colorthree!60}, \setinnerblocktextcolor{textcolor}, \setinnerblockfillcolor{white}, \setinnerblocktitletextcolor{white}, \setinnerblocktitlefillcolor{colorthree},