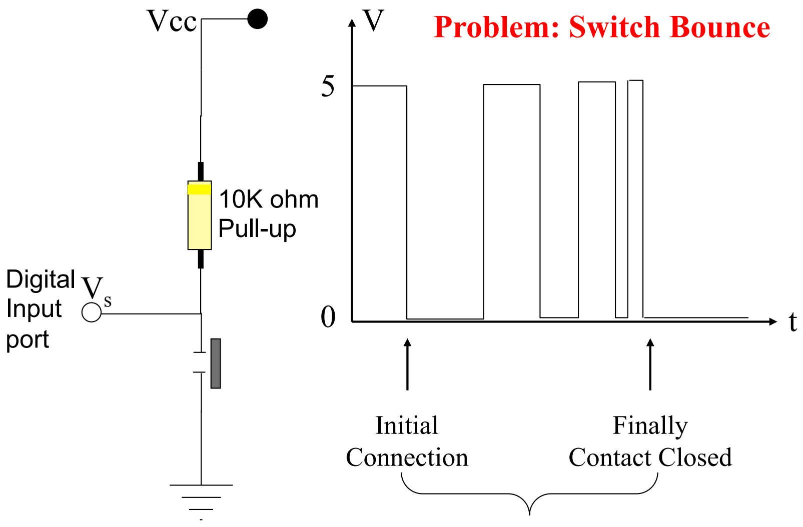
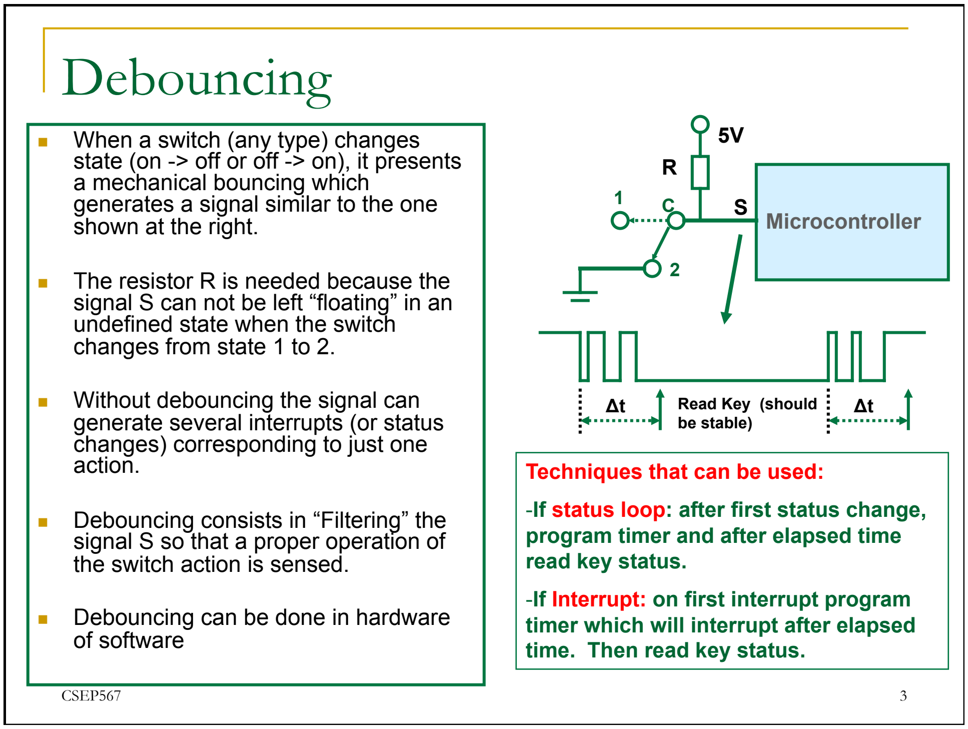
I. Switch Debouncing

A Switch is Pressed, So What???

Problem: Switch Bounce



Typically 10-20ms



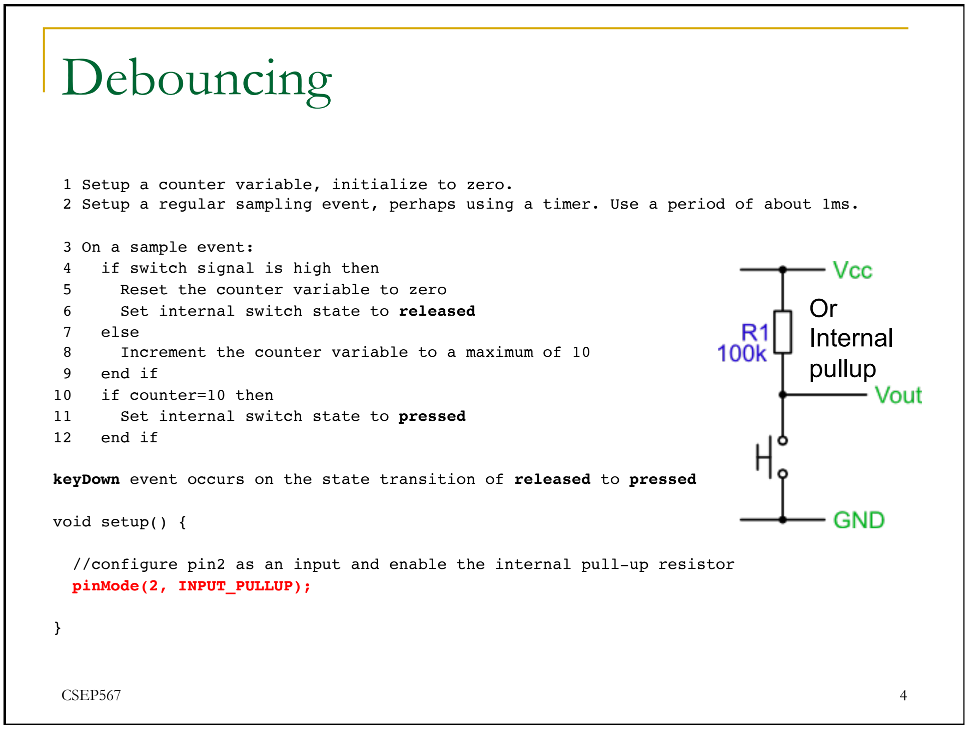
Debouncing

- When a switch (any type) changes state (on -> off or off -> on), it presents a mechanical bouncing which generates a signal similar to the one shown at the right.
- The resistor R is needed because the signal S can not be left “floating” in an undefined state when the switch changes from state 1 to 2.
- Without debouncing the signal can generate several interrupts (or status changes) corresponding to just one action.
- Debouncing consists in “Filtering” the signal S so that a proper operation of the switch action is sensed.
- Debouncing can be done in hardware of software

Techniques that can be used:

-If **status loop**: after first status change, program timer and after elapsed time read key status.

-If **Interrupt:** on first interrupt program timer which will interrupt after elapsed time. Then read key status.



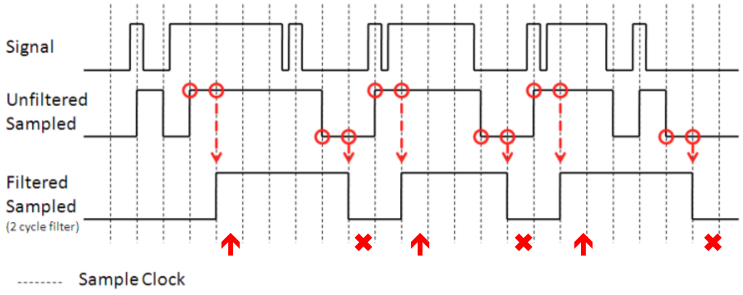
Debouncing

```
Setup a counter variable, initialize to zero.
Setup a regular sampling event, perhaps using a timer. Use a period of about 1ms.

On a sample event:
  if switch signal is high then
    Reset the counter variable to zero
    Set internal switch state to released
  else
    Increment the counter variable to a maximum of 10
  end if
  if counter=10 then
    Set internal switch state to pressed
  end if

keyDown event occurs on the state transition of released to pressed

void setup() {

  //configure pin2 as an input and enable the internal pull-up resistor
  pinMode(2, INPUT_PULLUP);

}
```

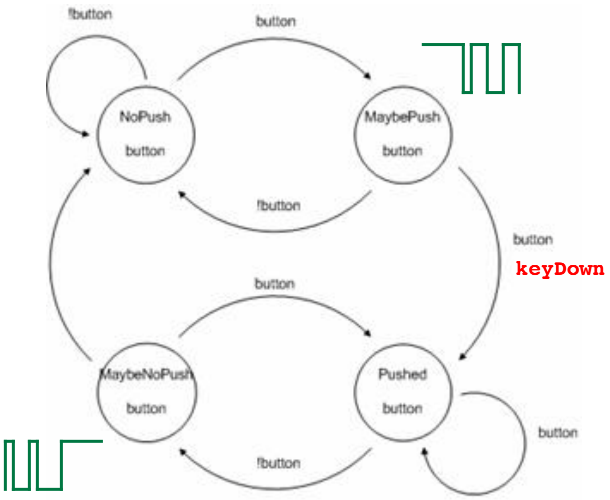
Debouncing

- A Better Way:
  - Use the **Bounce** library, check examples
- Remember that debouncing is not the same as one event per button press:

`keyDown` event occurs on the state transition of **released** to **pressed**



Debouncing State Machine



`keyDown` event occurs on the state transition of **MaybePush** to **Pushed**