Sundial siting

How to evaluate the best position for a new dial by means of the Orologi Solari

program

... e alura ?

Argineis - Castellamonte

In order to evaluate the position of a new dial the lighting conditions of the wall must be taken into account.

The following conditions must be satisfied to have the sun illuminating the dial :

- Sun above the horizon
- Sun in front of the wall
- No obstacle between dial and sun

The following slides show how to use "Orologi Solari" for the evaluation of these three conditions.

Set usual dial parameters as coordinates, declination etc.

Sun dial parame	eters				
Options Type	Background image Geographical coordinates	Roof and b Dial	alcony   Style	Map Hourlines	Buildings Daylines
Sundial Type family directional		•	Time zone c		
type vertic	al	•	+ minutes		
?			OK	Annulla	Applica

In the "Background image" page click "choose image" then select an image file showing the front of the wall where the dial should be placed.

Include in the picture any obscuring elements such as roofs, balconies etc.

Sun dial parameters	<b>X</b>
Type Geographical coordinates Dial S Options Background image Roof and balco	Style Hourlines Daylines ony Map Buildings
	choose image enable image
	C:\Users\gian\Documents\gnomoni ca\documenti di gian\circeo\campore\campore - Copia.jpg P1
	□ P2 □ P1 · P2 □
?	OK Annulla Applica

Select the "P1" check box and then click on a characteristic point in the picture.

Repeat with "P2".

Introduce in "P1-P2" the true distance between the two points (use the same arbitrary measurement units you are using everywhere in the program).

Sun dial parameters	
Type Geographical coordinates Dial Options Background image Roof and balco	Style Hourlines Daylines ony Map Buildings
	choose image enable image
	C:\Users\gian\Documents\gnomoni ca\documenti di gian\circeo\campore\campore - Copia.jpg
	□ P1 900 , 1977 □ P2 2236 , 1967
	P1 - P2 210
f	Annulia Applica

Select the "C" check box and then click on the point where the dial should be put (this position can be easily changed later).

Select the "enable image" check box in order to have the picture displayed behind the dial design.

Sun dial parameters	<b>X</b>
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	choose image enable image
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	P1 900 , 1977 P2 2236 , 1967 P1 - P2 210
	C 1594 , 1128
?	OK Annulla Applica

When selecting a point in the wall picture, zoom can be used.

Zoom in : use the mouse wheel or drag upward on the picture keeping the right mouse button pressed.

Zoom out : use the mouse wheel or drag downward on the picture keeping the right mouse button pressed.

Pan : drag the picture keeping the left mouse button pressed.

dial paramete	ers			
Туре	Geographical coordinates	Dial S	Style 📔 Hou	lines Daylines
Options	Background image	Roof and balco	ny Map	Buildings
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			🗆 P1 🔤	300 , 1977
	-1		P2 2	236 , 1967
			P1 · P2	210
1.1.2.51				594 , 1128
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Click OK. The dial is now drawn on the background image.

To move the dial in the frame : drag the dial with the left mouse button pressed. To move the frame borders only : drag the frame border with the left mouse button pressed. To move frame and dial : drag the frame border with the right mouse button pressed. To move frame, dial and picture : drag the picture with the right mouse button pressed.

To zoom use the mouse wheel or the "page up" and "page down" keys.



Now in order to see when the wall is illuminated, select "View", "dial lighting" and "cartesian graph".

You will now get the following window.



The position of the sun at the zodiac dates and for each hour in the day is shown on an azimuth / height diagram.

True local time or time zone time is shown as selected in the dial parameters ("Type" page).

Sunrise and sunset times can be read from this graph for each zodiac date.

Time when the sun reaches or leaves the wall (switch-on and switch-off time) can also be read.



If an obscuring element as a roof or a balcony is present, it can be taken into account. In the "Roof and balcony" page select "P0" check box then click on the image in the position where there is a vertex of the roof. Insert the prominence length of this vertex in the "depth" box. Repeat for P1 to P4 (minimum 2, maximum 5 points can be inserted). If known, the coordinates of the points can be directly inserted in the X and Y boxes. Finally select the "show the shadow in simulation" check box.

n dial parame	ters				
Туре	Geographical coordinates	Dial	Style	Hour lines	Day lines
Options	Background image	Roof and	balcony	Map	Buildings
			P0 delete P1 delete P2 delete P3 delete P3 delete	× Y   -220.38 -74.87   -218.02 -123.48   1.42 -213.45   218.17 -127.41   220.22 -73.14   e shadow in simulation	depth 50.00 50.00 50.00 50.00 50.00
?			OK	Annulla	Applica

If now the lighting diagram is again asked for, a new situation can be seen in the afternoon hours. The dial stops working at about 13:15 in summer, at 15:00 at the equinoxes.

With respect to the no-roof situation, about 1.5 hours in summer and 1 hour at the equinoxes have been lost.



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## **Gian Casalegno**

Let's move now the dial immediately below the roof (drag the dial frame by keeping the right mouse button pressed) and let's see what is the effect.



Select the lighting conditions diagram again. Situation has dramatically changed.

In summer the dial will never work. At the equinoxes switch-off happens 2.5 hours earlier than before and in winter the dial will work until 14:55 only and not until sunset as before.



In order to get a simpler and easier demonstration of what is happening, a simulation can be run. Select "Tools" and "Simulation". Click the "min" button to minimize the simulation window. Now click "stop", set the desired date (September 19<sup>th</sup> in the example) and move the hour slide to see where the roof shadow will be during the day.

Snapshots can be saved to files by clicking the "snapshot" button and selecting the desired output directory.



In order to take into account any building that could obscure the dial during the day, select the "Map" page, click "choose image" and then select an image file showing the map of the place.

Define again two points P1 and P2 together with their true distance.

Define the position of the center C of the dial as it is seen from on high and introduce the height of the dial center with respect to the ground (or to the same arbitary level used in the following step).

Sun dial parameters	N 100 100 100 100 100 100 100 100 100 10
Type Geographical coordinates Dial Options Background image Roof and ba	Style Hourlines Daylines   Icony Map Buildings
2	choose image I:\gnomonica\documenti di gian\circeo\argineis\mappa.tif
HIG2	□ P1 249,260 □ P2 315,292
3	P1 - P2 270
	C height 340
?	OK Annulla Applica

In the "Buildings" page define (as for the roof) up to 5 points that are the vertexes of the building element to be considered.

Introduce for each point its height (with respect to the same level as used in the previous slide).

Finally select the "show the shadow in simulation" check box.

Sun dial parameters				X
Type Geographical coordinates Options Background image	Dial Roof and	Style balcony	Hour lines Map	Daylines Buildings
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C C C C C C C C C C C C C C C C C C C		delete P2 delete	55.22 964.44   644.19 1255.2	450.00
3	3	delete	1045.0 520.37	580.00
2		delete	e shadow in simulati	
?		OK	Annulla	Applica

Now select "View", "dial lighting" and "cartesian graph".

The effect of the roof is evident in summer (sun high in the sky) while the effect of the nearby building is present in the winter morning hours (sun is low in the sky).



# Sundial siting

Run simulation.

Snapshots can be saved to files.



