Title	Short description	Reference link
Analog temperature controller	Design PID control based temperature regulator to maintain constant temperature for the power resistor you used in EE236 midsem. The temperature set-point must be controlled with a potentiometer (knob).	https://www.youtube.com/watch?v=JvK_HGSsF78
1D motion stage	A potentiometer (knob) should be used for actuation of bi-directional motion. Depending on amount of rotation of knob (potentiometer), a motor must rotate by the same amount. Rotation of motor may be converted to linear motion using rack and pinion arrangement (optional). Design for fast motion and fast settling.	Motor PWM drive, with PID control. Contact Date madam for PWM lab sheet. https://www.youtube.com/watch?v=w7bP9M6JR4c https://www.youtube.com/watch?v=ON_Lris5KiQ
Motor driver with PWM	Implement a pulse width modulation (PWM) circuit to control motor speed. Use Hall effect sensor to measure the motor speed. A PID controller may be optionally used to maintain constant set speed.	Contact Date madam for PWM lab sheet. https://www.youtube.com/watch?v=w7bP9M6JR4c
Lux meter	Design a circuit that can measure intensity of light as a voltage output. The circuit must be compatible with the light source used in the solar cell experiments you did in EE236. You may use LDR or photodiode.	All you need is a photodiode receiver circuit, similar to the one you will use in “How dark is dark” experiment. Demo: As the intensity of the LED bank varies, the output voltage should vary. Show Voltage v/s Intensity plot. Interested groups may build on this project topic to make a light activated switch that responds when light intensity crosses a user defined reference.
Keyless piano/harp	Use an array of IR sensors to detect position of obstacle (finger) against a ruled background to emulate a piano/harp. You should generate some basic notes. You can use krypton to generate musical notes.	TCRT5000 datasheet, or may use discrete LED and photodiode (as in “How dark is dark” experiment). Demo: Something like this https://www.youtube.com/watch?v=L3L-IKAiC1s

Electronic stethoscope	Using a regular acoustic stethoscope diaphragm, design an electronic front end circuit to convert heart sounds into electrical signals, to be displayed on an oscilloscope.	http://www.ee.iitb.ac.in/~stallur/wp-content/uploads/2017/02/On-the-electronic-detection-of-heart-sounds.pdf and reference material from audio amplifier lab for microphone circuit. http://people.ece.cornell.edu/land/courses/ece4760/FinalProjects/s2012/myw9_gdd9/myw9_gdd9/
MOSCAP C-V measurement with PSD	Using the technique of phase sensitive detection, design an experiment to measure the C-V profile of MOSCAP devices you tested in EE236, and compare performance to the technique you used previously.	Relevant lab sheets. Measure C-V of MOSCAP and compare to your readings from EE236.
Touch-less gesture recognition	Use an array of ultrasound/IR sensors to implement simple hand gesture recognition (swipe, raising/lowering of hand, turn etc.)	TCRT5000 datasheet, or may use discrete LED and photodiode (as in “How dark is dark” experiment). A project report from EE617 Autumn 2017 will be provided to groups that intend to use ultrasound sensor instead of optical.
Robust ECG front end	Build an ECG front end that gives better performance (SNR) than the circuit you built in one of the labs.	www.iitk.ac.in/eclub/ee381/Expt4_Chopper_Amplifier.doc http://wel.ee.iitb.ac.in/teaching_labs/WEL%20Site/ee617/Labsheets_2017/Expt_5_Supporting_Material_Michigan_Biopotential_Amps.pdf http://wel.ee.iitb.ac.in/teaching_labs/WEL%20Site/ee617/Labsheets_2017/Expt_5_ECG_Amplifier.pdf
Universal sensor signal conditioning	Design a flexible analog signal conditioning circuit, capable of being reconfigured for specific applications. Demonstrate versatility of the architecture by choosing two different sensors and reconfiguring the circuit to interface with each sensor.	https://www.sciencedirect.com/science/article/pii/S2212017313000303

Ultrasonic parking sensor with audio output	Design an ultrasound parking sensor and a voltage controlled oscillator that emits a beeping sound on a speaker. As the car approaches an obstacle, the frequency of the beeps should keep increasing and turn to a constant hum when the distance falls below 5cm.	TI analog system lab kit, frequency synthesizer experiment. A project report from EE617 Autumn 2017 semester will be provided to groups working on this project.
FM receiver	Build a simple FM receiver to receive your favorite FM station and play it on a speaker.	https://electronicsforu.com/electronics-projects/simple-fm-receiver (use components available in WEL lab) https://www.electroschematics.com/5923/fm-radio-receiver/
Walkie talkie	Build an audio transmitter that can be used as part of a walkie talkie system.	https://www.homemade-circuits.com/homemade-walkie-talkie-circuit/ (you may use microphone conditioning circuit from audio amplifier lab, and hook it up to an antenna for transmitter. For receiver, you may use a readymade FM receiver.)
Encrypted audio transmission using chaotic circuits	Use simple chaotic op-amp circuits for encrypting audio signals, and build a corresponding chaotic decryption circuit to extract the transmitted audio signal.	https://www.compadre.org/advlabs/bfy/files/TalKnightonChaosPaper21.pdf https://physics.csuchico.edu/ayars/427/handouts/AJP000503.pdf
Phase locked loop (PLL) design	Design a PLL operating at 100kHz master clock frequency (frequency divider/counter could be implemented on your Krypton board).	TI analog system lab kit, frequency synthesizer experiment. Ask WEL staff for access to brochure.
Multi-channel audio equalizer	Build a 6-channel (or more) audio equalizer to go with the audio amplifier you designed in one of the labs. The equalizer must be tunable, so that the user can adjust amplitudes of different frequency components per their desire.	Extend the audio amplifier handout circuit, adding more channels (bandpass filters). You may implement bandpass filters using the switched capacitor filter IC you used in lab.
Noise cancelling headphone	Build a simple noise cancellation circuit using additional microphones to cancel out ambient noise to improve the performance of the audio amplifier you designed in one of the labs.	Extend the design used in audio amplifier experiment, and explore adding filters to your circuit using switched capacitor filter IC used in lab.

Class D audio amplifier	Using components available in WEL lab, design a class D audio amplifier and demonstrate a loud speaker!	http://www.analog.com/en/analog-dialogue/articles/class-d-audio-amplifiers.html https://www.allaboutcircuits.com/projects/how-to-build-a-class-d-power-amplifier/