ECE 401: HW#1: Project Selection

Due: Week #2

Pick a lab partner: 2 people per group

Pick a project for ECE 401

- Email these to Jeff Erickson & Jake Glower

	Project	Description
1	Freezer Alarm	Piezo alarm (5V) activates when temperature is greater than 30 Deg. F, stays on until temp is less than 10 Deg. F. (Turns off @ 10DegF and below). Note "ice cubes work great for this testing", and "ECE has DMM with Temp Sensors for calibration". One IC, NPN & PNP transistor minimum required Sensor will be tethered (extended) 12"
2	Binary Counter	Use an oscillator to count from 0-15 in binary in 0.5 Second Intervals, cycles and repeats. Two IC's & one transistor minimum required
3	0-9 Counter	0-9 counter: Use a CdS (LDR) to count from 0-9 (Numerically), showing on a 7 segment display, with a reset, Minimum of two IC's and one transistor required
4	Light Sensor	This circuit requires an OP amp with buffer output to turn on a 1 watt LED when room is dark or in low light conditions, will be off in ambient light Minimum of One IC & two transistors required
5	H Bridge Motor Driver	Create an H Bridge using a red and green LED to show direction of motor rotation. Motor will go forward when its dark and reverse when its light. No motor will be used. Either 4 or 6 transistors or mosfets required
6	Stop Light: Software Based	This project should be software based, Yellow LED: 3 seconds, switches to Red LED 6 seconds, green LED 6 seconds and repeats. Mut have a manual reset and include in-circuit programming. One IC Required
7	Door Open with Delay	Timer Circuit- Use a Magnetic Reed switch to activate a piezo buzzer that latches on after the door has been left open after 60 seconds, close door will reset automatically. Minimum of Two IC's & Two transistors required
8	Mod 9 up/down counter with reset: Software based	Use an microcontroller to drive 9 LED's counting up/down in Binary. The LED's will have a Zylon effect if programmed correctly. One IC and 9 FET transistors required, Must be able to program while IC is in circuit (on the PCB)
9	Freezer Alarm Software Based	Same characteristics as Hardware based #1 and #8 IC used. but add an LED in parallel with the Piezo Buzzer. LED is Green when alarm is inactive and off when Buzzer is activated. Minimum of One IC and two transistors required - Buzzer will Latch on until reset, Sensor will be tethered 12". Must include in-circuit programming.
10	0-9 paper-clip counter	Use a magnetic sensor to count from 0-9 in Binary using LED's , with a reset. Minimum of two IC's and transistors as required
11	Annoyatron	Annoy your friends, parents, or siblings with an Annoyatron. This device generates noise at random times in order to cause confusion. Normal requirements plus a switch to change from short to long duration.
12	Electronic Doorbell	Play your favorite tune on a speaker of piezo when you press a button. Optional: Have two buttons for two tunes (front door and back door).

Additional Requirements:

1. All circuits require a minimum of two transistors driven LEDs. The transistors must be capable of driving a 100mA load (hfe * Ib > 100mA). The LEDs should be driven at 20mA.

2. All software based projects will use a Raspberry Pi-Pico microcontroller.

	ECE 401	**ECE 403/405**
PCB Size	2" x 2" (no uP) 2" x 3" (with a uP)	up to 60 square inches
Power Supply	9V Battery	any
PCB Voltages	5V	any
LEDs	One or more 5mm, 20mA +/- 5mA	any
BJT Transistors	One NPN One PNP	any
Reverse Polarity Protection	yes	optional
Fuse	1 Ohm, 1/4W resistor	optional
Integrated Circuit	One or more Through Hole only	any number Through hole and/or surface mount