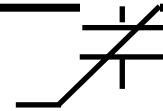


# Autonomous Memory Demonstration Circuits

*Radiant Technologies, Inc.*

*October 24, 2014*



# Demonstrations

- #1 Robust, stand-alone non-volatile analog switch.
  
- #2 Discrete event detector with piezoelectric and RF event sensors.



# Autonomous Analog Switch

An autonomous analog switch must be able to:

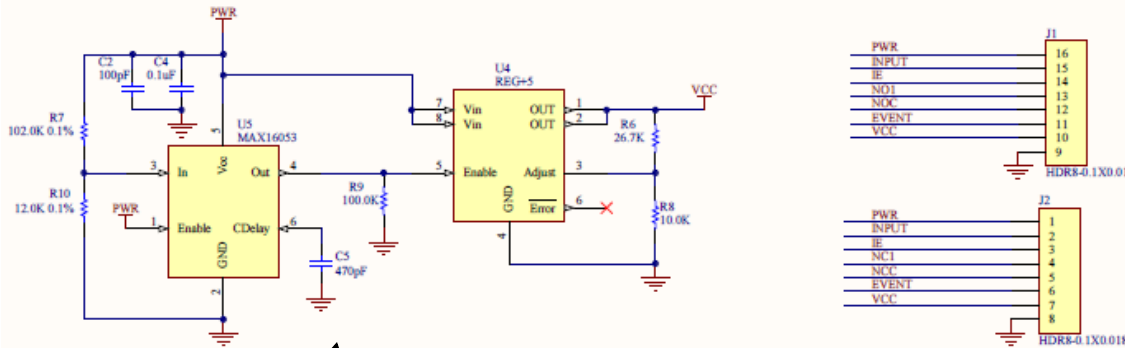
- 1) operate from any power supply,
- 2) save and restore the memory state without an external controller, and
- 3) control an analog current channel or two with its non-volatile memory state.

The non-volatile switch *must be able to withstand* any kind of power disturbance without losing its stored memory state!

- It must have significant internal power protection and regulation.

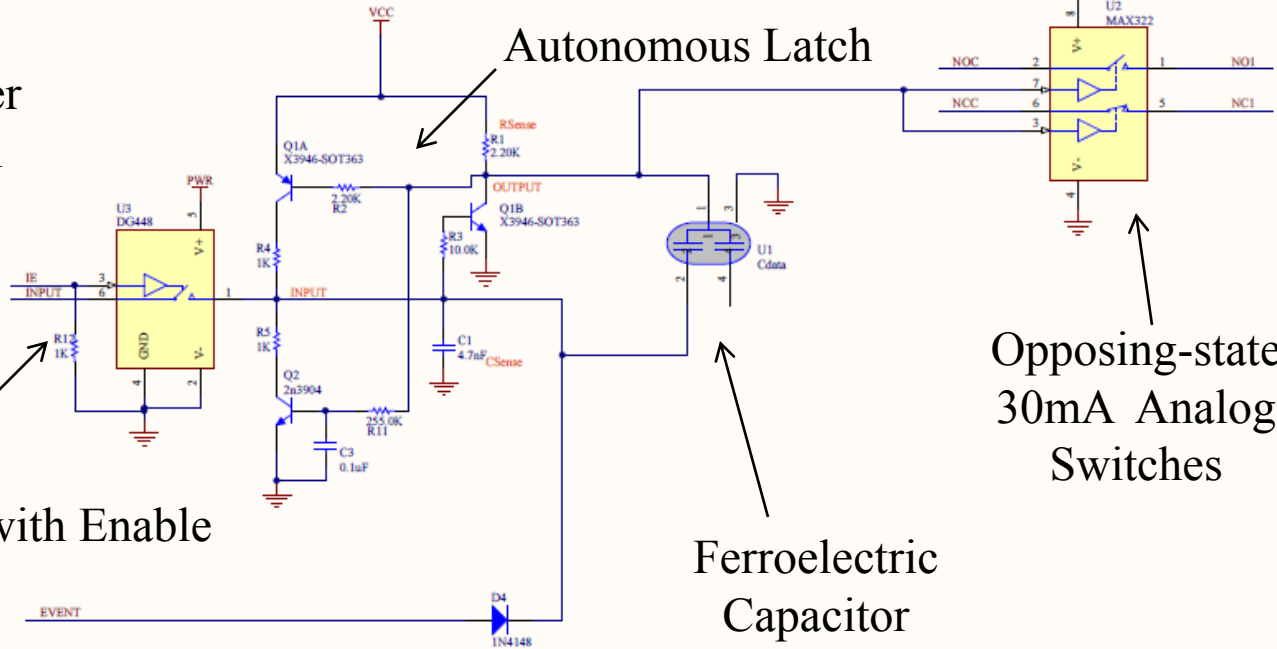
# Autonomous Analog Switch

4.8V to 16V operation



Input Power Protection

Alternates, MAX325 is spec'd for single supply operation  
 MAX322 Ron = 35 ohms max 16 ncm  
 MAX325 Ron = 60 ohms max 33 ncm



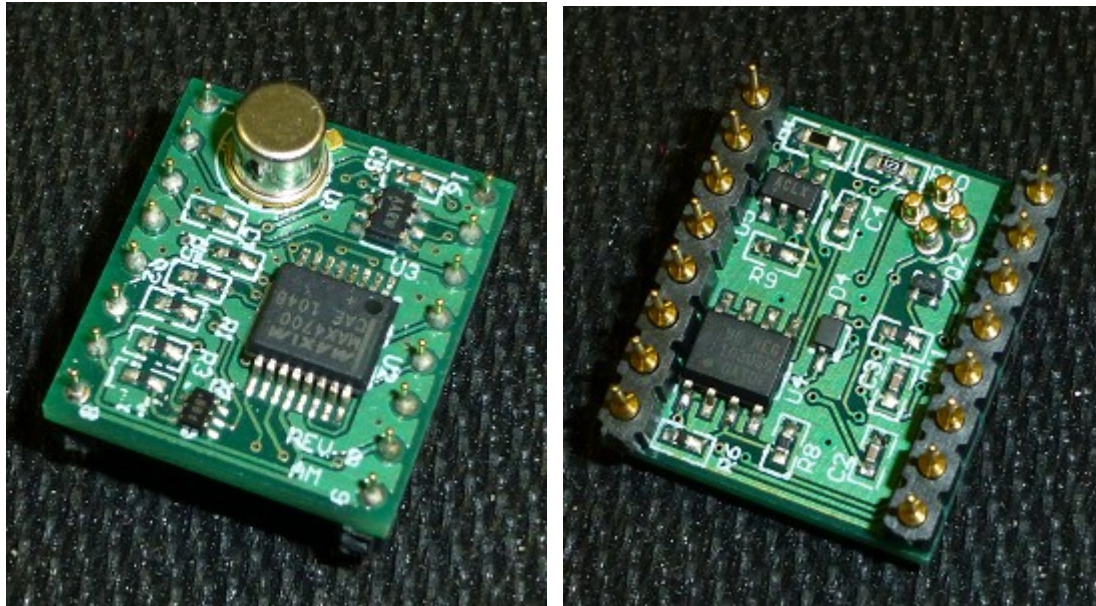
Autonomous Latch

Opposing-state 30mA Analog Switches

Input isolation with Enable

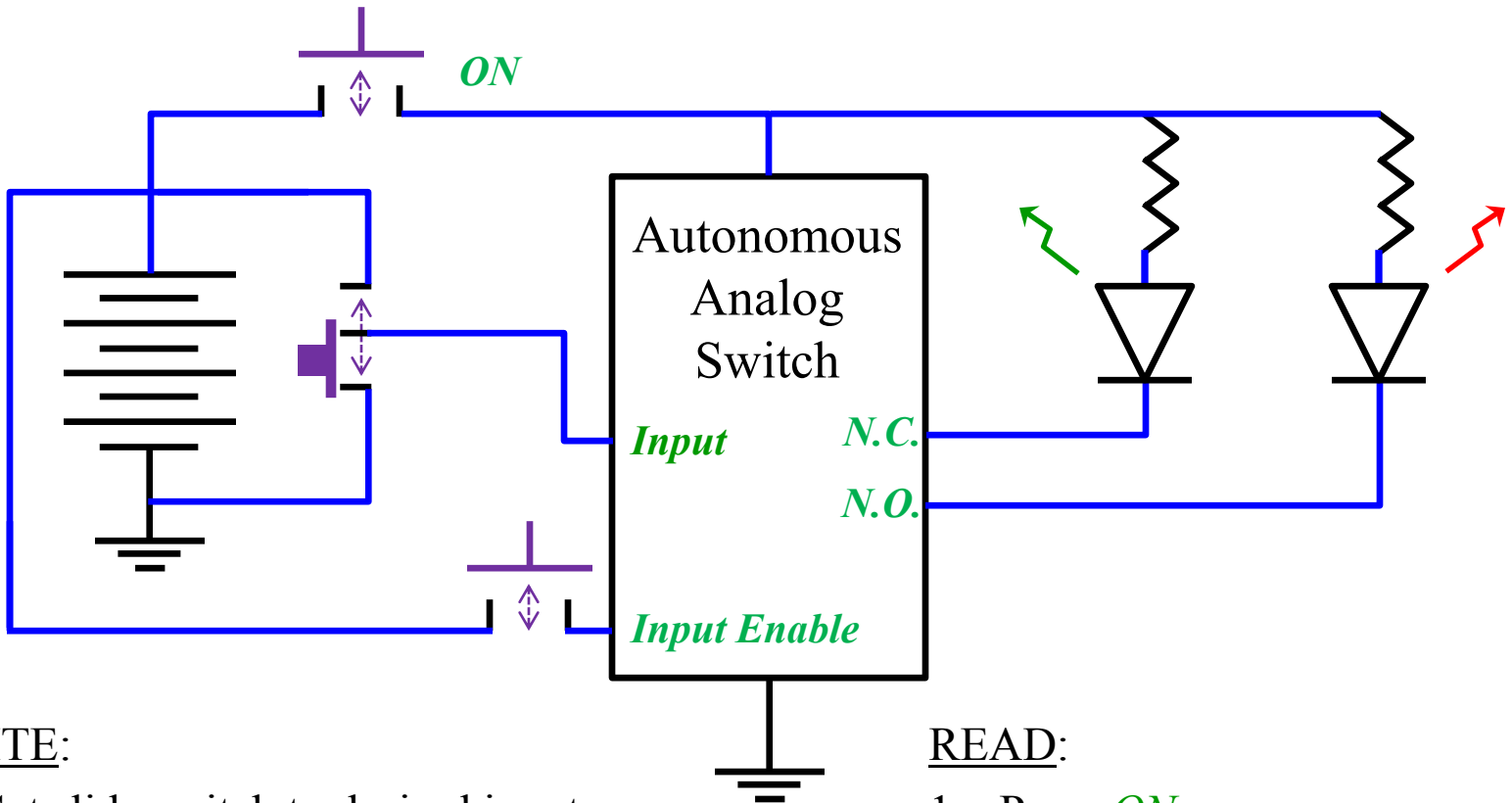
Ferroelectric Capacitor

# Autonomous Analog Switch



This entire PCB with discrete components and a packaged ferroelectric capacitor can be shrunk into the same solid state switch package on the PCB in the left image. This circuit can stand-alone and resist disturbs from dramatic power-line voltage events.

# Demonstration Circuit

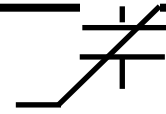


## WRITE:

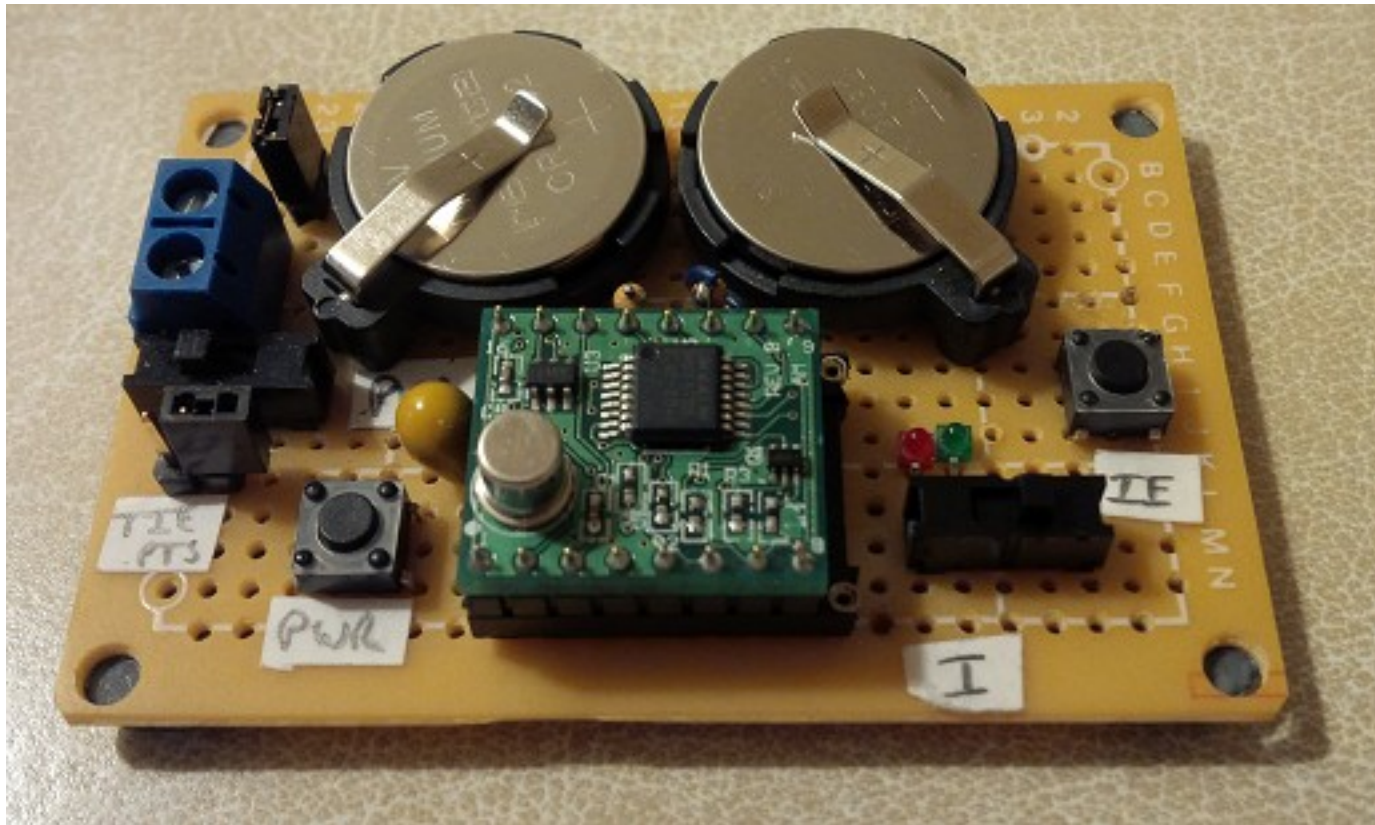
1. Set slide switch to desired input.
2. Press **ON**.
3. Momentarily press **Input Enable**.

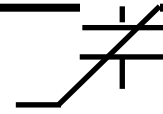
## READ:

1. Press **ON**.
2. Memorized LED will light.



# Demo Board





# Autonomous Event Detector

Indicates if one of its sensors has been activated since the last read operation.

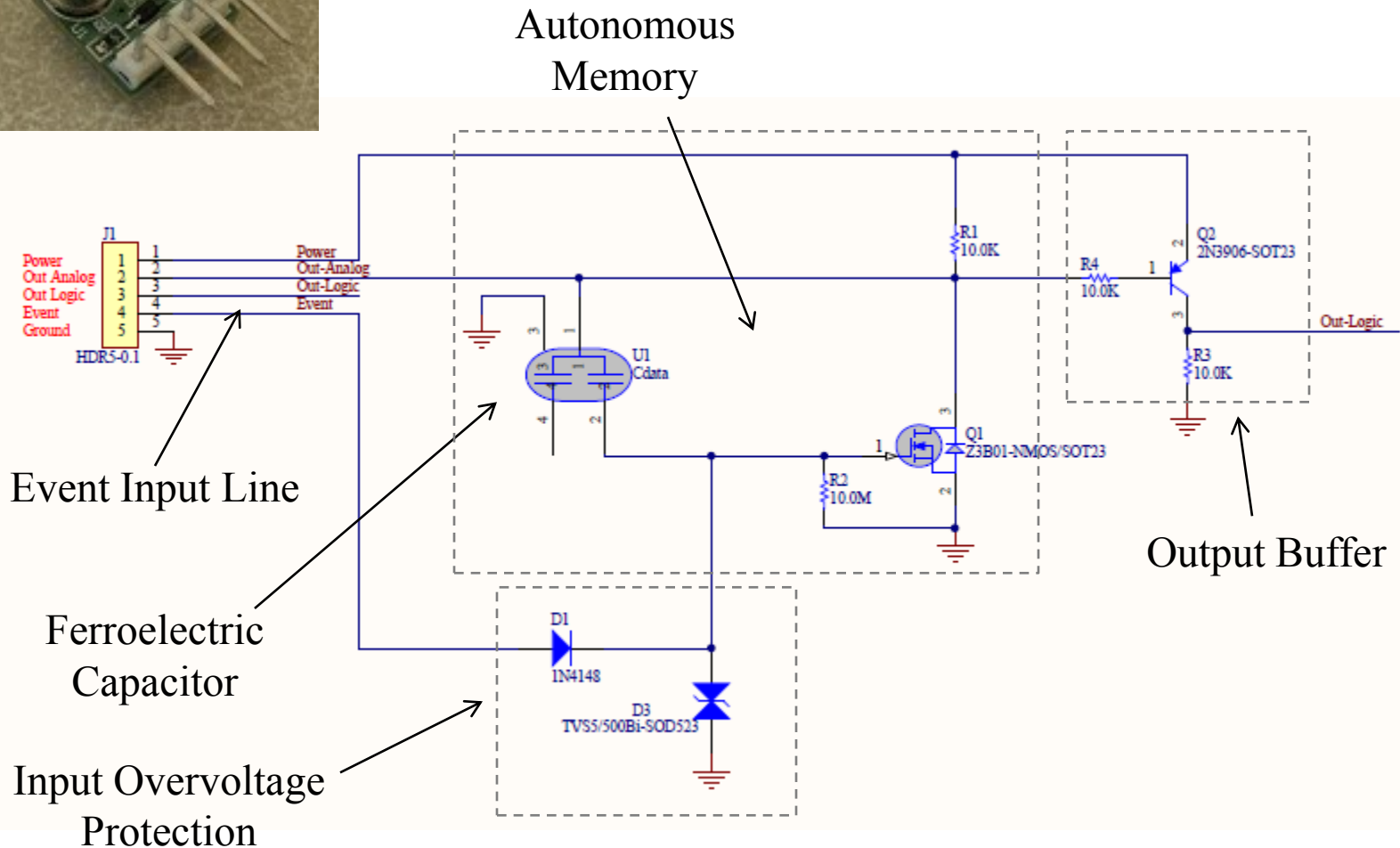
Ferroelectric capacitor inside the circuit connects *directly* to the sensor.

*It always remembers!*

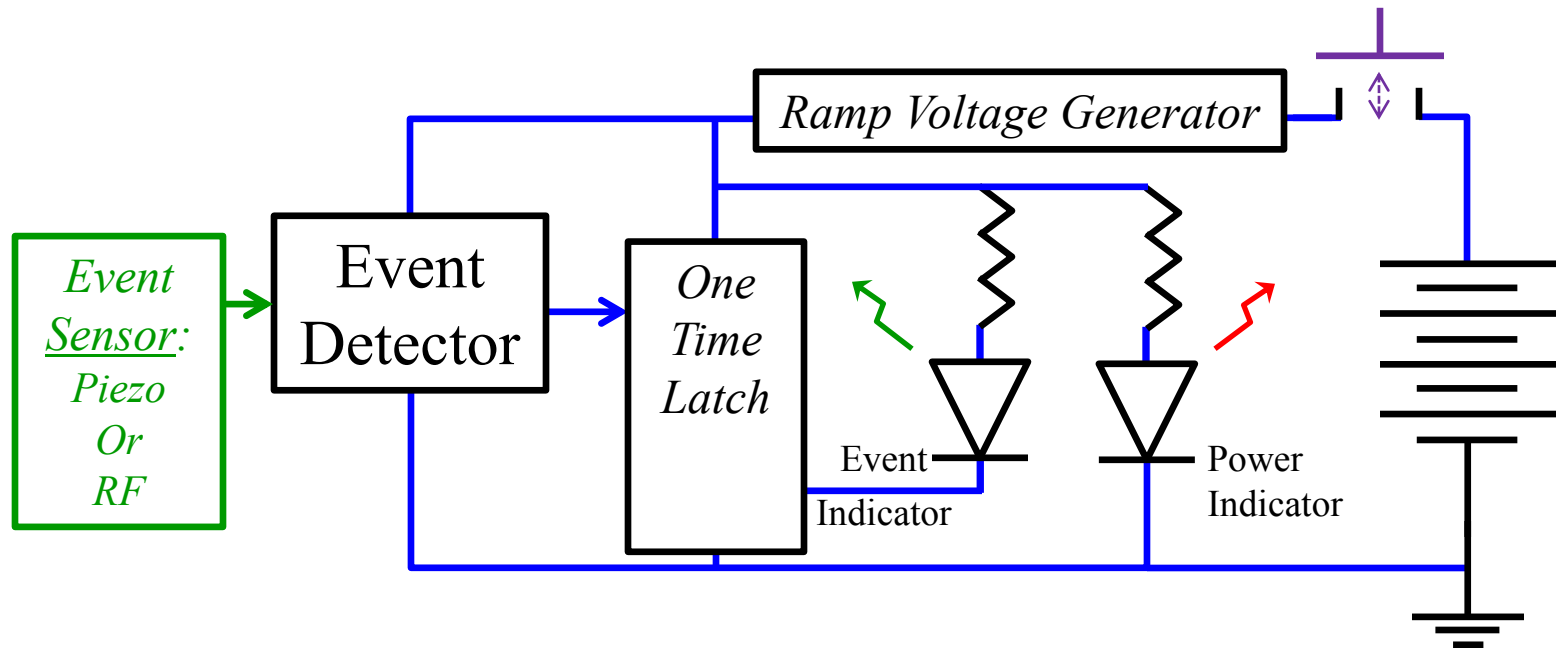
*The ferroelectric capacitor can be set with no battery and remembers with no battery.*



# Autonomous Event Detector



# Demonstration Circuit



## WRITE DOWN

Bend piezoelectric detector

OR

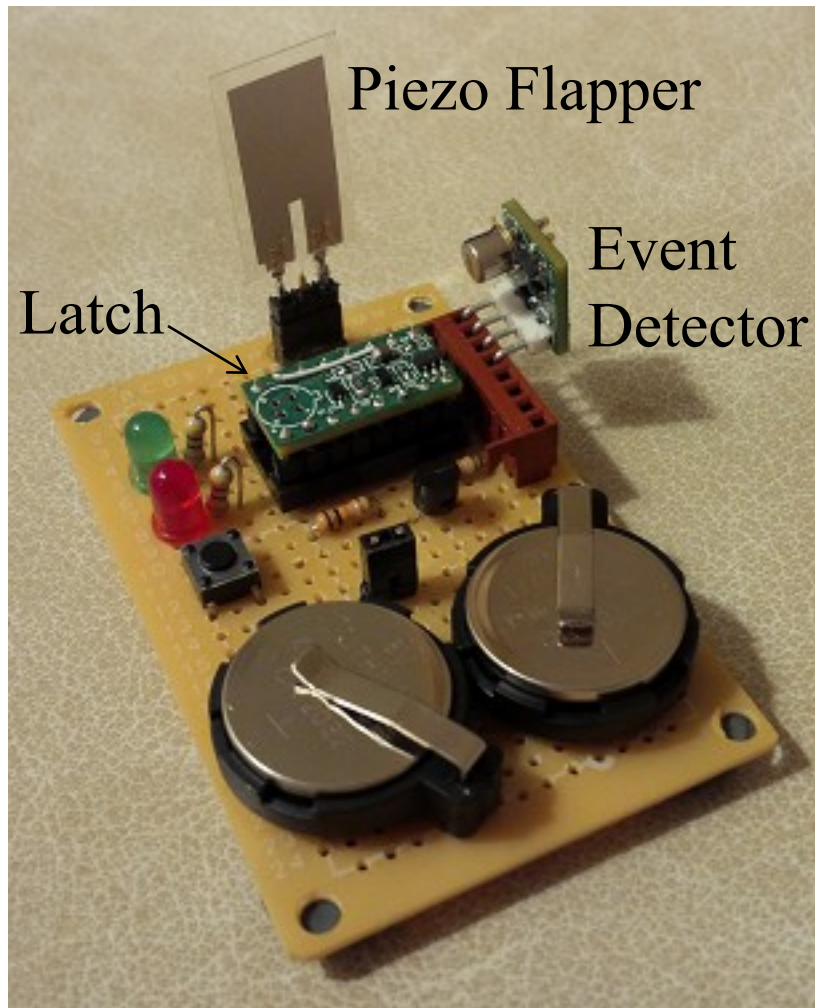
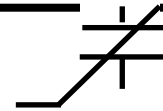
Place cell phone near antenna with  
NFC radio active.

## READ:

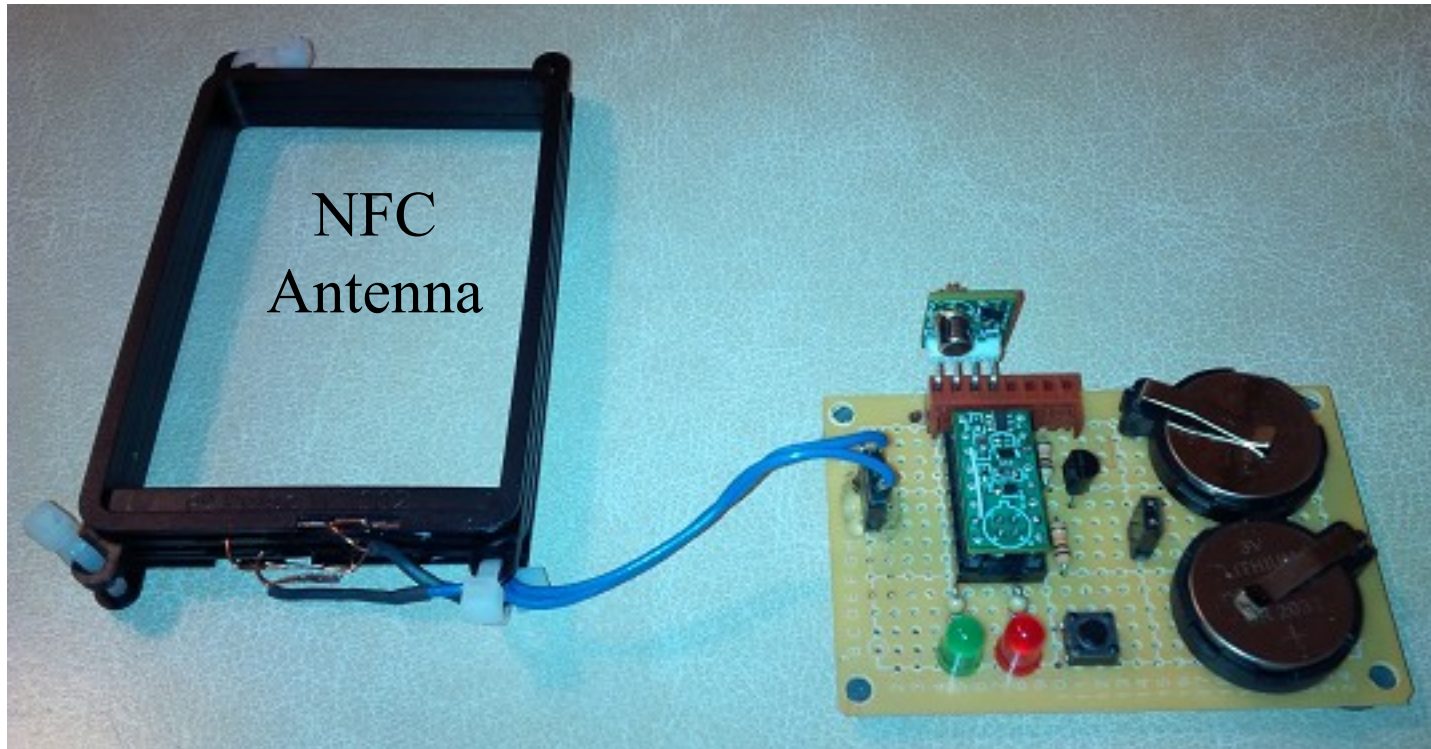
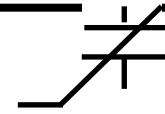
1. Press **ON**.
2. The **RED** LED will always light indicating power.
3. The **GREEN** LED will light *if event did not occur*.

**Radiant Technologies, Inc.**

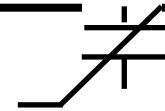
# Demo Board - Piezo



# Demo Board - RF



# Closing



Autonomous Memory Demonstration:

*Write with a push-button!*

*Read with an LED.*

Autonomous Event Detector Demonstration:

*Listen with a sensor!*

*Read with an LED.*