Hello. Now, I am going to tell you about the process of photolithography, that is being used to create semiconductors. This is an extremely crucial since almost all of the electronic devices from ovens to laptops use microprocessors. Obviously, the production of microprocessors is not limited just by photolithography, however, this is one of the most important steps of production.

Machines, that are used for photolithography, are some of the most sophisticated. Without them that would be basically impossible. It all starts with a special wafer made of silicon, that is being cleaned by scrubbed with an ultra-soft brushes and deionized water, afterwards, using a robotic hand, the wafer is being placed in an ultrasonic bath. These ultrasonic vibrations dislodge fine particles without damaging the wafer surface. Then, special machine, similar to some kind of a dropper, applies a uniform layer of light-sensitive coating and spins the wafer on the frequency around 12000-14000 RPM. This light-sensitive solution is being mixed precisely. The thickness of this layer is around 0.5-2.5 micrometers. Then, the wafer is being delivered special vacuum grippers . And now we arrive to the photolithography machine. As you can see this is a giant thing and each of them costs around 100 mil USD. Using fiducials, the wafer is being aligned perfectly with the photomasks. Afterwards, the programmed system loads and positions reticles into the lithography tool. Advanced tools like extreme ultraviolet systems use highly precise moving mechanism that alternates the position of the wafer in such a way that allows the UV beams to, in fact, print the scheme. Then this process might be repeated in order to achieve different geometries. Using automated optical inspection and, especially, AI vision the wafer are being inspected for proper pattern alignment and cleanliness. Ciritical dimension scanning electron miscroscopes are used to determine whether the pattern meets design specifications. It should be mentioned, that in order to minimize the amount of mistakes made by humans we should minimize the amount humans. So, after the process of photolithography these wafer are being transported by the self-driving vehicles (or automated guided vehicles) that are joined to the rails on the roof (overhead transport system). Moreover, these vehicles are covered in dozens of sensors that detect obstacles, may calculate the speed of other vehicles in order to prevent collisions. Despite all of this automation, the human supervision is needed. For example, on a TSMC factory there is a special remote operations center. The role of people has essentially shifted from manual labour to knowledge-based and logical decision-making