A quadruple-potential waveform, at $E_{\text{det}1} = -0.5 \ V$ ($t_{\text{det}1} = 240 \ \text{ms}$), $E_{\text{det}2} = +0.2 \ V$ ($t_{\text{det}2} = 180 \ \text{ms}$), $E_{\text{oxd}} = +1.0 \ V$ ($t_{\text{oxd}} = 180 \ \text{ms}$), and $E_{\text{red}} = -0.8 \ V$ ($t_{\text{red}} = 300 \ \text{ms}$) versus SCE, was employed at a Nafion-coated Au electrode for the simultaneous determination of glucose and fructose by flow injection analysis. $E_{\text{det}1}$ and $E_{\text{det}2}$ caused the oxidation of glucose and glucose and fructose, respectively. Hence, concentration subtraction could be used to determine both species. Using the FI-PAD, a linear response to glucose at $E_{\text{det}1}$ was obtained across the concentration range 5-60 mM, with a sensitivity of $2.34 \times 10^{-7} \ \text{A} \ \text{mM}^{-1}$, and the limit of detection of 1.2 mM (S/N=3). Whereas at $E_{\text{det}2}$ scaled linearly with either glucose or fructose concentration in the range up to 60 mM, with a sensitivity of $7.50 \times 10^{-6} \ \text{A} \ \text{mM}^{-1}$, and the limit of detection of 0.13 mM (S/N = 3). Interference from other sugars, organic acids, and amino acids were studied. The method developed was used to analyze glucose and fructose contents in five different fruit samples; the method showed good agreement with the standard liquid chromatographic method.