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🏠 **Board index** ‹ **Game of Life** ‹ **Other Cellular Automata**   🔍

List of the Turing-complete totalistic life-like CA

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Naszvadi   ❝

List of the Turing-complete totalistic life-like CA

📄 December 4th, 2016, 4:00 pm

This topic is for collecting all 2D life-like totalistic cellular automata that are **proven** to be Turing-complete, with link to/summary of the **first AND the simplest** proof of its Turing-completeness...*

...or with embedding a Wolfram 110 automata, showing at least that the automata is capable to perform all **finite** computations - the purpose is: mostly all logic element implementations usually lack precisity, e.g. correct timing, discussing correctly the connectivity of elements etc.

Game of Life (citation needed, with oldest existence and simplest constructed UTM) Others?

What I prefer:

- Would be handy including constructions of unit cells that emulates GoL, Rule-110 or other relevant rules, and wonder if there are such unit cells that work in other rules
- If there is at least one $SUBJECT CA that is TC, then it can be embedded into Life using OTCA-metapixel
- An up-to-date wiki entry with the corresponding rules

Currently known universal rules that support the Glider and the rule inspected by David Eppstein (total 257 rules, and 64 glider-compatible without S0 and S5):

1. B3/S23
2. B3/S236
3. B3/S2367
4. B3/S23678
5. B3/S2368
6. B3/S237
7. B3/S2378
8. B3/S238
9. B36/S23
10. B36/S237
11. B36/S2378
12. B36/S238
13. B368/S23

14. B368/S238
15. B37/S23
16. B37/S236
17. B37/S237
18. B37/S238
19. B378/S237
20. B378/S2378
21. B378/S238
22. B38/S23
23. B38/S236
24. B38/S2367
25. B38/S23678
26. B38/S2368
27. B38/S237
28. B38/S2378
29. B38/S238
30. **B35/S236**

Last updated on: 2017.10.27.

Last edited by Naszvadi on October 27th, 2017, 1:47 pm, edited 5 times in total.

Naszvadi

Re: List of the Turing-complete totalistic life-like CA

December 8th, 2016, 6:04 pm

B3/S23 (Game of Life): A unit cell of Rule-110 automaton was created, visit for more:
http://pentadecathlon.com/lifenews/2005 ... _cell.html

Naszvadi

Re: List of the Turing-complete totalistic life-like CA

December 9th, 2016, 6:51 pm

> **Naszvadi wrote:**
> B3/S23 (Game of Life): A unit cell of Rule-110 automaton was created, visit for more:
> http://pentadecathlon.com/lifenews/2005 ... _cell.html

The above unit cell works in B3/S238, too, and in the non-totalistic B3/S234c and B3/S236e rules.

So, EightLife is Turing-complete - proven since 2016.12.09

http://www.conwaylife.com/wiki/EightLife is B3/S238, so a pattern with 000001 Rule-110 initial configuration is here:

CODE: SELECT ALL

```
#C Unit cell for Wolfram's "Rule 110".
#C Place multiple copies of this pattern in a horizontal
#C row, overlapping the decorative still-lifes at the corners.
#C The state of the cell is determined by the presence (OFF)
#C or absence (ON) of a glider between the tubs at generation
#C 1200N. Note the negative logic. For generation 0, the
```