

# Innovative wideband ring voltage-controlled oscillator (VCO)

October 8 2013

---



UNIST undergraduate Seyeon Yoo is majoring in the School of Electrical and Computer Science, UNIST. Credit: UNIST

A new wideband ring voltage-controlled oscillator (VCO) was proposed by UNIST undergraduate student, Seyeon Yoo with the the research work published in *IEEE Microwave and Wireless Components Letters*.

\*VCO (voltage-controlled oscillator) : an electronic oscillator whose

oscillation frequency is controlled by a voltage input. The applied input voltage determines the instantaneous [oscillation frequency](#).

Wideband VCO is a key component of an IR-UWB system (Impulse radio-Ultra-wideband) which has drawn attention as a practical technology for a Doppler radar\* system which can detect human vital signs such as heart beats and respiration.

\*Doppler radar: a specialized radar that makes use of the Doppler effect\* to produce velocity data about objects at a distance.

The IR-UWB's large signal bandwidth can yield an increased time resolution and its wide range of frequency bands is desirable because an optimal band can be selectively used to maximize detection accuracy.

With the new VCO designed by the UNIST research team led by Prof. Jaehyoun Choi and proposed by a UNIST [undergraduate student](#), Seyeon Yoo, an operating [frequency band](#) is digitally set using a digital-to-analog convert (DAC) in the supply-voltage regulator.

Once a band is selected, the specific target-frequency is analogously tuned, controlling the strength of latches in delay cells. Furthermore, by storing the latches in each cell, the KVCO becomes scalable.

Ultimately, throughout the entire 2-8 GHz frequency band, the KVCO can be constantly maintained, which helps ensure the stable operation of the phase-locked loop\* (PLL).

\*phase-locked loop: a control system which generates an output signal whose phase is related to the phase of input signal.

"This technology will be applicable for IR-UWB based Doppler radar systems and various radio frequency (RF) semiconductor applications

since it provides stable wideband frequency," said Prof. Choi.

He also specially praised Yoo: "Developing an analog/RF integrated circuit (IC) chip requires extensive knowledge and know-how on IC designs. As an undergraduate student, developing a new IC and publishing a research paper in a leading science journal is a remarkable performance."

Provided by Ulsan National Institute of Science and Technology

Citation: Innovative wideband ring voltage-controlled oscillator (VCO) (2013, October 8)  
retrieved 20 March 2024 from <https://phys.org/news/2013-10-wideband-voltage-controlled-oscillator-vco.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--