Cuffless Blood Pressure Measurement via Pulse Transit Time Analysis and Arduino

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This project addresses the accessibility gap in hypertension monitoring by developing a low-cost, cuffless blood pressure device. With 48.1% of U.S. adults affected by high blood pressure, many cannot afford standard monitors ($50-$100) or find traditional cuff-based systems uncomfortable. We designed and built an Arduino-based alternative utilizing Pulse Transit Time (PTT) methodology at a $25-$35 price point. Our prototype integrates an Arduino Uno R3 microcontroller with pulse sensors in a 3D-printed housing, eliminating the need for uncomfortable cuff inflation while maintaining clinical accuracy. Testing against commercial monitors demonstrated relatively accurate measurement precision with an average of 7.64% error for SBP and 8.88% error for DBP. This innovation demonstrates how engineering solutions can address healthcare accessibility challenges while potentially improving hypertension management for underserved populations.

Awards Won: