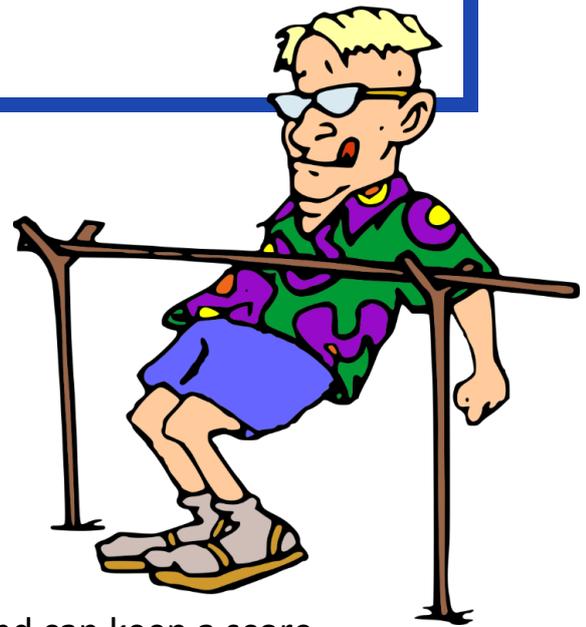# EPro8 Challenge

Engineer   Problem Solve   Innovate

Limbo

"*Jack be limbo, Jack be quick,*
Jack go unda limbo stick,
All around the limbo clock,
Hey, let's do the limbo rock".

It is everyone's favourite party game, so build a contraption that you can limbo under and that can detect when you hit the limbo stick.

The limbo machine will have an adjustable height and can keep a score.

⚡ This challenge contains optional activities using the EPro8 Electronics Starter Kit.

Limbo Frame
Criteria

Criteria	Measure a standard door frame. Construct a basic frame the same height and width as the door. The frame should have sides and a top – but no bottom as you could trip on this. Attach feet so that the frame is free standing.

Knockable Limbo Bar

Criteria	A limbo bar sits on the frame 1.3m above the ground. If the limbo dancer knocks the limbo bar then the bar must fall to the ground.

Adjustable Limbo Bar

Criteria	The limbo bar is attached to rope. Pulling on the rope raises and lowers the limbo bar. The rope can be secured so that the limbo bar will stay at its new height.
Hint	Use pulleys to direct the rope from the limbo bar to the top of the frame, across to one side, and then down.

Adjustable and Knockable Limbo Bar

Criteria	The bar from the previous challenge can't be knocked off as it is attached by rope. Add aluminium rods that point down from the original bar. A new limbo bar sits on these rods. The new limbo bar can be knocked off. The limbo bar can now be: - raised or lowered using rope - secured at its new height - knocked onto the ground if hit by the limbo dancer.

Crank Handle Operated

Criteria	Turning a crank handle raises and lowers the limbo bar.
Hint	Attach the reel to the crank handle and use this to adjust the rope.

⚡ Motorised Limbo Bar

Criteria	The height of the limbo bar can be adjusted using push buttons.

Motorised Limbo Bar (Simulator)	
Criteria	Use the online electronics simulator, code **LMBO**. The height of the limbo bar can be adjusted using push buttons.

Limbo Fail Alarm	
Criteria	When the limbo bar is NOT on the frame a buzzer will sound.
Hint	Use a limit switch to detect when the bar is on the frame, and a NOT box to detect when it is not on the frame.

Scoring	
Criteria	The limbo dancer breaks a laser beam every time that he passes under the limbo bar. This counts up, showing how many times the limbo dancer has passed under the bar.
Hint	You want the laser beam on all the time, so use a switch for this. Use a COUNTER to record the score. Click on the number on the COUNTER to reset the count.

Automatic Limbo Bar	
Criteria	Every time the limbo dancer passes under the bar the level of the limbo bar lowers for two seconds.
Hint	Use a TIME DELAY connected to the laser sensor to lower the limbo bar by a fixed amount each time.

After you have attempted this challenge watch the tutorial to see our solution at www.EPro8Challenge.co.nz/Tutorial and enter the Challenge Code **LMBO**.