

## **Supervisor review of dissertation thesis**

**Student:** Ing. Salma Bay Abo Dabbous

**Title:** Utilizing Unconventional CMOS Techniques for Low Voltage Low Power Analog Circuits Design for Biomedical Applications

**Supervisor:** Doc. Ing. et Ing. Fabian Khateb, Ph.D. et Ph.D.

### **- Evaluation of the student during her study:**

Ing. Salma Bay Abo Dabbous started her doctoral study at Brno University of technology in September 2012 and in year 2014 she passed successfully the doctoral state exam. During her doctoral study she was a hardworking student and she shows a very good energy on learning new skills. Her work was published in international conference and journals indexed in Web of Sciences.

### **- Evaluation of the doctoral thesis:**

The dissertation thesis is dealing with utilizing the unconventional CMOS techniques for low voltage low power analog circuits design which is a hot research topic nowadays. The designed circuits are highly demanded for portable, wearable electronics and biomedical applications.

The thesis describes in details the most important features of the unconventional CMOS techniques. These techniques are: bulk-driven, floating-gate, quasi-floating gate and their combination. Based on various analysis of these techniques such as large and small signal and noise, the advantages and disadvantages of each of these techniques are given.

The dissertation thesis presents several analog circuit designs such as operational transconductance amplifier, tunable transconductor, current conveyor transconductance amplifier, loser-take- all and winner-take-all circuits, fully balanced four-terminal floating nullor and others, all of them are capable to work with low-voltage supply and low-power consumption. Applications for the abovementioned designed circuits are also included.

Some of these structures and applications were published in international journal with impact factor such as Radioengineering Journal in 2013, Indian Journal of Pure & Applied Physics, in 2015 and AEU -International Journal of Electronics and Communications in 2016.

### **- Final evaluation:**

I can conclude that the contents and the level of thesis is interesting and that the main goals of the thesis were fulfilled. Therefore, I recommend it for defense.

November 2, 2016

Doc. Ing. et Ing. Fabian Khateb, Ph.D. et Ph.D.