

Pocket Cube Digital Clock Design

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WebSites	http://www.mementoslangues.fr/	http://www.randelshofer.ch/

Introduction

A **Pocket Cube Digital Clock** is a 2x2x2 **Pocket Cube** used for indicating time. A **digital clock** is a type of clock that displays the time digitally, as opposed to an analog clock, where the time is displayed by hands. Seven-segment displays are widely used in digital clocks and other electronic devices for displaying digital information.

Digital Clock – Useful Links

http://en.wikipedia.org/wiki/Clock	http://en.wikipedia.org/wiki/Digital_clock
http://en.wikipedia.org/wiki/Seven-segment_display	
http://en.wikipedia.org/wiki/Mathematical_constant	http://en.wikipedia.org/wiki/Physical_constant

There are **Virtual Cubes** that can be *virtually* rotated and twisted on a computer screen and **Real Cubes** that can only be *physically* rotated and twisted by hand. A **Texture** is laid down on a Virtual Cube whereas real **Stickers** are stuck down on a Real Cube. A Digital Clock Cube is designed by placing numerals on a texture which is then laid down on a Virtual Cube (see <http://www.randelshofer.ch/> for more details). The time of the day can be displayed on a *selected* Cube Face by rotating and twisting some parts of the Cube. The following example shows the *initial* state of the Cube where '0:00' is displayed on the front face.

Pocket Cube Digital Clock – Initial State

7-segment Display

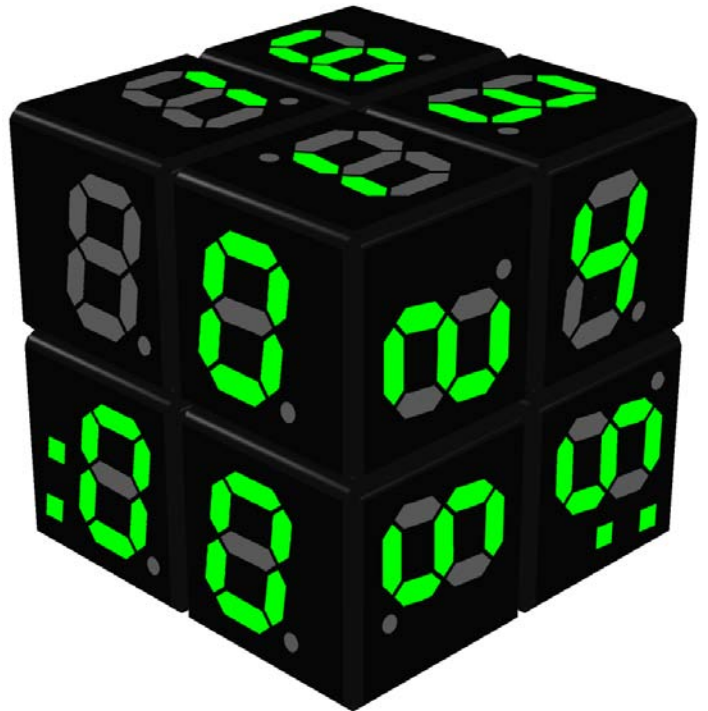
Digital Clock Cube

Original design 2009
by André Boulouard
and Walter Randelshofer

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Cube Texture



Virtual Cube

Pocket Cube Digital Clock Features

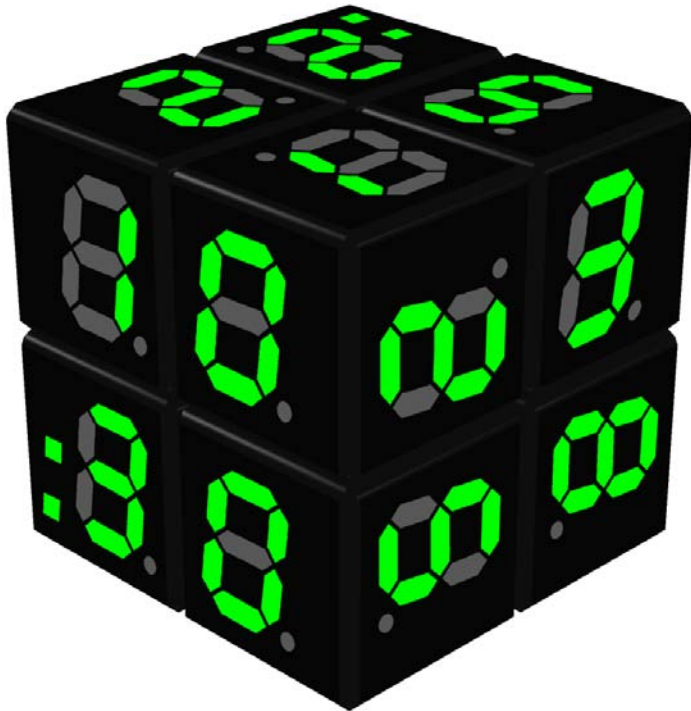
The Pocket Cube Digital Clock can be used in 2 modes:

- 1- Mode A (Digital Clock): from 0:00 up to 24:00 in 5-minute steps
- 2- Mode B (Accumulated Time Counter): from 0:00 up to 39:55 in 5-minute or 5-second steps

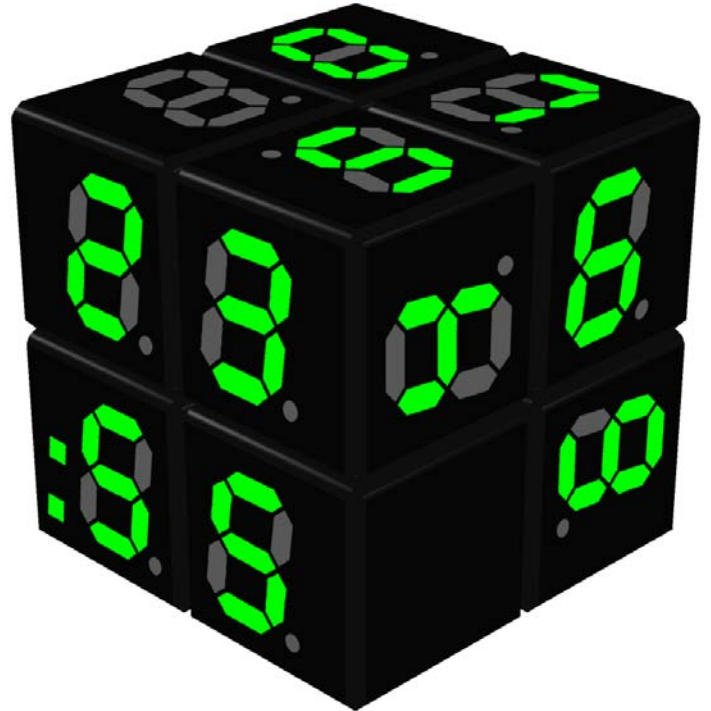
Examples of Pocket Cube Digital Clock Synthesized Algorithms

Pocket Cube Digital Clock Synthesized Algorithms

10:30



23:55



Optimized Synthesized Algorithms

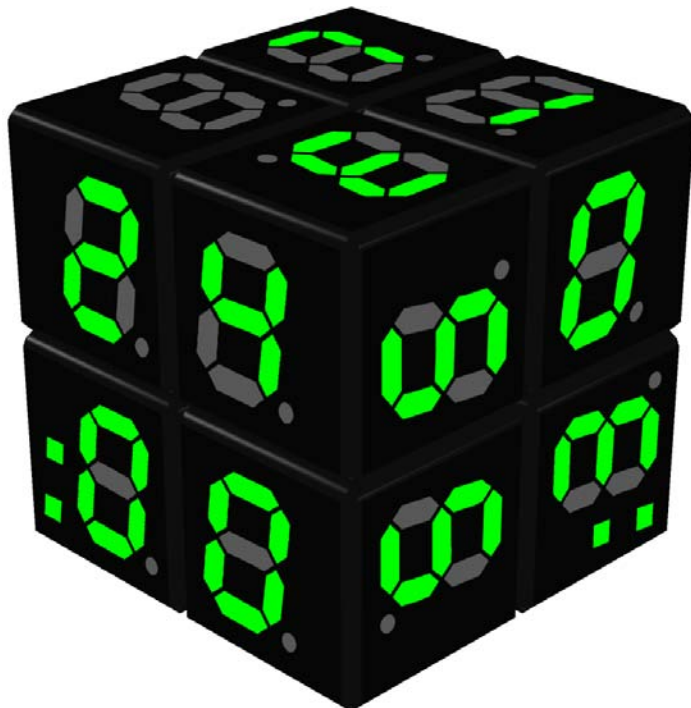
10:30

B D' B2 D U B2 U' L' B2 L

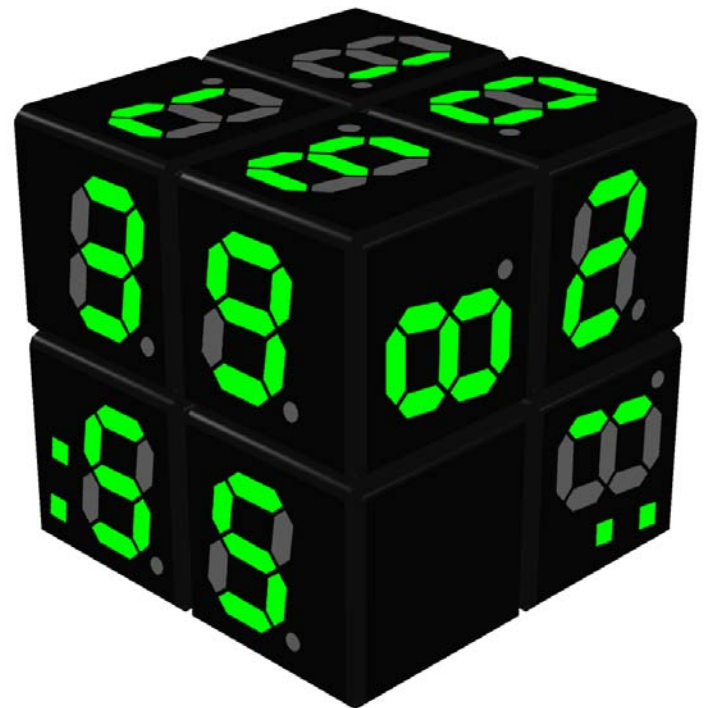
23:55

B R B' R2 B2 R D B2 D' L B2 L2 B2 L U B2 U'

24:00



39:55



Optimized Synthesized Algorithms

24:00

L U L2 B2 L U B2 U'

39:55

L B' L' R' B2 R D B2 D' U' B U B' L' B L

Pocket Cube Digital Clock Design

Top Left Corner: [blank,1,2]
Top Right Corners: [0,1,2], [3,4,5], [6,7,3_TLC], [8,9,3_TLC]
Bottom Left Corners: [:0,:1,:2], [:3,:4,:5]
Bottom Right Corner: [0,5,blank]

Note 1: Numeral 3_TLC is used on 2 corners to insure that it will be available at any time.

Pocket Cube Digital Clock Layout Table											
Top Left Corner						Top Right Corners					
1, 2, 3, blank						0, 1, 2, 3, 4, 5, 6, 7, 8, 9					
Bottom Left Corners						Bottom Right Corner					
:0, :1, :2, :3, :4, :5						0, 5, blank					

Corner Cubes Location											
		Up		Up				TLC		TRC	
		Up		Up				BLC		BRC	
Left	Left	Front	Front	Right	Right	TLC	TRC	TLC	TRC	TLC	TRC
Left	Left	Front	Front	Right	Right	BLC	BRC	BLC	BRC	BLC	BRC
		Down		Back				TLC		TRC	
		Down		Back				BLC		BRC	

Corner Cubes States Numbering and Orientation – Initial State (Texture State)											
Initial State Numbering						Initial State Orientation (degrees)					
		9		10				0		0	
		11		22				0		0	
13	14	1	2	5	6	0	0	0	0	0	0
15	16	3	4	7	8	0	0	0	0	0	0
		17		21				0		0	
		18		22				0		0	
		19		20				0		0	
		23		24				0		0	