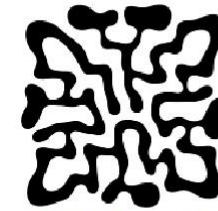


# LSCIN (Laboratorul Sisteme de Calcul de Inspiratie Naturala)



*Natural &  
High Performance  
Computing  
Laboratory*

**NHC Lab**

- Arhitecturi si algoritmi de inspiratie naturala (rețele neuronale, sisteme cu logica fuzzy, automate celulare, "swarm intelligence" etc.) cu aplicatii in probleme de prelucrare a imaginilor, semnalelor vocale, text etc. Clasificare si detectie, predictie, optimizare, dezvoltare de senzori inteligenti.
- Aplicatii ale dinamicii neliniare in rețele neliniare complexe (criptografie, predictie, modelare si simulare a sistemelor complexe: biologice, sociale, fizice)
- Eficientizarea algoritmilor pentru integrare in platforme computationale diverse (PC, tableta, sisteme FPGA, CUDA, sau circuite specializate)
- Biodinamica neliniară (sisteme dinamice neliniare cu aplicatii in prelucrarea semnalelor si modelare in biologie)

# RD- CNN (continuous-time / cont. state)

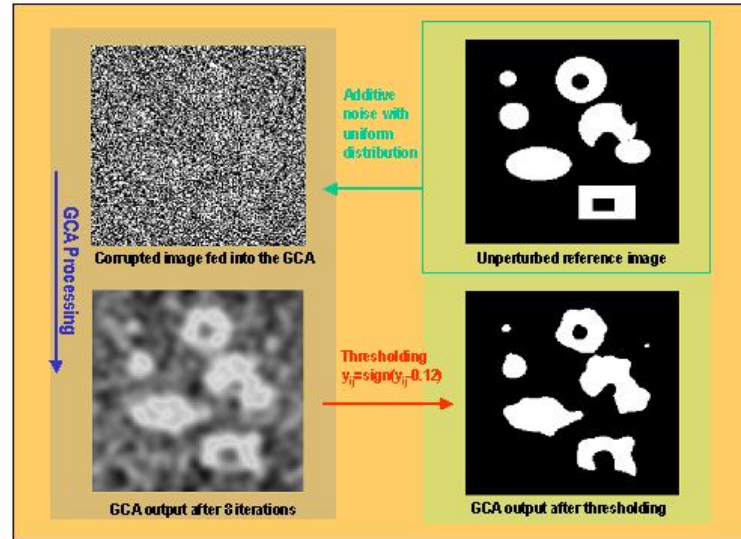
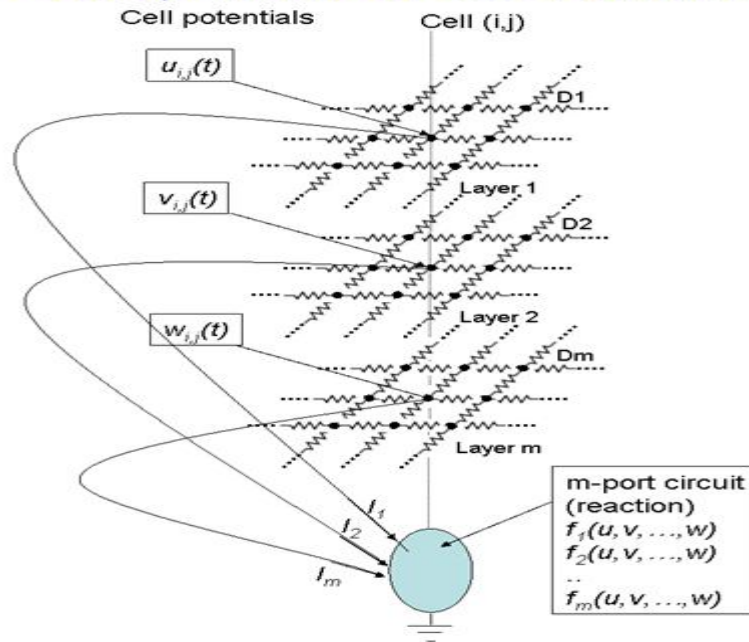
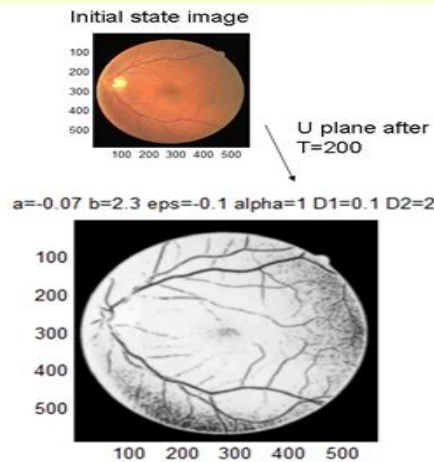
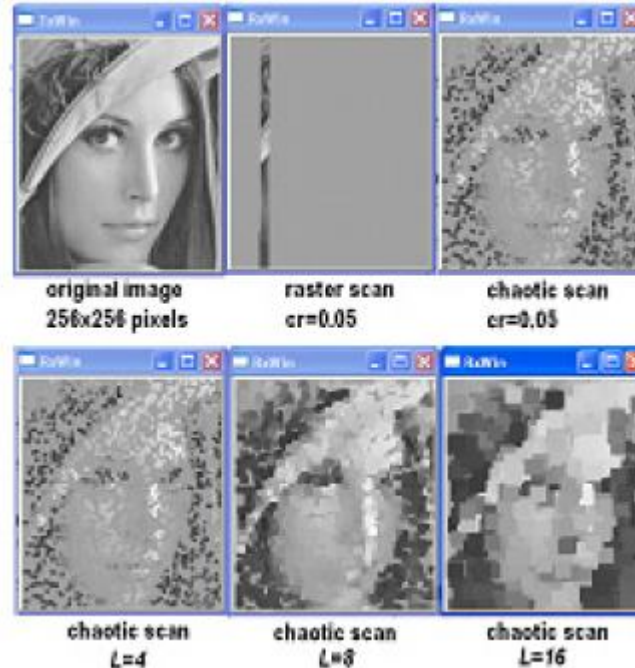


Fig. 15: Pattern detection and restoration from highly degraded image using a generalized cellular automaton with recurrent CNN coupling. The noise added to the original pattern in the upper right corner has the amplitude 10 times larger than the unperturbed image, and the noisy input is shown in the upper left corner. Color black corresponds to an output equal to  $-1/3$ , while the white color codes an output equal to  $1/3$ . Corresponding shades of gray are assigned to the intermediate values.

D  $a = -0.07, b = 2.3$



Feature enhancement



## VHDL – Unealta software pentru generare cod

Regula automatului celular: parametru programabil

Numar de celule: parametru programabil

Cod VHDL generat



Interfata utilizator – parametri programabili

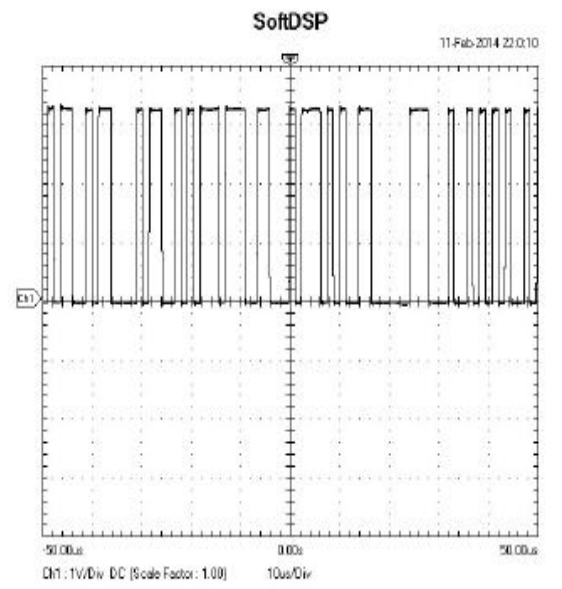
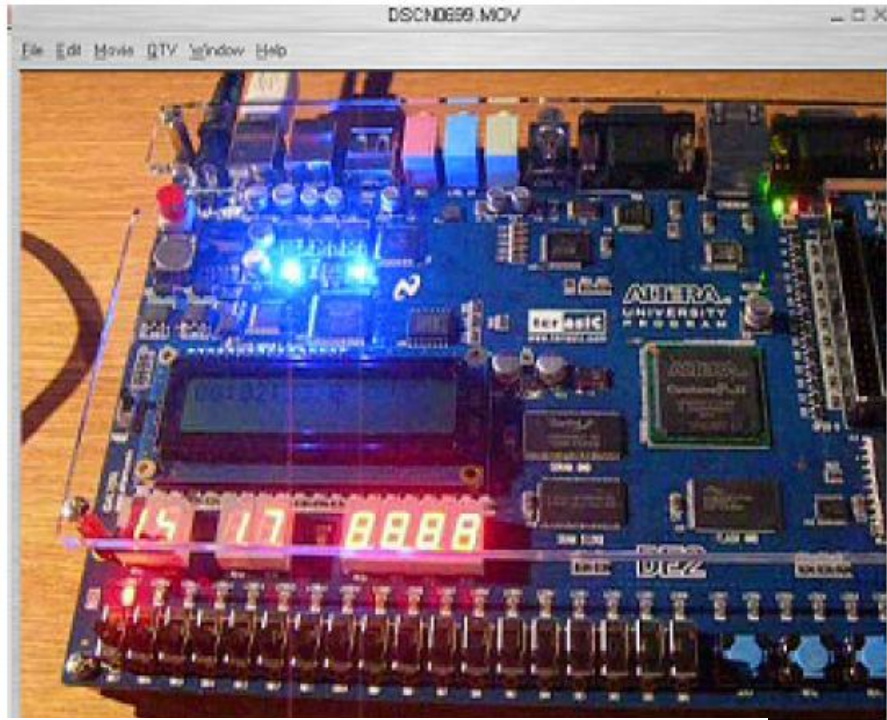
Start generare cod VHDL corespunzator automatului celular

Localizare fisier care contine codul VHDL

Unealta software dezvoltata in C++

Generare automată a codului VHDL asociat descrierii unui automat celular hibrid

Hardware design implementare FPGA



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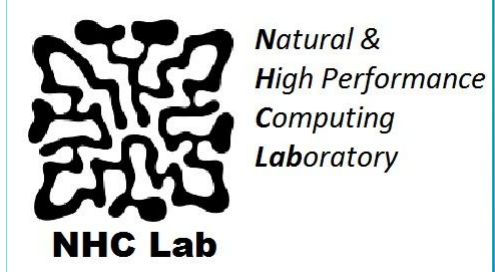


Figure 5. Oscilloscope probe capture from the PRNG sequence for chain HCA case