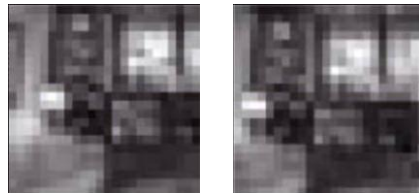


LASER TECHNOLOGY

The previous generation optical trackballs utilised camera based surface tracking technology, taking 1500 frames/second and overlaying each 1mm square frame to look for, and track, identifiable features a typical example of the frames captured can be seen below:

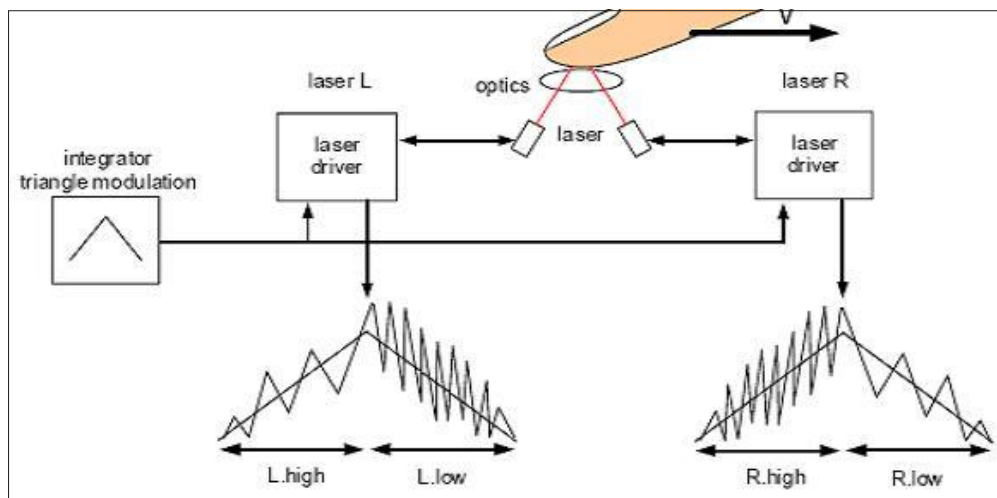


Frame 1 at 0.0ms Frame 2 at 0.67ms

The disadvantage of the optical system is the reliance on identifiable surface features being evident from frame to frame and thus the requirement of a patterned/textured surface with sufficient contrast.

Surface tracking with the new X-range devices is based on the use of laser self-mixing to detect movements of the ball surface.

A solid-state laser within the sensor generates an infrared laser beam that is focused by a lens onto the ball surface. The emitted laser is scattered by the ball surface, resulting in some of the light being reflected back to the sensor.



Motion of the target towards or away from the laser source causes a Doppler shift in the frequency of the returning laser light. This Doppler shift is proportional to the speed of the ball movement. Self-mixing of the laser allows measurement of the Doppler shift frequency and subsequent calculation of the ball surface velocity. Direction is determined by modulation techniques.

Although the sensor does require certain reflective characteristics from the target ball, the threshold is much broader than the led camera based technology and as such allows for a wider range of ball options.