In order to list some examples of life-critical applications, we must first define what a life critical application is. First, safety-critical is another term for life-critical; therefore, any definition for safety-critical application is also applicable to life-critical applications. J.C. Knight (2002) defines safety-critical applications as those “systems whose failure could result in loss of life, significant property damage or damage to the environment.” I will use this definition when considering three examples of life-critical applications.

1. Autonomous Vehicle Software
   1. As self-driving cars are driven by software. The software is responsible for adhering to all the rules of the road; the most notable of these responsibilities include stopping the car at red lights, keeping the car in between the lines of the road, and keeping the car within the speed limit. If the software fails to complete any of these tasks, the results could be fatal.
2. Pace maker software
   1. The software on a pace maker is responsible for keeping the heart from beating abnormally by controlling the electrical pulses required to maintain a steady heartbeat. If for some reason the software encountered an error and stopped running, the electrical pulses would stop, and the heart could start beating abnormally, or stop beating altogether. Obviously, this could be fatal.
3. AED (automated external defibrillator) Software
   1. Similar to pace makers, AEDs can restore a heartbeat back to a normal rhythm. AEDs have small pads that can be attached to the victim which sense the victim’s heartbeat. If an abnormal heartbeat is identified, the AED can deliver a shock to the heart potentially restoring the heartbeat back to a normal rhythm. Imagine the scenario in which the software identified an abnormal heartbeat when the victim’s heartbeat was normal. The AED would then give instructions to deliver a shock to the victim which could cause an abnormal heartbeat, or maybe cause the heart to stop beating. Both outcomes could potential have fatal consequences.

References

Knight, J. C. (2002). Safety critical systems: Challenges and directions [Abstract]. Retrieved July 6, 2019, from https://ieeexplore.ieee.org/abstract/document/1007998.