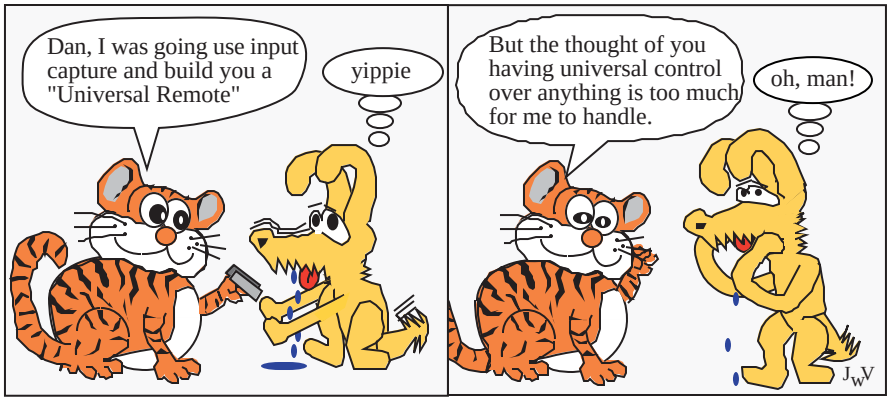
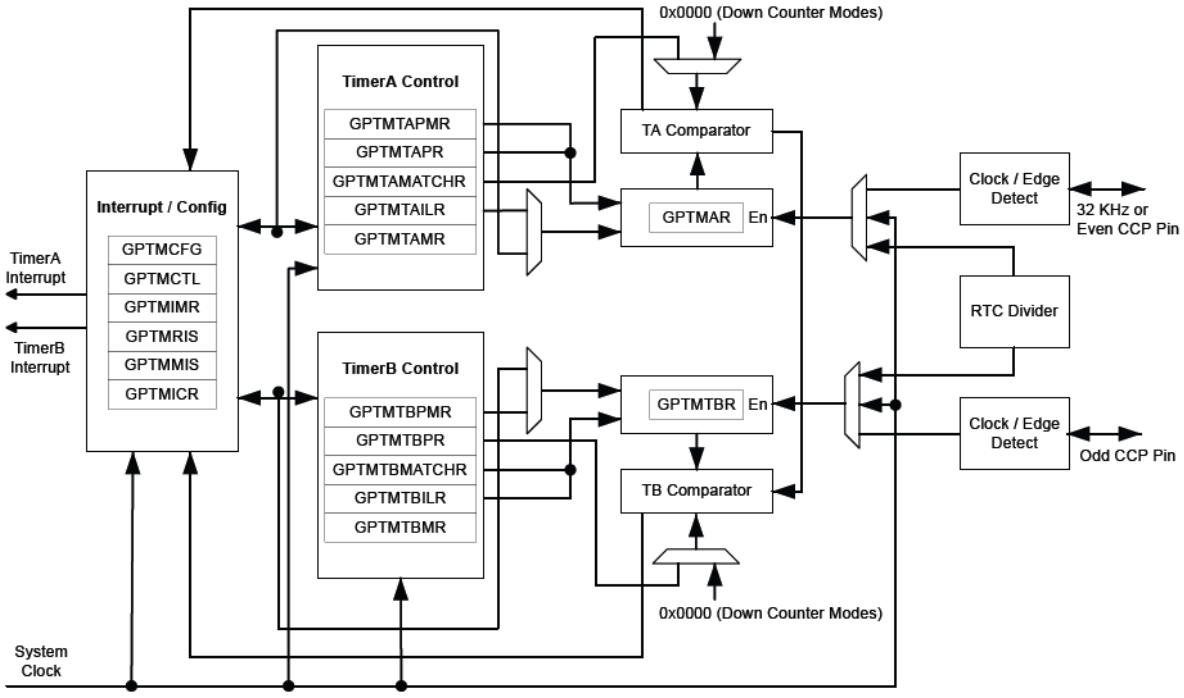


Lecture 16 objectives are to use:

- Input capture to generate edge based interrupts;
- **Input capture to measure period;**
- Input capture to measure pulse width;

CCPx pins used for input capture: e.g., CCP0=PD4



See book section 8.1

Period Measurement

Select clock period, Δt because measurement resolution

TIMER0_TAILR_R = 0xFFFF

Choose edge (rise/fall)
Arm interrupt on capture

ISR

Poll to see which channel (if needed)
Now = captured time
Period = Now-Last
Last = Now
Acknowledge interrupt
Save/process Period

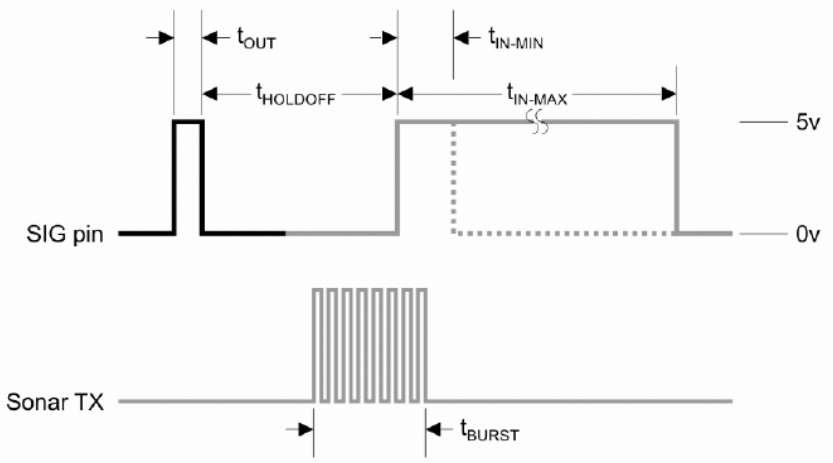
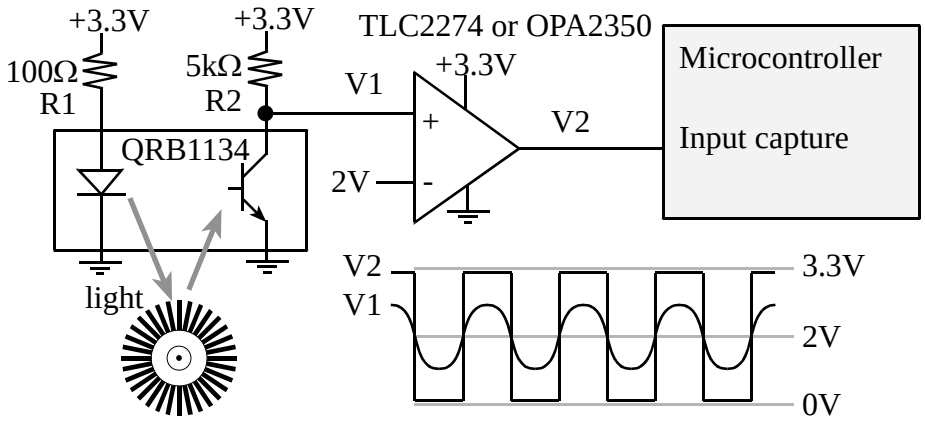


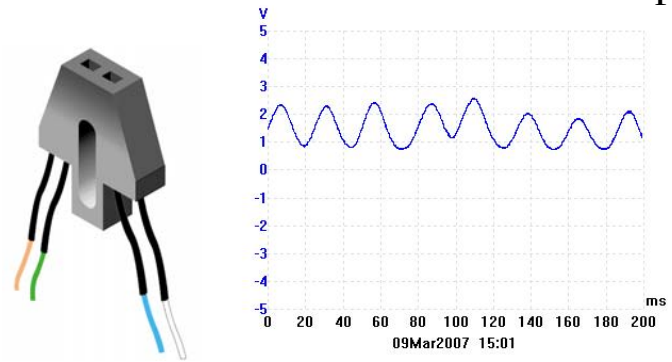
Figure 6.1. Ping))) sensor signals. See PingDocs.pdf for an explanation of this figure.

1) make the **SIG** pin an output;
2) issue a 5 μs output pulse;
3) switch the **SIG** pin to back to an input; and
4) measure the t_{IN}.
Rising edge, record TAR
Falling edge, calculate t_{IN}.

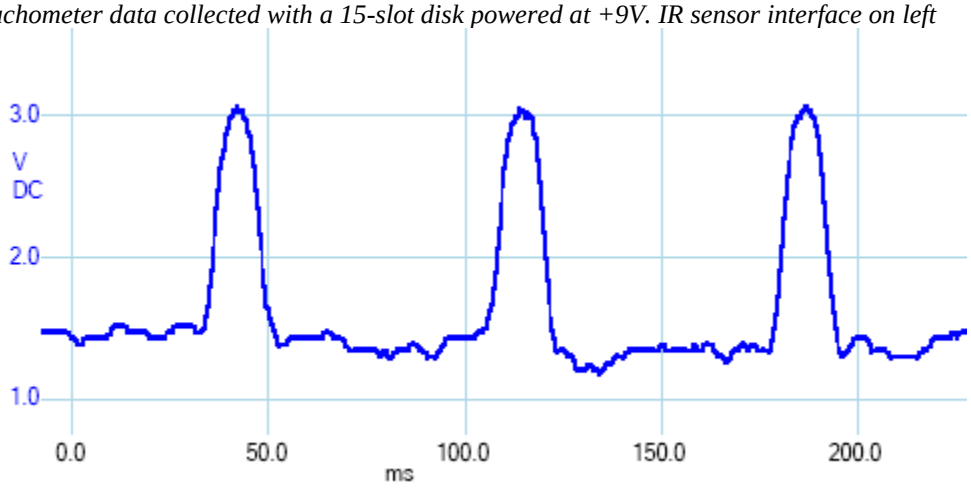
For HCSR04, skip steps 1,3

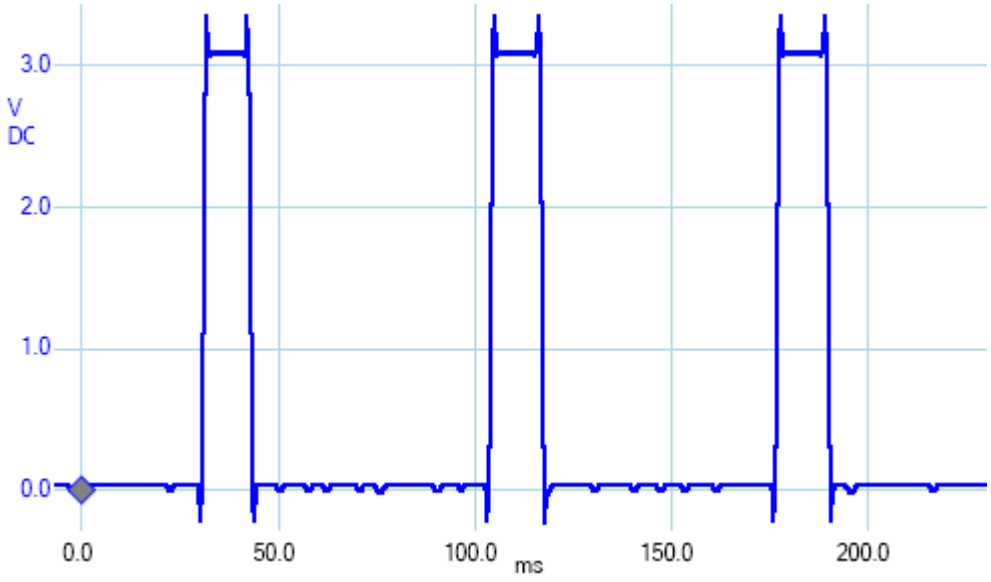


Use AddPeriodicThread to detect period too long (speed to slow)

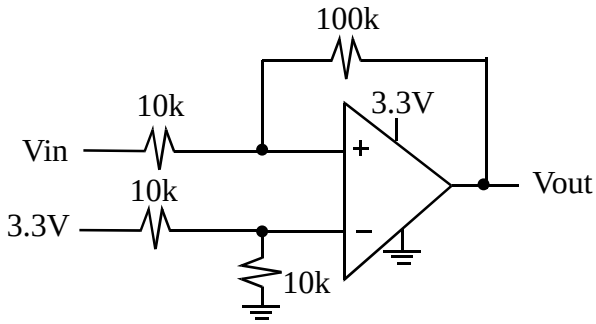


Tachometer data collected with a 15-slot disk powered at +9V. IR sensor interface on left





What does this circuit do?




```
See two examples
InputCapture_4F120  count edges
PeriodMeasure_4F120 16-bit period measurement.
```

How to choose the resolution

Determine the minimum and maximum robot speed

Convert speed to tachometer period

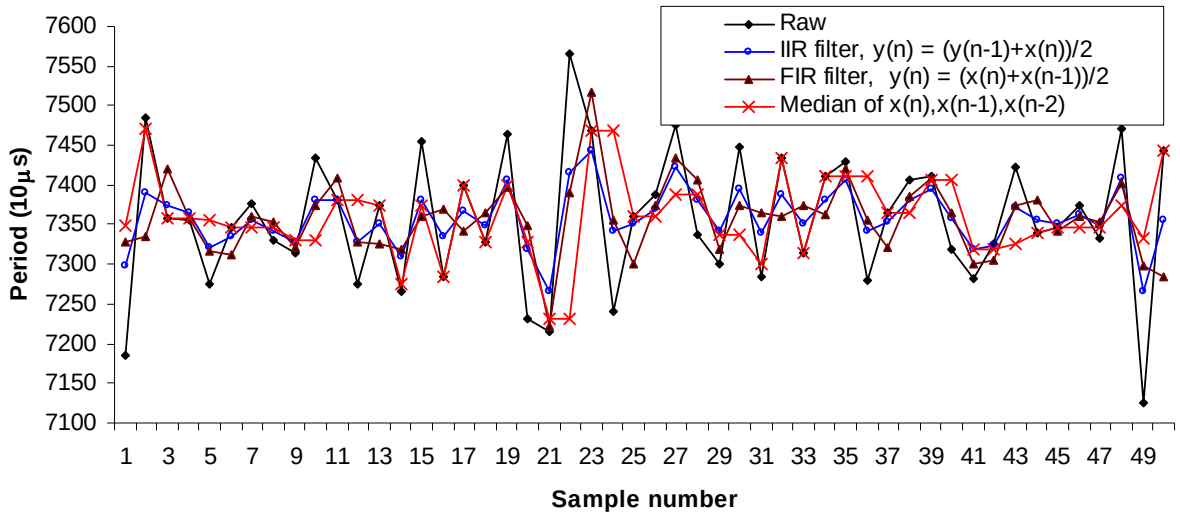
For example

Period	7100	
	4	holes/rotation
P resolution	10	usec
Speed	3.521127	rps
Speed	211.2676	RPM

Should you filter the tachometer?

Reduce noise (good)

Increase lag (very very bad)



How to detect a speed too slow (period too large)?

Clear a counter on each tachometer edge

Increment the counter on each rollover 0000 to FFFF

If counter >= 2, then wheel is stopped