

## LIDAR Dynamic Range Improvement

A passive device to significantly improve the dynamic range of laser pulse detectors for LIDAR and laser-based optical communications.



A key issue in Light Detection and Ranging (LIDAR) sensing is simultaneously identifying objects both near and far that have varying reflectivities. The reflected signals can vary significantly in intensity which makes accurate ranging problematic. This technology is a passive device that overcomes these issues to significantly increase the probability of successful detection.

Numerous applications ranging from industry and consumer products to medical and scientific research use LIDAR pulsed lasers.

However, resolving these laser pulses is difficult as reflections come back at a wide range of intensities. The ability to simultaneously identify both nearby retroreflecting and distant dark objects requires significant effort. The limited dynamic range of available detectors make rapid identification of objects problematic.

### LIDAR Dynamic Range Improvement

This innovative device, developed by scientists at the Atomic Weapons Establishment (AWE), significantly improves the dynamic range of any LIDAR sensor.

It's a passive device that can be retrofitted to existing LIDAR sensors to increase the dynamic range by several orders of magnitude.

### Benefits

- » **Compatibility** - the device is potentially compatible with any laser detector or laser emitter and can be retrofitted to any LIDAR sensor.
- » **Customisable** - the device can be tailored precisely to the user's application by configuration of the time delay and the amplification characteristics of the signal.
- » **High Dynamic Range** - detector saturation is mitigated to deliver an increase in the dynamic range by two orders of magnitude.
- » **Easy Integration** - the device does not need a power source, which makes it easier to integrate with existing systems.

## How it works

Precisely configured fibre couplers and delay lines are used to split an incoming signal into a chain of replicas of increasing intensity.

This is analogous to an echo but here, rather than a decaying series of echoes, the volume increases progressively over a fixed number of echoes. This chain of pulses can be used to effectively increase the dynamic range of time of the detector by several orders of magnitude.

## Testing

The device has been successfully tested and proven to increase the dynamic range of single shot laser detectors by two orders of magnitude at the AWE Orion laser facility.

## Applications

This technology is ideally suited to improve the dynamic range of LIDAR, for example, in the autonomous vehicles industry for navigation in difficult conditions such as rain or fog.

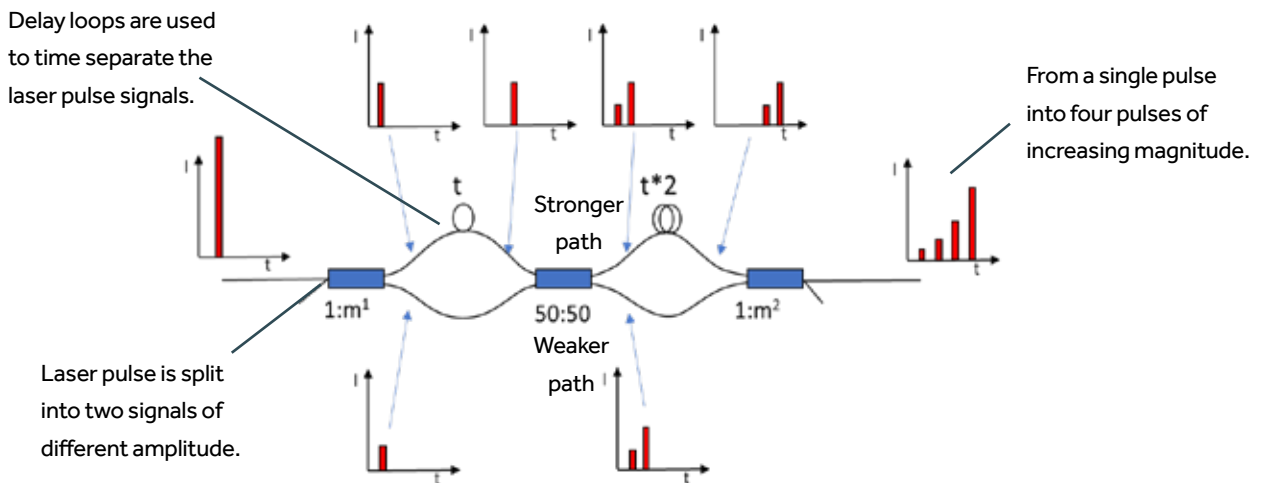
It could also be used for laser-based optical communications. For example, in telecoms to characterise fibre optical cable communications networks, and in the field of free space laser optical communications.

## Intellectual Property

Patent Application: GB 1902183.1

## More information

For more information about licensing this technology, or to speak to us about our other sensors-related IP, please contact us.



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