Moore's law:

This is an observation that the number of transistors in a silicon chip doubles every 2 years, approximately.

Reasons why it doesn't hold true any more are:

1. **Power/Temperature problem:**
   Transistors on the chip consume power, and as we increase the number of transistors on the chip, the power consumption also increases, and this high power consumption leads to the generation of a lot of heat. Thus, cooling the silicon chips becomes the major hurdle, as there is a certain limit to air-cooling.

2. **Dennard Scaling Issue**:
   Dynamic Power consumed by a transistor is given by the formula below-
   P=(alpha)*C*F*V^2
   Alpha- percent of time switching
   C- Capacitance (related to size)
   F- clock frequency
   V- Voltage swing (from low to high)

So in order to keep the temperature low, i.e the power consumption low, we need to reduce the voltage swing. But we cannot reduce the voltage below the threshold voltage to turn the transistor on for switching. Moreover, the voltage cannot go below a certain value because of the noise issues. The noise voltage can interfere with the actual switching of the transistor if the voltage is too low. One more reason is voltage leakage power across the capacitor walls. So we cannot reduce the size below a certain limit, because the current will start flowing across the walls of a capacitor if the distance is too small.