Examples of applications of the Internet of Things (IoT)

1. **Health Care:**
   - **Smart Watches:** A smartwatch has sensors that can detect heartbeats, stress levels, and sleeping patterns.
     - Provides real-time data, such as heartbeats.
     - Makes devices smarter: Ordinary watch becomes smartwatch.
     - Provides superior analytics: Data gathered by sensors can be sent to servers where data can be analyzed. Patterns can be detected based on data evolving in time.
   - **Patient Care:** A patient in ICU is connected to devices and sensors.
     - A sensor keeps checking oxygen level or heartbeat rate and automatically sends data to the server and the server can send alerts to nurses' phones in case of any danger to the patient's life.
2. **Smart Cities:**
   - **Traffic Congestion:**
     - Traffic can be detected by sensors that measure the speed of cars. Traffic can also be detected using smart cameras that use AI algorithms to detect the number of cars within some areas. Data is sent to servers where notifications to drivers can be sent to their smartphones to alert them to avoid roads with high traffic.
     - Smart traffic lights turn red and green based on traffic instead of time intervals.
   - **Energy-Efficient Buildings:**
     - Sensors can detect when a person enters a room and lights are turned on.
     - Sensors can measure electricity consumption for devices, where data is sent to servers which can analyze which devices consume more energy and therefore give a recommendation to users to replace some devices with more efficient ones.
   - **Public Safety:**
     - *Smart Intersection*: Sensors gathering information about traffic at a road intersection, can directly send alerts to cars so that driver knows about danger coming from the intersection even if he does not see the car, or in some cases, the car can automatically use its brakes to prevent accidents.
     - *Face Recognition*: Smart cameras can detect the faces of people which makes police work easier by detecting suspects and sending alerts directly to police departments.
3. **Agriculture**
   - **Precision Farming:**
     - Automated seed-throwing machines that can measure how many seeds are exactly needed. This is better than the farmer's arm which cannot be precise. Also, it is much more time-saving than manual farming.
     - Drones with cameras monitor the crops and send live videos to farmers.
     - Sensors that detect when a crop is ready to be harvested.

- **Smart Irrigation:**
  - Sensors can monitor the soil condition and temperature and therefore decides whether plants need water and accordingly can turn on and off water sprinklers.
- **Smart Greenhouse:**
  - Sensors measure oxygen and humidity levels and send data to servers. After that, automatic adjustments can be made such as opening windows to let the air inside.
  - Sensors can detect if a door is unintentionally left open and send an alert to the user to close the door.
  - Automatically adjust lighting inside the greenhouse based on what is best for plants.
  - Smart irrigation and fertilization based on plants' needs by using sensors that test soil health and automatically turn sprinkles and open fertilization containers.

4. **<u>Industrial Automation</u>**
   - **Optimization and Time-Saving:**
     - Instead of having scheduled maintenance, sensors can always test machines' condition and accordingly send maintenance alerts. This reduces cost by minimizing the number of maintenance attempts and consequently saves time.
   - **Quality Control:**
     - Instead of relying on humans to test the quality of a product. Sensors and smart cameras can analyze finished products and decide if a product meets the needed quality or have certain flows.
   - **Inventory Management:**
     - Each machine is equipped with its needed inventory, for example, ink, gas, etc. Sensors can detect when the level of those materials is low and send alerts for refilling.
   - **Cost and Labor Efficient:**
     - Make labor work more efficient. For example, a security guard normally circulates a given area at scheduled times. Instead, sensors and motion detectors can detect abnormalities and send alerts to the guard’s cell phone.
     - Automatically adjust machines based on their usage. For example, an escalator goes slow when no one is using it and it goes faster when someone is using it. This saves energy and therefore saves cost.
5. **<u>Disaster Management:</u>**
   - **Firefighting:** Fire and carbon sensors, where data is sent to servers where abnormal values lead to alerts on employees' devices and they send firefighters accordingly.
   - **Early detection of earthquakes and Tsunamis** by sensors that detect activity at lower earth layers or the height of waves.