A Surface Acoustic Wave (SAW) correlator built on a Lithium Niobate substrate is temperature compensated in order to maintain a constant center frequency. Frequency shifts as a result of temperature variations limit device performance. An Arduino®-based PWM temperature controller is developed to read the device temperature from a resistance temperature detector located on the SAW wafer and to regulate its temperature to a specified setpoint by providing current to a heater which is co-located with the temperature sensor on the SAW correlator substrate. The final temperature controller achieves frequency shifts of 0.013 MHz from room temperature with a worst-case PPM experienced over 30°C of temperature variation of 0.48 PPM/°C. Linear and non-linear plant models are developed successfully to predict the device’s temperature based on any input setpoint. Although there are alternatives to limit temperature drift at different temperatures, this thesis presents a simple method that works on a standard Lithium Niobate substrate.

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The public is welcome to attend.