

Dept. of Computer Science and Engineering

EECS3215 – Embedded Systems

Pulse Position Modulation

Lab 2

Objectives:

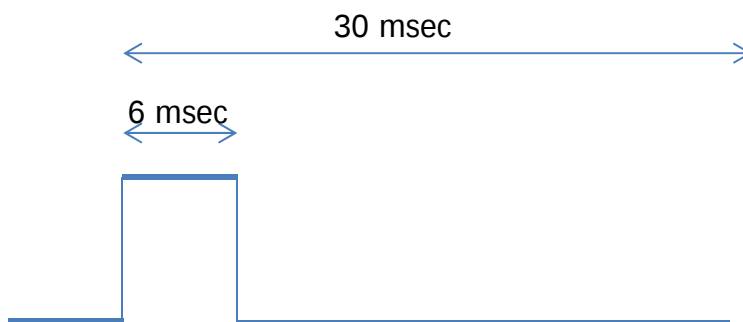
To use the DE2 Board in order to design a medium complexity circuit. The circuit is a PPM of 3 PWM signals.

PPM

Pulse position modulation is used to combine together multiple PWM (pulse width modulation signals into one signal).

PWM

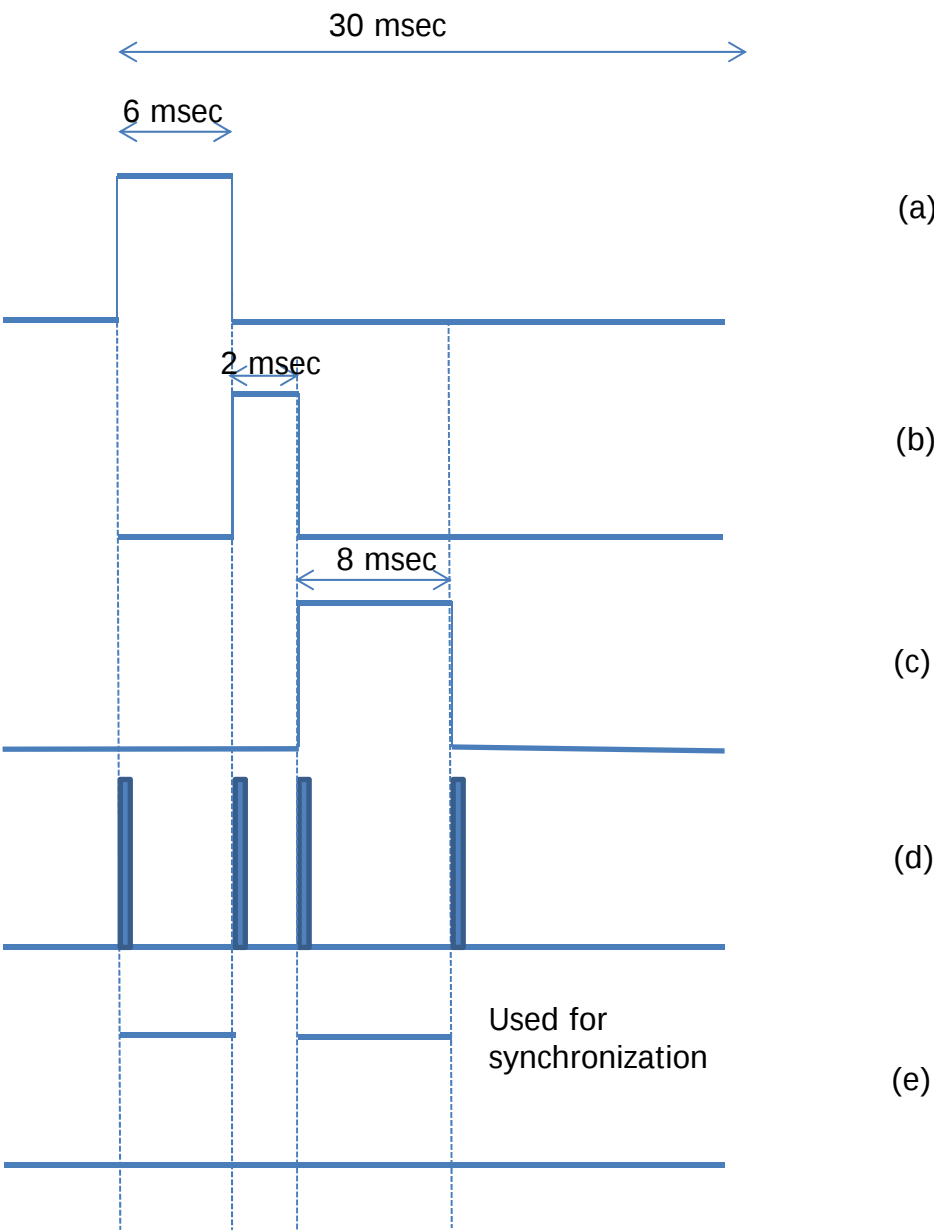
PWM is a binary signal that encodes some information in the pulse width, for example



In this case, the signal is active for 6 msec, and no signal for 24 msec.

The idea of the PPM is to use the 24 msec. to transmit another PWM signal

Consider the following figure.



Signals (a), (b), and (c) represent 3 PWM signals with combined pulse width less than the frame length.

In (d), we combined the three PWM signals (four if you consider the synchronization period) into pulses with the time between pulses representing the width of the corresponding PWM signals. For example, the time between the first and the second pulse is 6 msec, that is the width of the first PWM signal. The time between the second and third pulse, 2 msec., representing the width of the second PWM signal and so on.

Also (e) represents the same information in (d) but represented as a change of amplitude instead of a pulse. You can think of (d) as the derivative of (e).

Specifications

Design a PPM signal for the three PWM signals shown above. The frame duration is 30 msec. The widths of the 3 PWM signals are 6, 2, and 8 msec.

Use push button switch as a reset

You can choose which form the PPM signal you choose (d) or (e). However, in your report you should explain why did you choose a specific form?

Deliverables

1. You have to show to the TA the circuit working on the board using the scope.
2. A report showing the high level design, and the V4rilog code (and pin assignment)