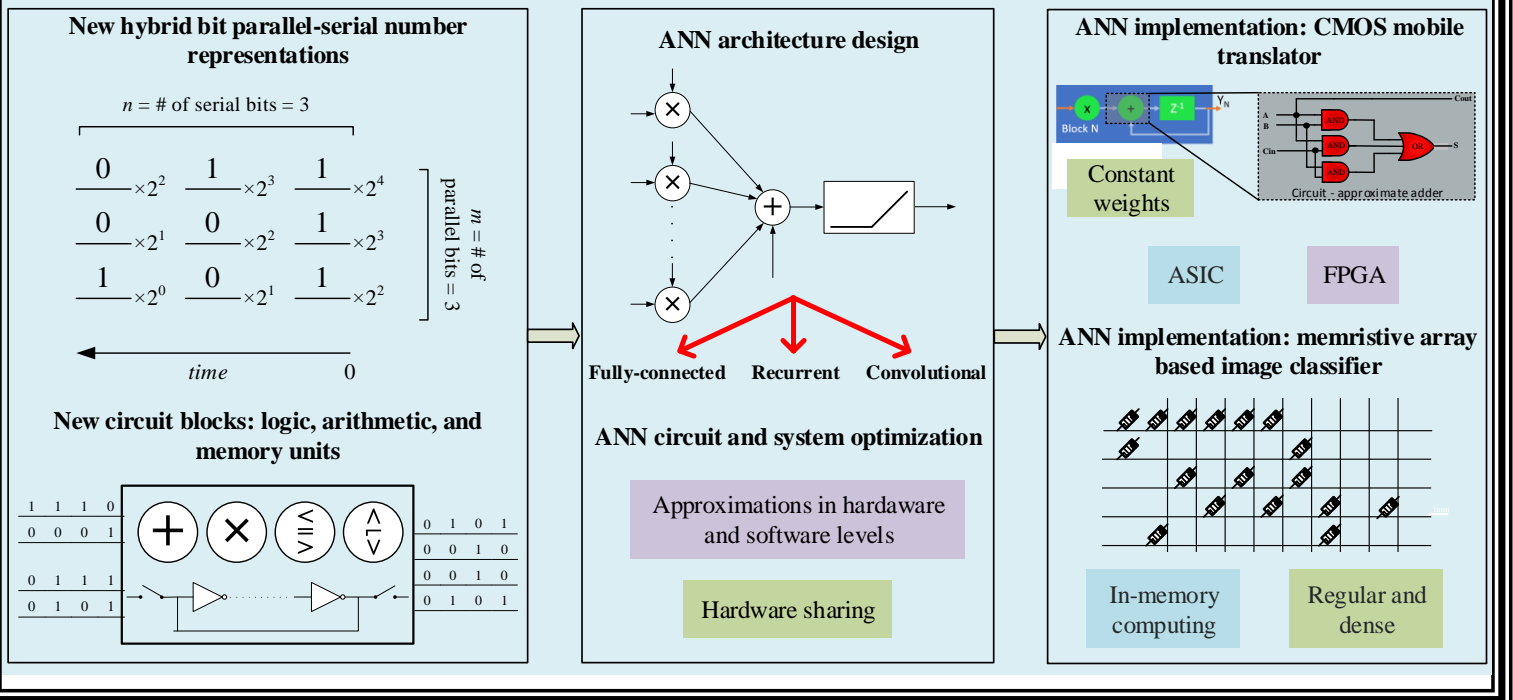**Master**, **PhD**, and **Post-Doc** positions available within the **TUBITAK** and **European Union H2020** projects on Artificial Neural Network (ANN) Implementations. The general information of the projects:

Main objective: Implementing ultra-low energy electronic neural networks employing a new hybrid bit parallel-serial computing paradigm within the technologies of CMOS and memristor arrays

Long term vision: Making neural networks portable and embeddeple to portable devices such as smart phones

New hybrid bit parallel-serial number representations

n = # of serial bits = 3

$$\frac{0}{\quad} \times 2^2 \quad \frac{1}{\quad} \times 2^3 \quad \frac{1}{\quad} \times 2^4$$
$$\frac{0}{\quad} \times 2^1 \quad \frac{0}{\quad} \times 2^2 \quad \frac{1}{\quad} \times 2^3$$
$$\frac{1}{\quad} \times 2^0 \quad \frac{0}{\quad} \times 2^1 \quad \frac{1}{\quad} \times 2^2$$

m = # of parallel bits = 3

$time$ 0

New circuit blocks: logic, arithmetic, and memory units

ANN architecture design

Fully-connected   Recurrent   Convolutional

ANN circuit and system optimization

Approximations in hardaware and software levels

Hardware sharing

ANN implementation: CMOS mobile translator

Constant weights

ASIC   FPGA

ANN implementation: memristive array based image classifier

In-memory computing   Regular and dense

- Candidates are expected to have a background in electronic circuit/system design and/or computer-aided design of digital circuits.

- Researchers to be hired, will be supported through visits and internships to project collaborators.

- Post-Doc candidates are expected have a strong publication record.

- Check our web site www.ecc.itu.edu.tr for our group and project details.

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