

1. A good example of a microcontroller implemented toy would be fake car keys that make the sound of a car unlocking when pressed. The keys also light up. It is implemented by setting up an interrupt in address \$0002 for unlock and \$0004 for lock. For the code below, PORTB is connected to a horn that also makes a sound when triggered.

Code:

```
.org $000
    Rjmp INIT
.org $0002
    Rcall unlock
    Reti
.org $0004
    Rcall lock
    Reti
unlock:
    ldi mpr, 0b00000001
    out PORTB, mpr
    reti
lock:
    ldi mpr, 0b00000010
    out PORTB, mpr
    reti
```

http://www.amazon.com/B-LucKeys-Lights-Sound-Assorted/dp/B00IWCQR3M/ref=sr_1_78?s=toys-and-games&ie=UTF8&qid=1456345941&sr=1-78

2. The UDRE flag indicates if the transmit buffer is ready to receive new data, the TXC flag indicates when it has sent all the bits in the Transmit Shift Register. UDRE is set first because the receiver has to be ready to receive and TXC is only set after the transmission is complete.
3. The receiver state is indicated by RXC, the RXC address for USART0 is 0024, the address for USART1 is 003c