The first detection of gravitational waves in 2015 by the LIGO detectors, created by the merger of black holes more than a billion years ago, was followed by several other signals from black holes. In 2017, the merger of neutron stars was detected by LIGO and Virgo detectors and by gamma-ray telescopes, and was found by many electromagnetic observations too: a new era of gravitational wave astrophysics has started with very bright prospects for the future. We will describe the technology involved in the LIGO gravitational wave detectors, details of the latest discoveries and the exciting prospects for more detections in the next years.