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Achieving Nanosecond Timing with the Vernier Method REBECCA COOPER, ELIZABETH GEORGE, PAUL VOYTAS, Wittenberg University — Many subatomic processes occur in a small time frame, on the order of nanoseconds. We report on a project to create a circuit that can measure time intervals accurately on a nanosecond scale. To achieve this we used the vernier method which is based on coincidence between two oscillators of slightly different frequencies. For accurate timing, the oscillators needed to have a stable, clean signal. The frequency needed to be in the MHz range, producing a pulse period of $\sim$100 ns, and the pulse width needed to be as narrow as possible, on the order of a few nanoseconds. Relaxation oscillators based on unbuffered inverters in an RC circuit were used to generate the pulses. To shorten the pulses, we used a high-speed comparator circuit that created two pulses from the input pulse, one of which was inverted and delayed relative to the other, and an AND gate that combined the two, thus creating a shorter pulse. We have achieved a frequency of 4.5 MHz and a width of 8 ns.

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