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कौशल से रोजगार, समृद्धि अपार

FITT
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SANKALP
Ministry of Skill Development & Entrepreneurship

IoT in Healthcare, Agriculture, Vehicular or Manufacturing

IoT Application in Healthcare

IoT in Healthcare

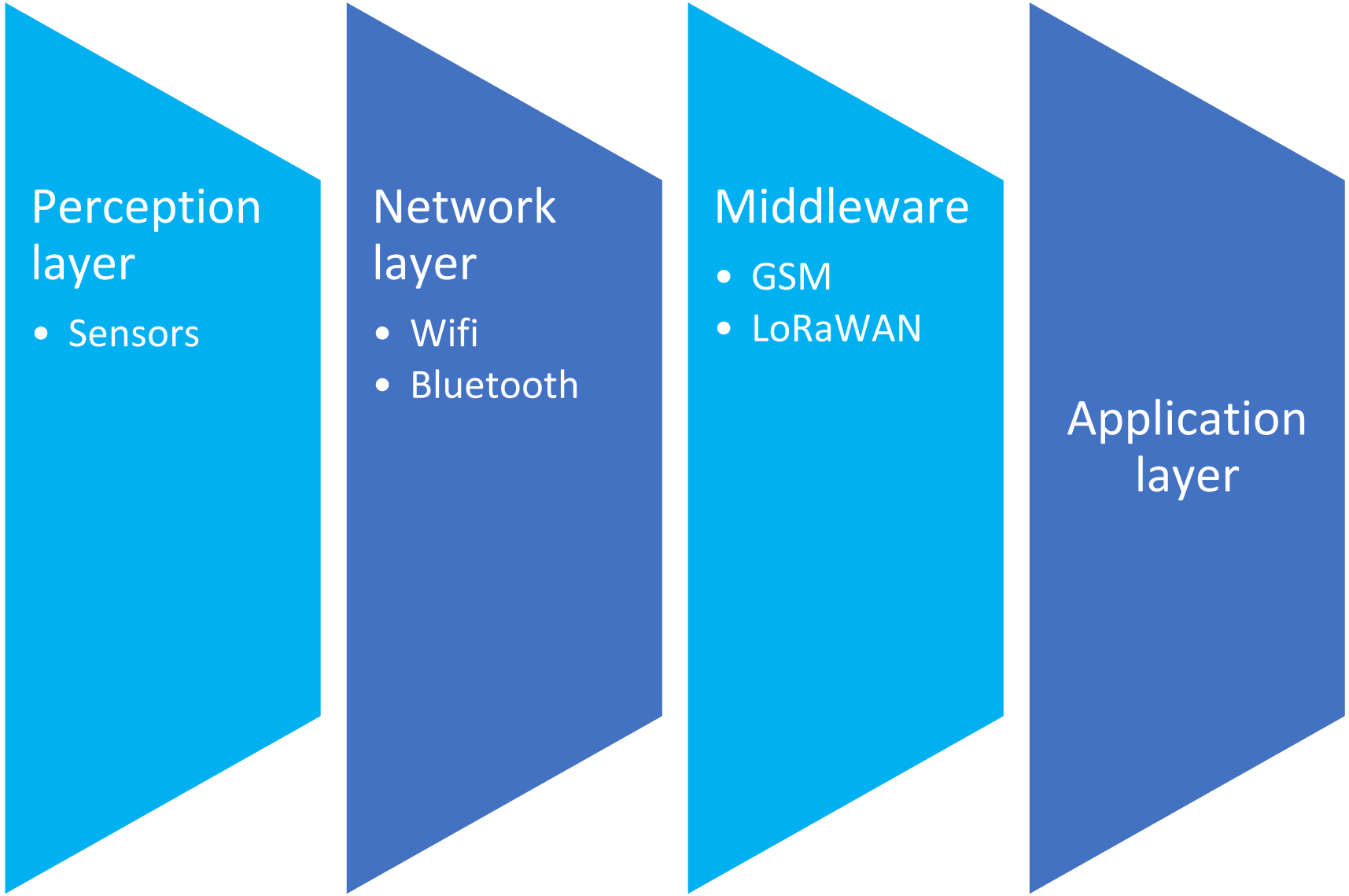
- Tracking of patients
- Patient identification and authentication
- Automatic data sensing and collection

Need of IoT in Healthcare

- Lack of access to medical facilities.
- Growth of elderly population and their desire to continuously monitor.
- Increase in medical costs.
- Need for telemedicine.

Need of IoT in Healthcare

Architecture of HIoT



Architecture of HIoT

- Perception layer: It consists of sensors to collect information.
- Network Layer: It sends the information collected to base station.
- Middleware: It is responsible for collecting information from network layer and sending it to database.
- Application layer: this layer is responsible for managing all activities and healthcare services through creating graphs, business models, and flowcharts.

Process of HIoT

Data Generation	Data Processing	Data Consuming
• Perception layer • Network layer	• Middleware • Machine learning	• Application layer • Business layer

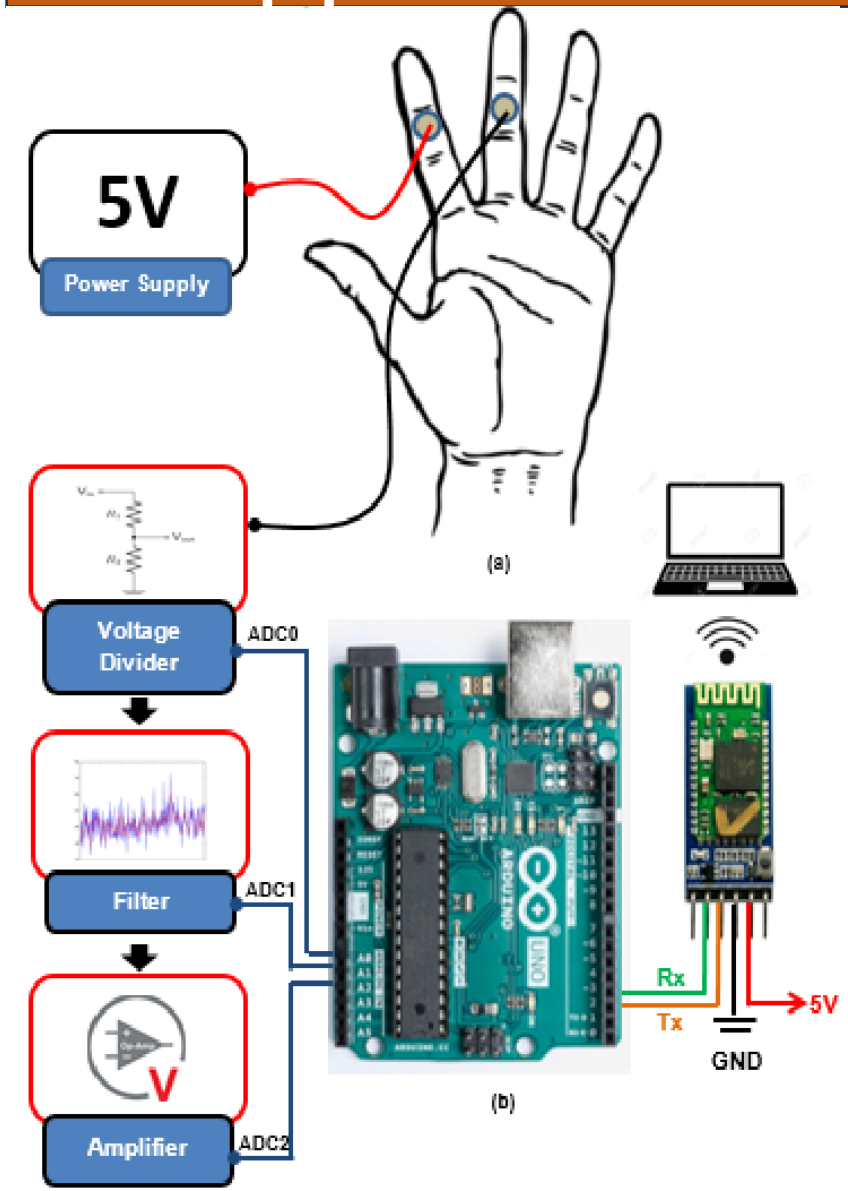
Features of HIoT

- Security and privacy
- Accuracy
- Performance
- Cost
- Energy consumption
- Scalability
- Interoperability
- Reliability

Applications of HIoT

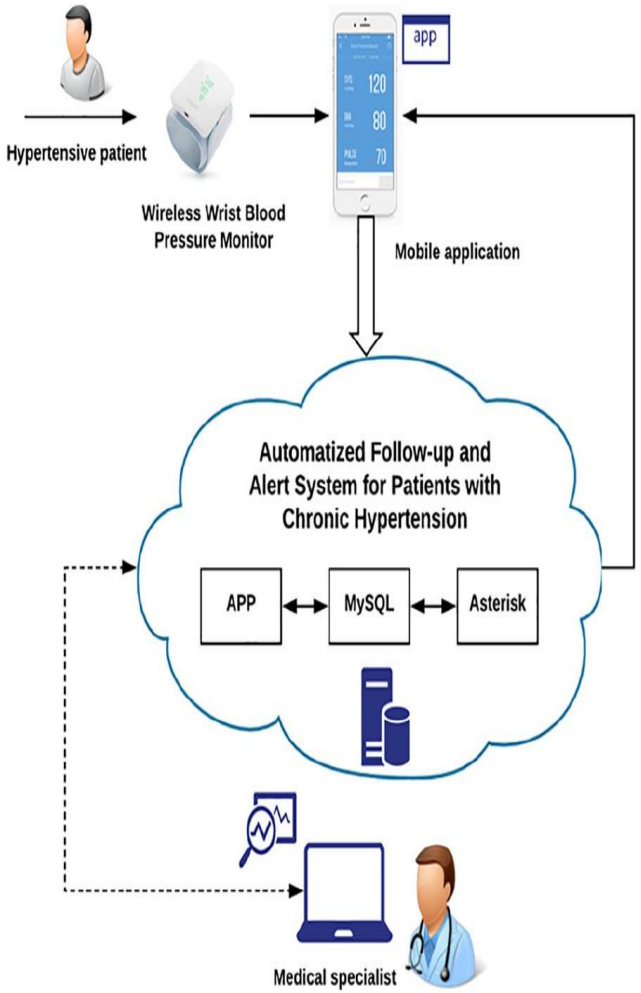
- Galvanic Skin Response (GSR) check for smart healthcare
- IoT based healthcare system for tracking of hypertension
- Use of smart nodes for collecting information form remote locations
- Remote monitoring of blood sugar level
- An IoT-based monitoring system for respiratory disorders

Applications of HIoT



GSR Measurement: GSR is the skin impedance which changes due to physical work and respiration. The GSR measured with sensors is sent to mobile app and further to cloud for processing. If the sensed value is more than pre-defined limit then alert is sent to the user.

Applications of HIoT

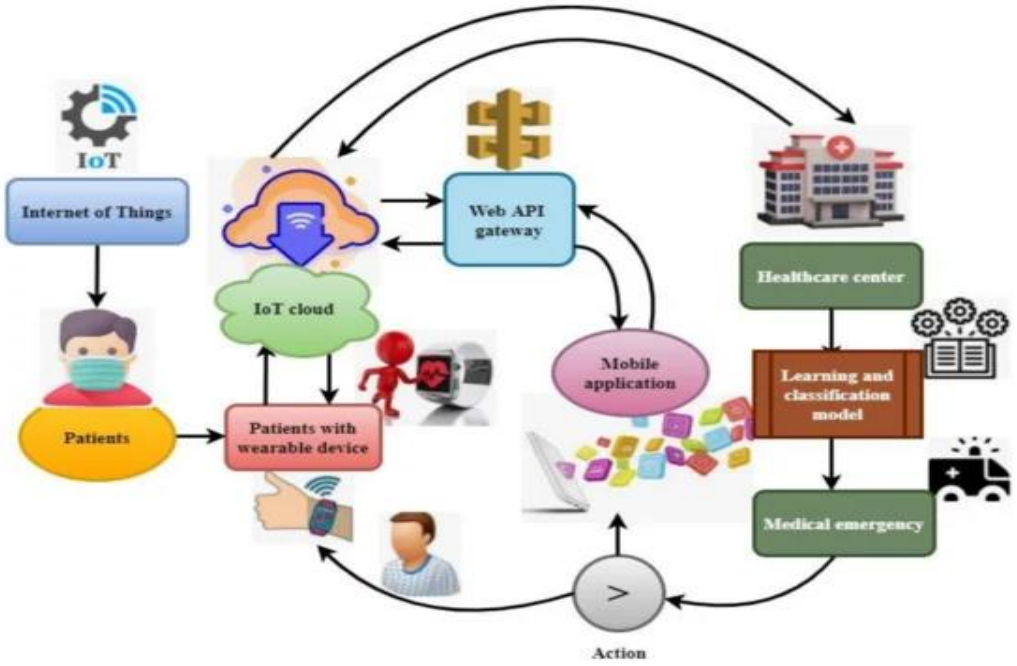


IoT based healthcare system for tracking of hypertension: The system consists of various sensors for collecting various information about the physical conditions, environmental conditions, current position of individual and also dietary habits. The data is sent to cloud over the internet which is sent to the medical staff and they can give advice regarding change in medicine and eating habits

Applications of HIoT

Blood sugar monitoring using IoT

Case Study of HIoT



IoT based system for tracking respiratory disorders:

- The device is equipped with an accelerometer sensor to measure abdominal movement generated by the inhale-exhale process.
- Butterworth filter and peak detection algorithm are applied to the signal to detect respiratory cycles.
- The system uses the message queuing telemetry transport (MQTT) protocol that implements publish-subscribe systems.
- The prototype monitoring system was based on the combination of the MPU-605 accelerometer sensor with the ESP32-DevKitC V4 microcontroller to collect respiratory rate data and Node-RED platform which provided user interface.

Pros & Cons of HIoT

- Advantages:

  Quick monitoring and reporting

  End to end connectivity and affordability

  Data assortment and analysis

  Tracking and alerts

- Disadvantages:

  Data security and privacy

  Incorporating multiple devices and protocol

  Data overload and analysis

  Cost is relatively high

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IoT Applications in Vehicular

History of VIoT

Infotainment Era (2007-2012):

1. Monitor/display facility for entertainment facility in vehicle
2. Real time vehicle navigation system
3. Vehicle cockpit
4. Wireless internet access in the car
5. Data streaming in the vehicle with the use of USB and Bluetooth connectivity.
6. Speech recognition interface for the car.

History of VIoT

V2X Era (2012-2020)

1. Eco navigation
2. Smart charging and charging safety
3. Ride sharing
4. Collision and accident avoidance
5. Smart traffic management system
6. Pedestrian safety alert from vehicles
7. Traffic congestion avoidance alert

History of VIoT

New mobility Era

1. Autonomous vehicle
2. Autonomous shared vehicle
3. Self-driven shared vehicle
4. Vehicular environment by LTE
5. NB and LoRa for vehicular connectivity

Vehicular IoT

IoT connectivity in vehicular:

- RFID
- Bluetooth and WiFi
- Zigbee and Ultra Wide band
- Vehicular communication network
- Automotive ethernet
- Wireless sensor network
- 4G and LTE
- Cloud based technologies
- NB-IoT and LoRa technology

Applications of VIoT

- Autonomous vehicle
- Fleet Management
- Real time vehicle telematics
- Software updates
- Connecting to vehicles to everything
- Monitoring the physical conditions of the driver

Applications of VIoT

- Real time navigation tracking of vehicle
- RFID based toll collection
- Anti-theft management using IoT
- IoT enabled black box and event data register
- Pollution control management system
- Emergency vehicles management system

Applications of VIoT

Break Sensor
Door Sensor
Ultrasonic Sensor
Rain Sensor
Smoke Detecting Sensor
Oxygen Sensor
Heat Sensor
Speed Sensor
Navigation Sensor
Fuel Tank level Sensor
Parking Sensor
Air Pressure Sensor
Fuel Tank Ejection Sensor
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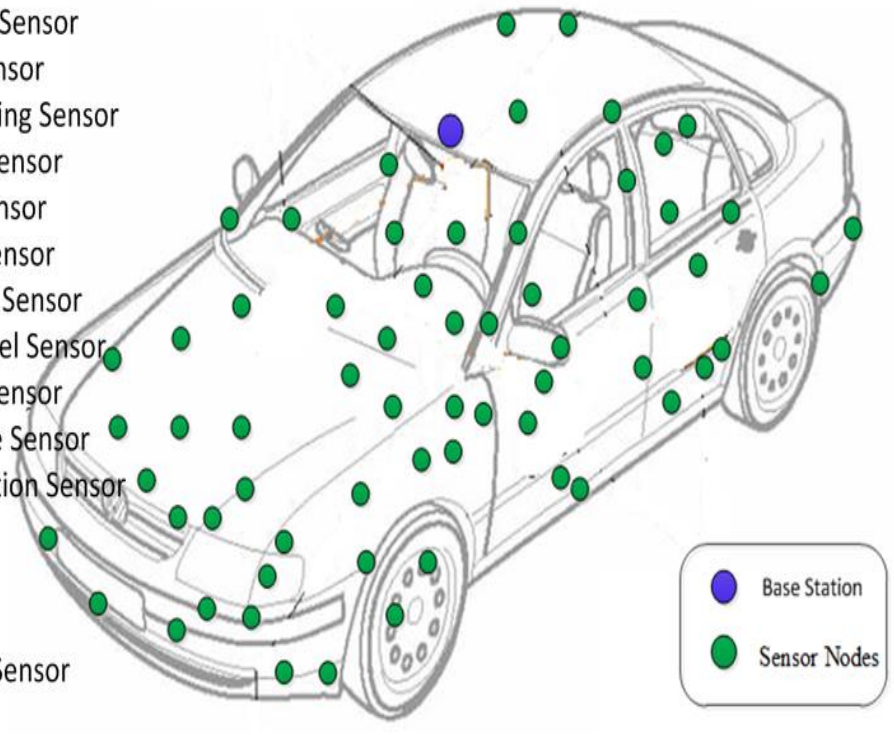
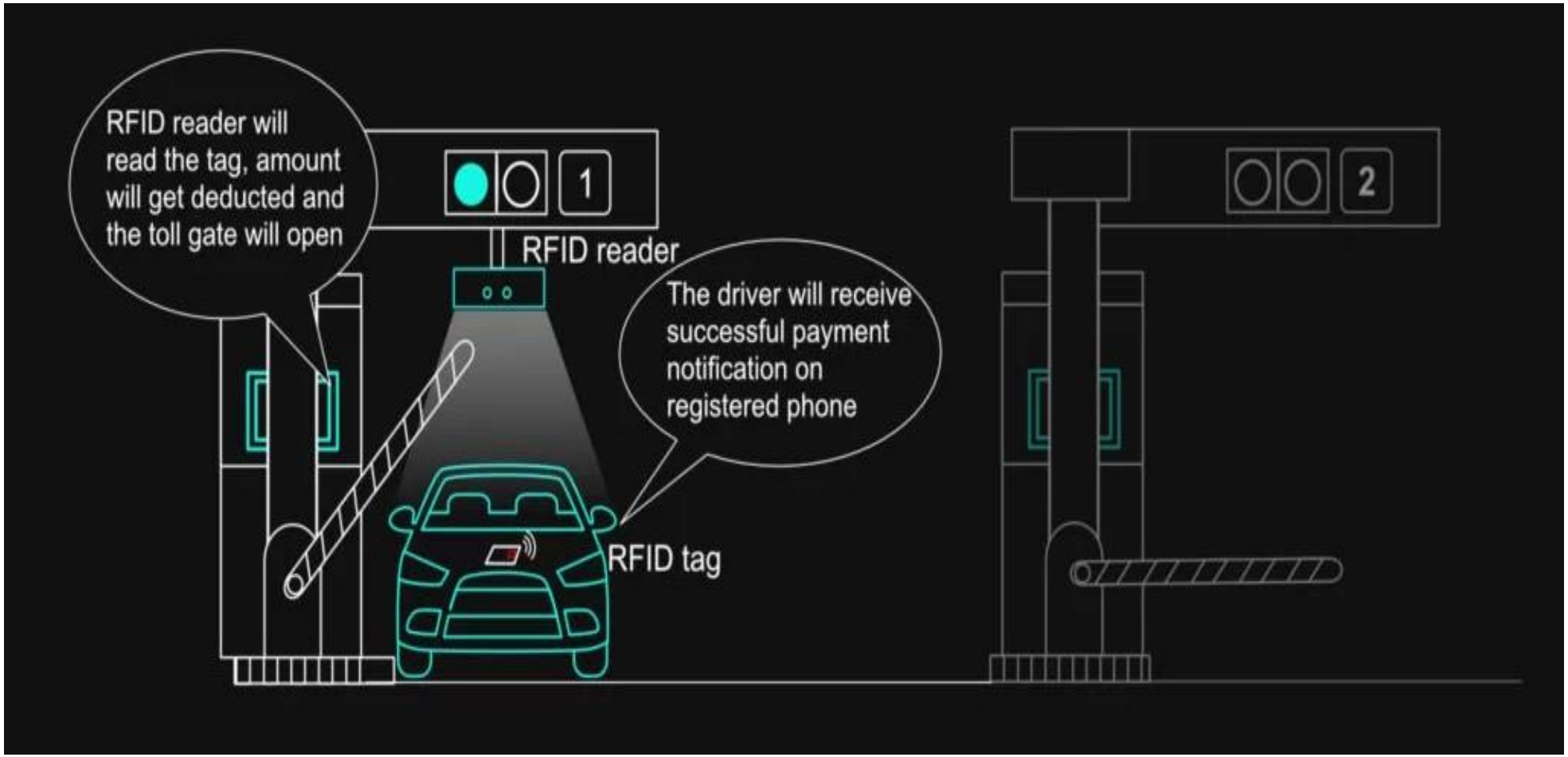
Obstacle Sensor
etc.



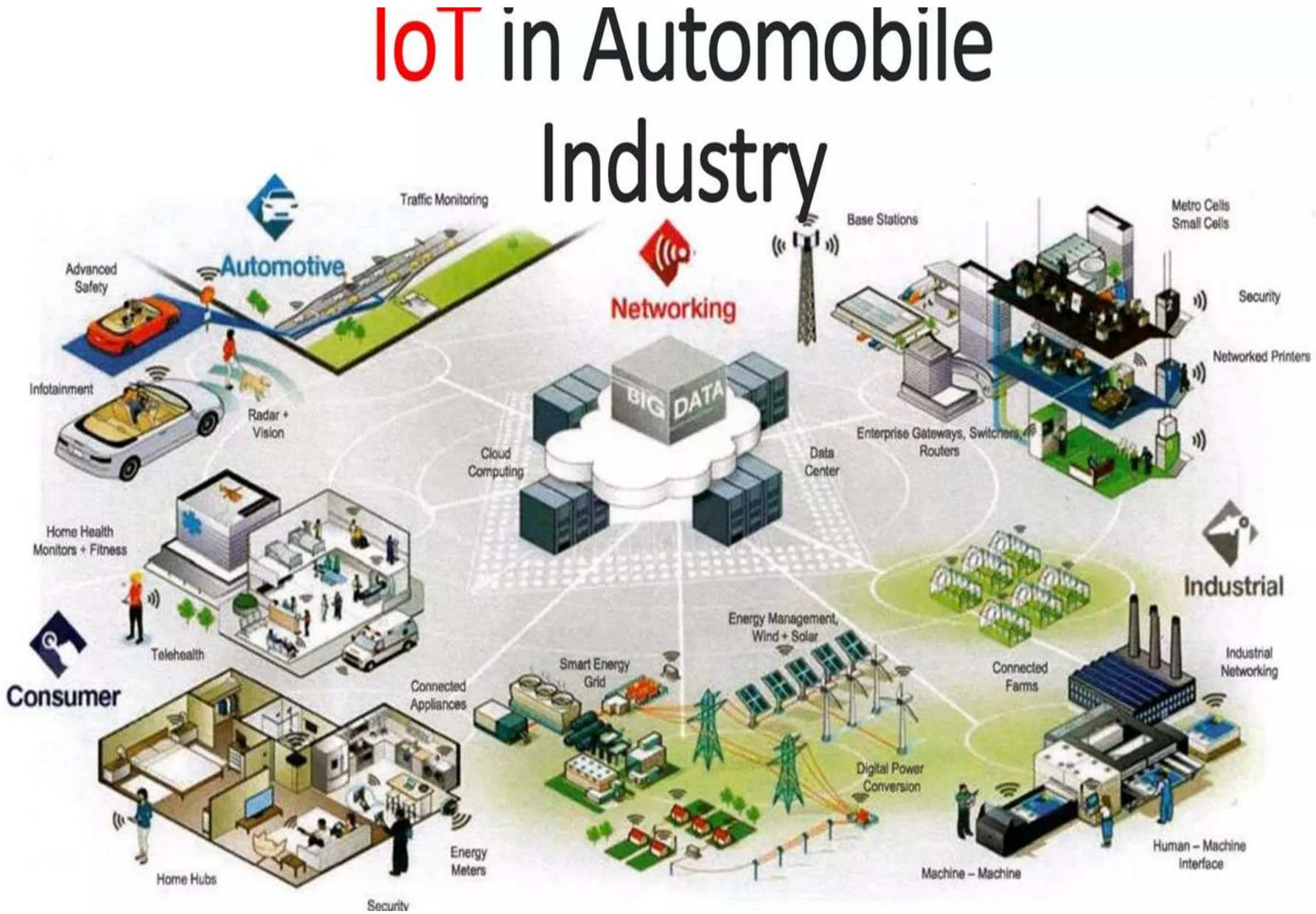
Real time vehicle telematics: The cloud is connected with the telematics devices which gives real time information about the driver health and vehicle status. Combination of IoT and telematics can track the movement, position, conditions, and behaviour of vehicles. The car owner can also monitor his vehicle remotely. The benefits of vehicle telematics are remotely controlling the speed of vehicles, remote access to vehicle operation data and vehicle collision notifications to emergency responders.

Applications of VIoT



Automatic toll collection using RFID technology

Case Study of VIoT



Applications of VIoT

IoT in Automotive Industry:

- For supply chain management: As information regarding raw materials is communicated with the manufacturers, suppliers and the management. From the forecasting of vehicles which can be send to market requirement of raw materials can be communicated to the concerned stake holders.
- Manufacturing Process: IoT enabled system helps in tracking of the material, semi-finished product and quality control with the use of RFID technology. During manufacturing process if anyone passed through hazardous position scanning can be done by laser scanners to intimate the controlling authority. RFID tagging of spare parts can also be done.
- After Sales Services: From the customer feedback and the suggestions automotive sector can analyse the information and can make proper planning for improving their services. From RFID technologies automotive industry can schedule the customers who needs maintenance service.

Pros and Cons of VIoT

- Advantages:

  Stay ahead in competitive industry

  Predictive maintenance

  Infotainment

  Connected vehicles

- Disadvantages:

  Skilled and trained man power required

  Obtaining consent from the user is difficult for sharing information

  Extra cost for the owner as well as manufacturer

  Network failure and non-availability of internet in remote areas

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IoT Applications in Manufacturing

Technologies in IIoT

- RFID: RFID system consists of RFID tags and readers. RFID tags attached to the object contains information about the object while readers can read the information i.e. the unique address associated with it. Therefore readers can track the movement of the tags to which they are connected to. In manufacturing RFID system can help in supply chain management, production scheduling and so on.

- Wireless Sensor Network: Wireless sensor nodes consist of autonomous nodes that are capable of sensing the environment, conduct computations and communicate with the other nodes. They support multi-hop wireless communication.

- Cloud computing and big data: Cloud computing enables efficient management of large shared pool of configurable computing resources. Big data are complexed data sets it consists of 3 characteristics volume, variety, velocity.

Components of IIoT

Components of IoT in manufacturing architecture:

- IoT enabled devices
- Edge data management
- Internet gateways
- Cloud for data processing
- Connectivity protocols
- IIoT platform

Applications of IIoT

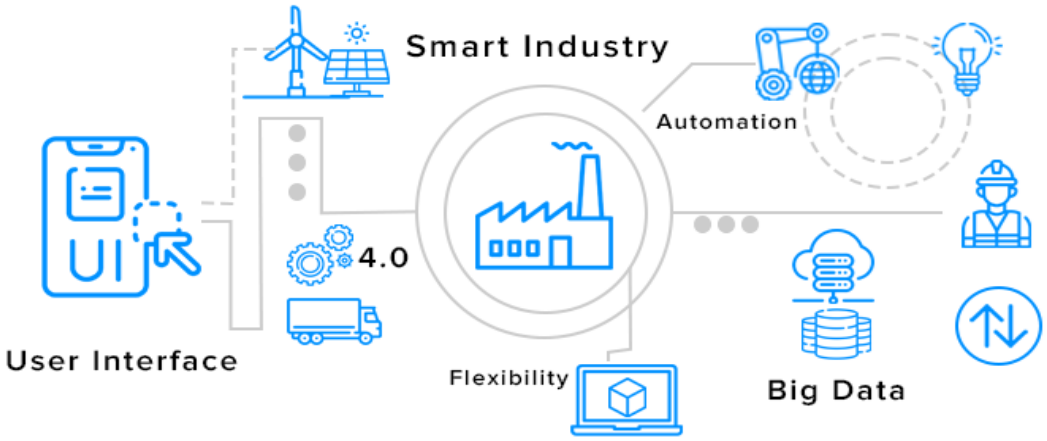
- Quality control: The products can also be tested at each manufacturing step to check if their attributes are within specifications.

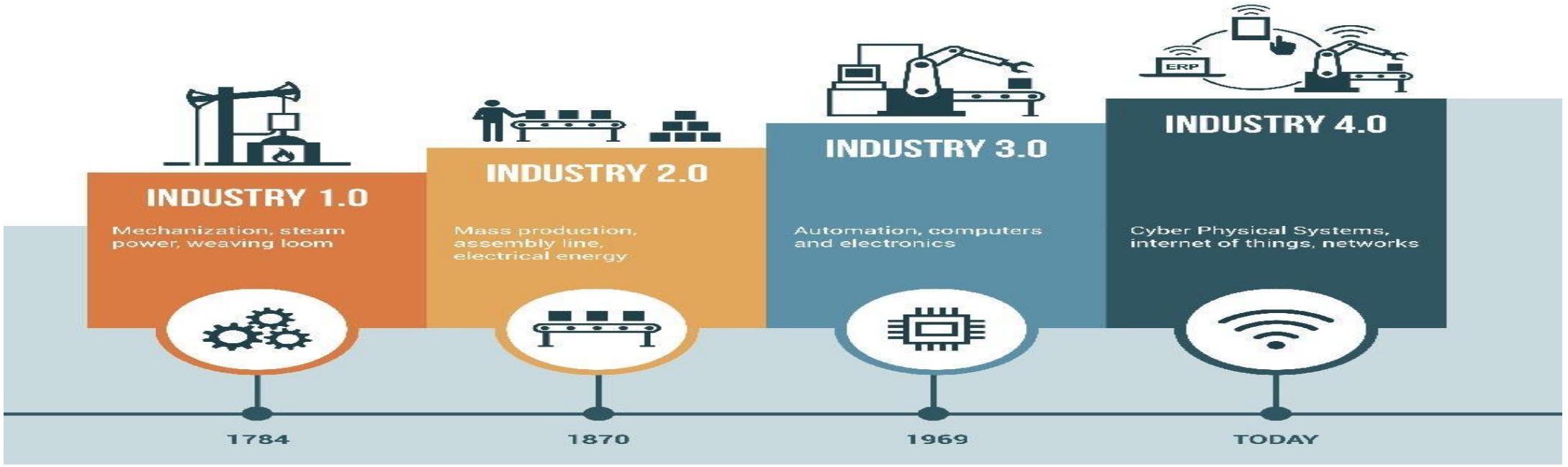
- Inventory Management: Together with radio frequency identification (RFID), IoT makes inventory management an efficient and seamless process.

- More safety in operation: In combination with big data analytics, IoT also optimises the safety of workers, equipment and operations in a manufacturing plant.

- Smart metering: IoT has also introduced the manufacturing sector, utilities and other industries to the world of smart meters that can monitor the consumption of water, electric power and other fuels.

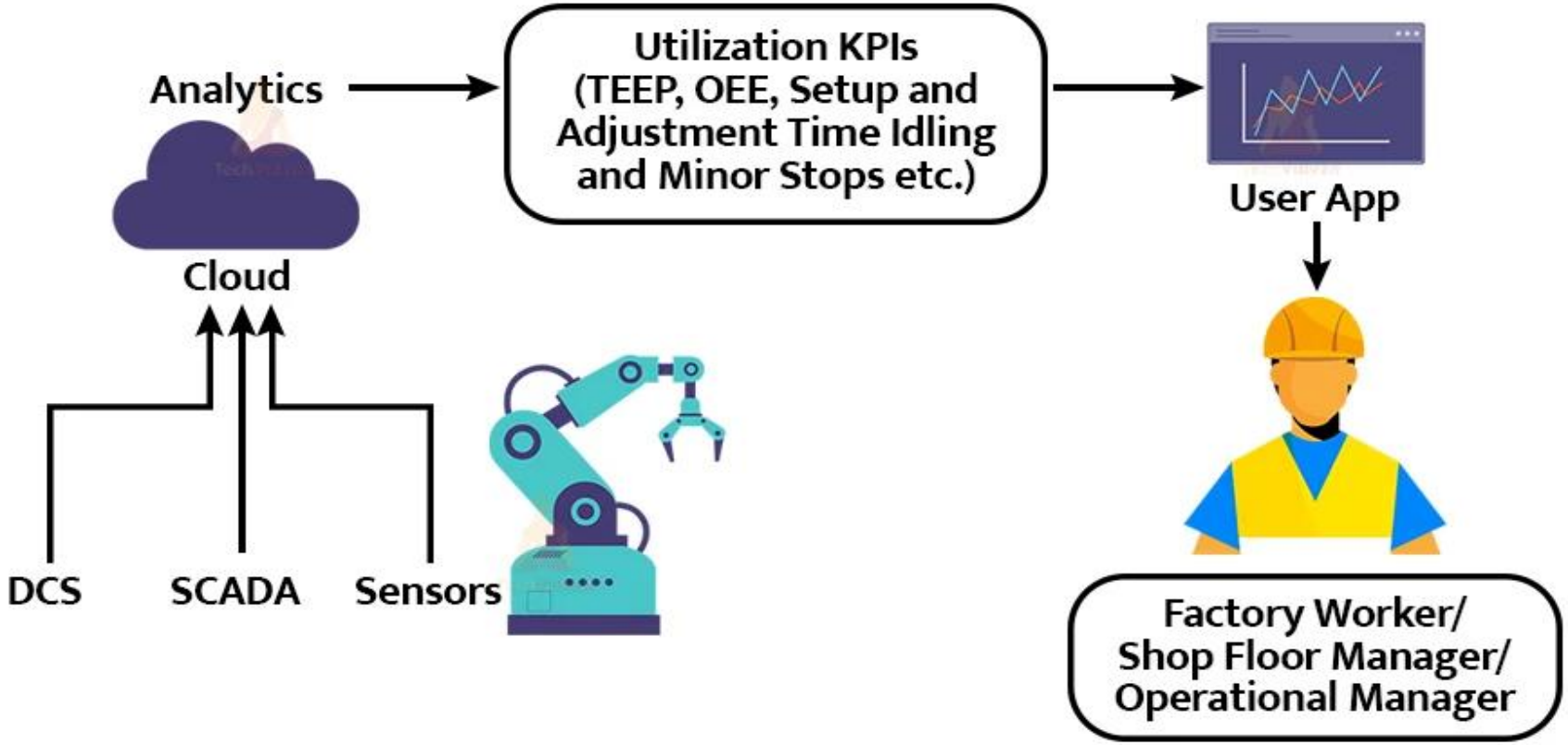
Applications of IIoT





Case Study of IIoT

Inventory Management



Case Study of IIoT

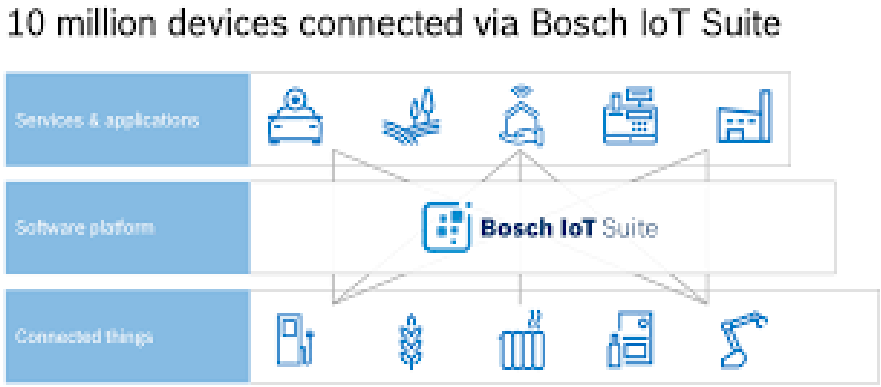
Inventory Management

- Together with radio frequency identification (RFID), IoT makes inventory management an efficient and seamless process.
- Every item in the inventory gets an RFID tag, and each tag has a unique identification number (UID) comprising encoded digital information about the item.
- RFID readers can scan the tags, and the data extracted gets transmitted to the cloud for processing.

Real Time Applications of IIoT

Real time applications

1. PepsiCo uses IoT for asset tracking
2. BMW uses industrial IoT to create digital twins of its products
3. L&T uses IoT for remote monitoring and cost saving
4. Airbus uses Bosch's IoT platform to create smart factory



Pros & Cons of IIoT

- Advantages:

  Automation and efficiency

  Energy management

  Proactive maintenance

  Supply chain management

- Disadvantages:

  Safety concern

  Expense

  Complex uses

  Communication

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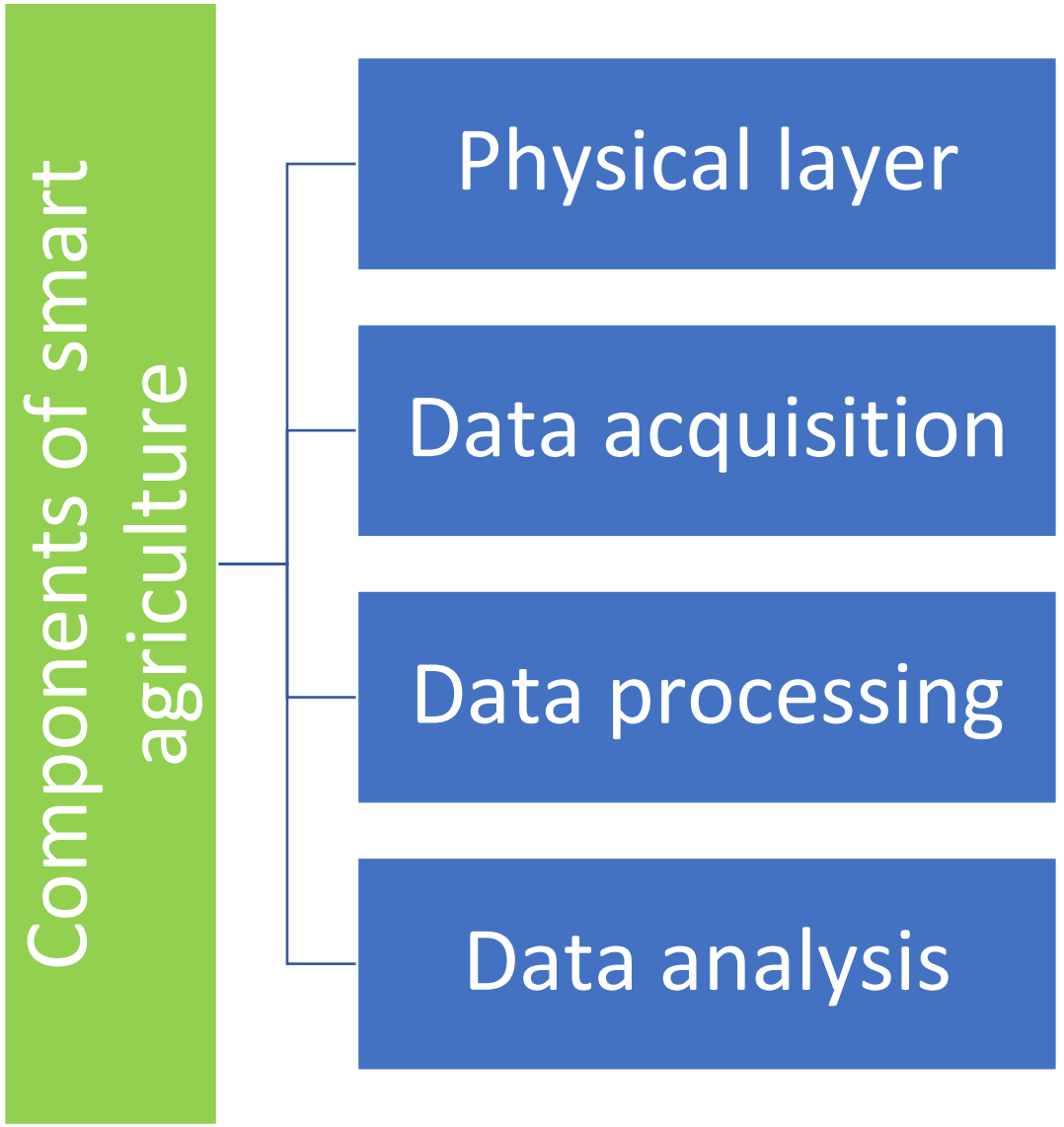
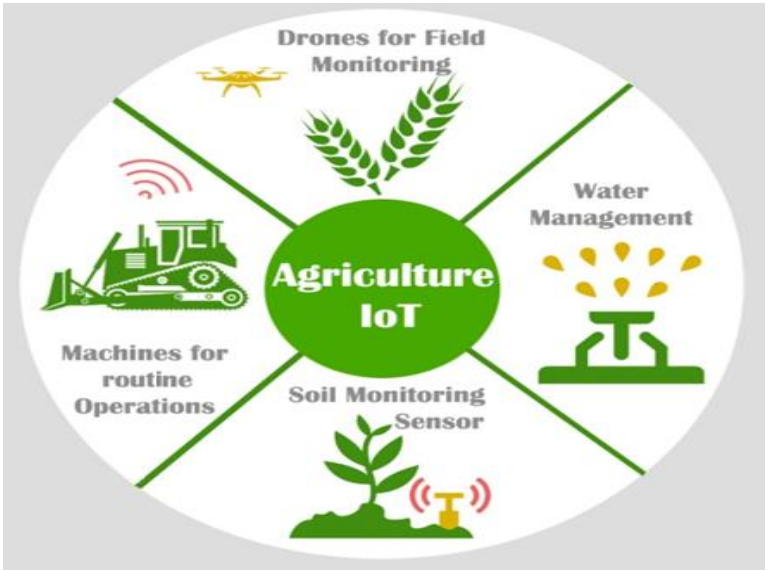
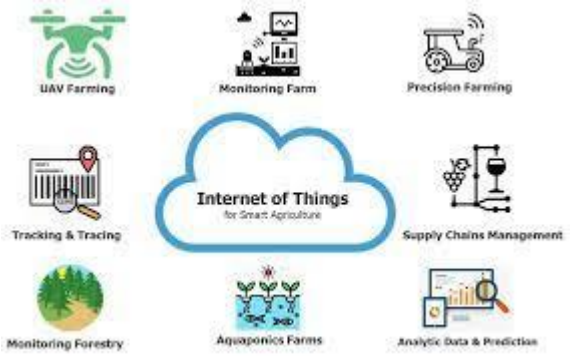
IoT in Agriculture

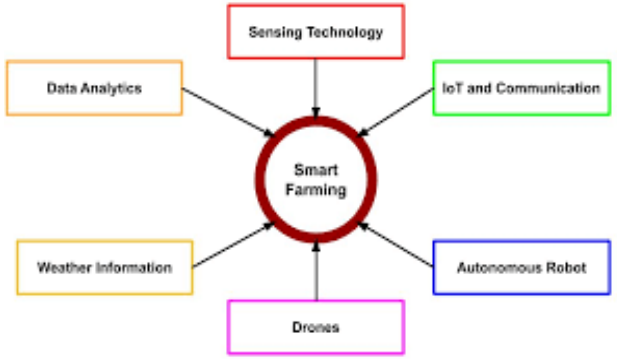
IoT in Agriculture



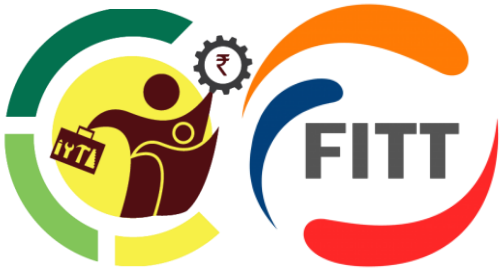
Applications of IoT in Agriculture





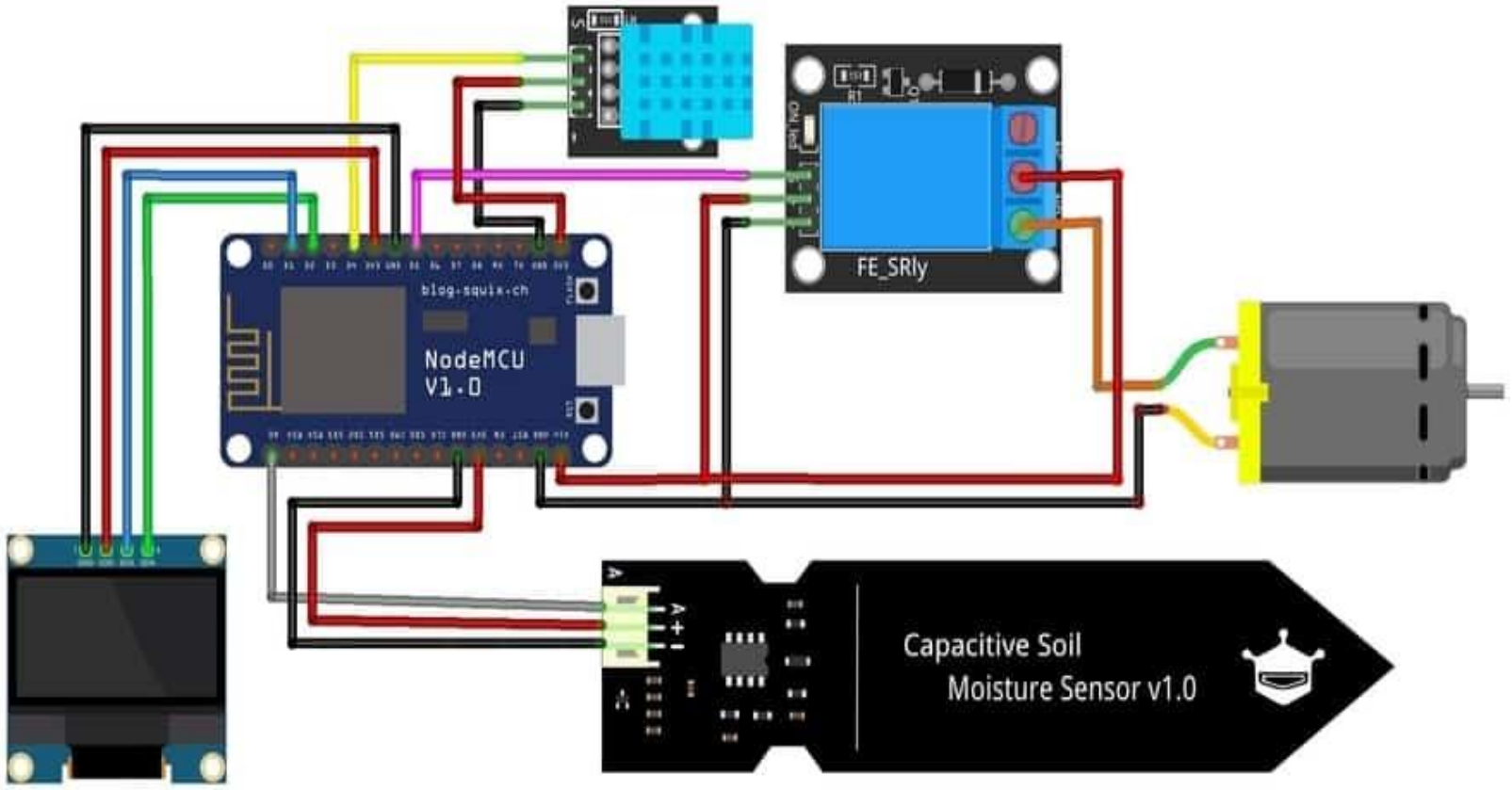


Applications of IoT in Agriculture



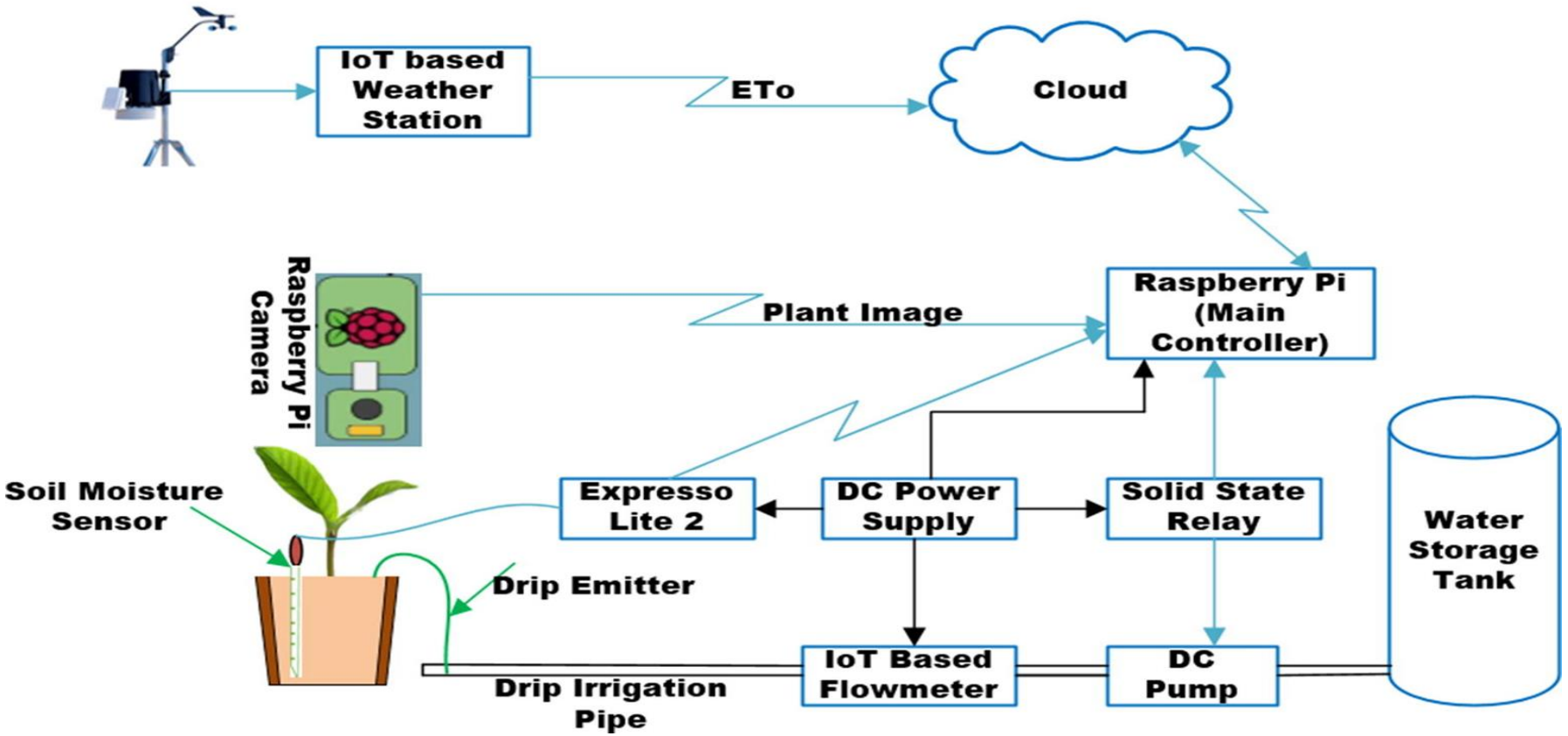
Precision Farming	Agricultural Drones	Livestock Monitoring	Smart Green house	Remote Sensing	Computer Imaging
• Use of IT and advanced technologies like sensors, automation vehicles, robotics, automated hardware. • Making the whole process of farming accurate.	• For Crop health assessment, crop monitoring, irrigation, spraying of pesticides. • Many benefits such as crop health imaging, integrated GIS mapping, saving time, ease of use, and also increasing crop yields	• Track well being, health and location of cattle, so that unwell cattle can be separated from others. • Helps in cutting labor cost and spread of infectious diseases	• Intelligently control and monitor the climate without human intervention. • Sensors used provide information regarding temperature, light, humidity and actuators control opening and closing of window and light.	• **Crop Assessment** The sensors placed keep a track on plant size, temperature, humidity, light. • **Soil quality** The analysis of soil quality aids in deciding on the nutrient value and parched sections of farms.	• Sensor cameras generate images that go through image processing • It helps in 3 parameters: • Quality control • Irrigation management • Sorting and grading

Case Study of IoT in Agriculture



IoT Enabled Soil Moisture Sensor Monitoring And Irrigation

Case Study of IoT in Agriculture



Smart Farming Using IoT


Thank you