VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)

Affiliated to **JNTUH**, Approved by **AICTE**, Accredited by **NAAC** with **A++** Grade, **ISO 9001:2015** Certified
Kacharam, Shamshabad, Hyderabad – 501218, Telangana, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Academic Year: 2023-24

IV B. Tech I Semester R20 Regulations
Project Work Phase - I (A6444)
Abstract

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PROJECT DOMAIN: VLSI

Title of the Project Work Phase - I:

Enhancing Real-Time Clocks with a Low-Power Crystal Oscillator and Pulsed Driver

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ABSTRACT:

A Real-Time Clock (RTC) is a crucial component in electronic devices and systems that require accurate timekeeping and timestamping. RTCs are responsible for tracking the current date and time, even when the device is powered off or in a low-power state. In generating an RTC, the already implemented Crystal Oscillator which consumes 3.24nW of power over the supply voltage of 1-1.8V with precise crystal values is used. Amplifiers required for RTC generation can be replaced with pulsed drivers for generating precise and controlled pulses of electrical signals, along with pulsed drivers Delay Locked Loop (DLL). Switched Capacitor Networks (SCN) can be used to create programmable time delays by controlling the charging and discharging of capacitors in RTC circuitry.

Firstly, the implementation of RTC can be done using the existing model as of base paper. The Real Time Clock for low-power applications includes a body-biased inverter and body bias generator in the Front-end block, Delay cells, and Pulse generators in the DLL circuit, PMOS and NMOS level converters, Multiplexer circuits, and finally SCN block which includes group of D-Flip Flops, 4x1 multiplexers, Capacitor networks, and amplifiers. It can be implemented in Cadence-Virtuoso 180nm CMOS technology for its simulation part for verifying the generation of a real-time clock. Further work can be improvised by reducing the complexity of the internal circuit of RTC with circuit and power reduction techniques.

Key words: Real Time Clock, Crystal Oscillators, Pulsed Drivers, Delay Locked Loops, Switched Capacitor Networks, Level converters, Cadence-Virtuoso.

References:
[1] Yoon, D., Jang, T., Sylvester, D., & Blaauw, D. (2016). A 5.58qnW crystal oscillator using pulsed driver for real-time clocks. *IEEE Journal of Solid-State Circuits*, *51*(2), 509-522.
[2] "Ultra-Low-Voltage CMOS Crystal Oscillators" by Mariana Siniscalchi, Fernando Silveira and Carlos Galup-Montoro.

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Supervisor

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Student(s)