

NITheCS COLLOQUIUM: Africhino: Open-hardware for Teaching and Learning Dr Marco Mariola (University of KwaZulu-Natal)

Monday, 10 October 2022 | 16h00 – 17h00 SAST

ABSTRACT

Africhino quasi-computer, a project funded by the Technology Innovation Agency, aims to design ad-hoc instruments for teaching and research purposes. The experimental setups for teaching and learning were designed to be low-cost and used under mentoring supervision. Practical tools for electronics were also designed to be low-cost and user-friendly but are still too expensive for less fortunate students to buy.

During the pandemic peak, the universities moved their laboratory activity online, replacing the experiments with video, simulations, and theoretical questions on practical applications. The pandemic changed the project's direction by implementing Africhino with new experimental devices for the applied physics modules.

The standard imposes a breadboard, electronics components, and instruments such as oscilloscopes and function generators for electronics experiments. Providing each student with a minimal experimental setup was impossible, and finding another way to implement practicals remotely was necessary.

A minimalistic setup was then designed to perform the experiments in electronics under remote supervision and safely.

The final product was never used during the pandemic but is now used in our laboratory sessions.

The new experimental setup put new tools and a new teaching paradigm close to the industry world.

BIOGRAPHY

Dr Marco Mariola is a Senior Lecturer of Physics at the School of Chemistry and Physics at the University of KwaZulu-Natal (UKZN). He is also part of the Quantum Research Group.

Dr Mariola studied Aeronautical Engineering at the School of Aerospace Engineering at La Sapienza of Rome. In 2015, he received a PhD in Quantum Physics at the UKZN.

In 2006 he was employed as a professional antenna designer, responsible for electromagnetic and structural analysis, at GRUNER S.R.L. Nettuno, Italy.

Dr Mariola's research involves designing new tracking and synchronisation techniques for free-space quantum cryptography, customisation of laboratory instruments and energy harvesting. He is also engaged in an educational programme for disadvantaged students promoted by the Rotary Club of Durban Umhlatuzana.



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