ROBOTIC HARDWARE SYSTEM

ROBOT TYPE: AUTOMATED GUIDED VEHICLE

NAME : EIMAN SALEH BIN MOHD AZIAN

MATRIC ID: 1728753

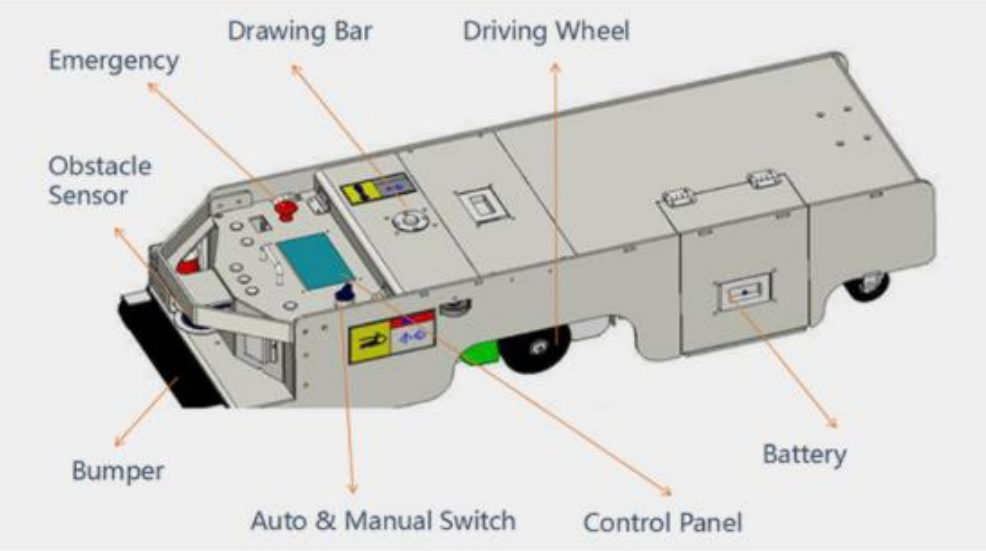
MAIN COMPONENTS

1. Design
2. Propulsion system
3. Navigation and Control system
4. Data Transmission and Collection
5. Power Management

DESIGN

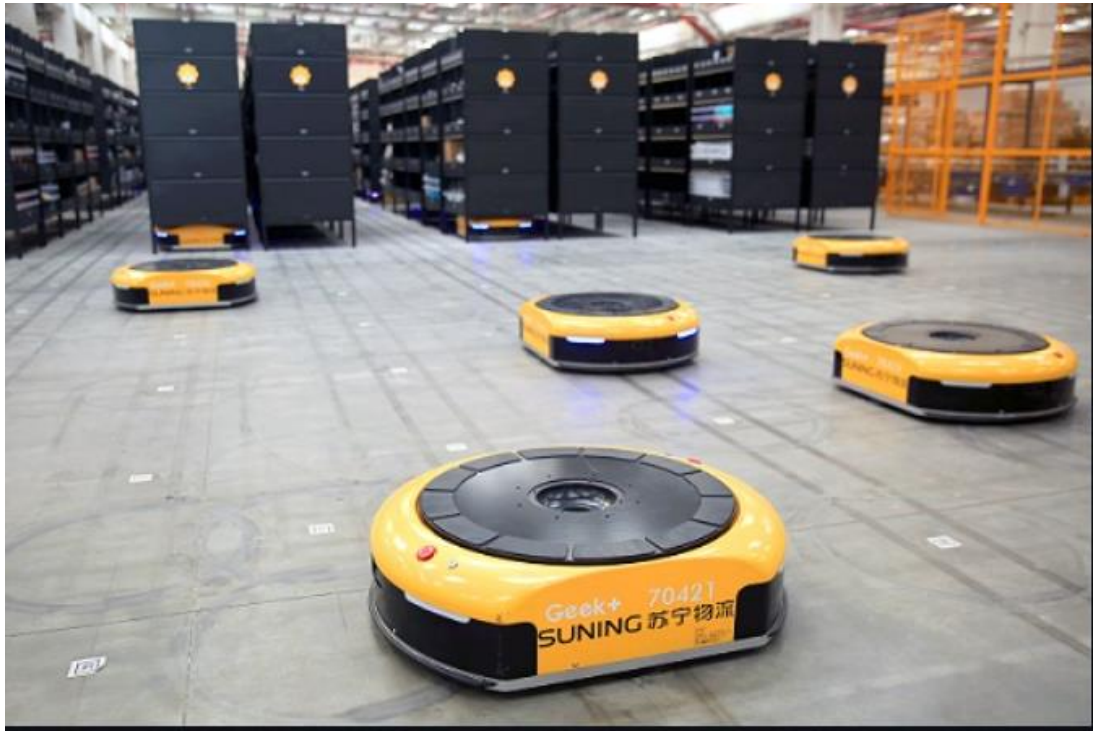
AUTOMATED GUIDED CARTS

- they can transport a variety of materials, from small parts to loaded pallets, and are often used in sorting, storage, and cross-docking applications.



DESIGN

AUTOMATED GUIDED CARTS



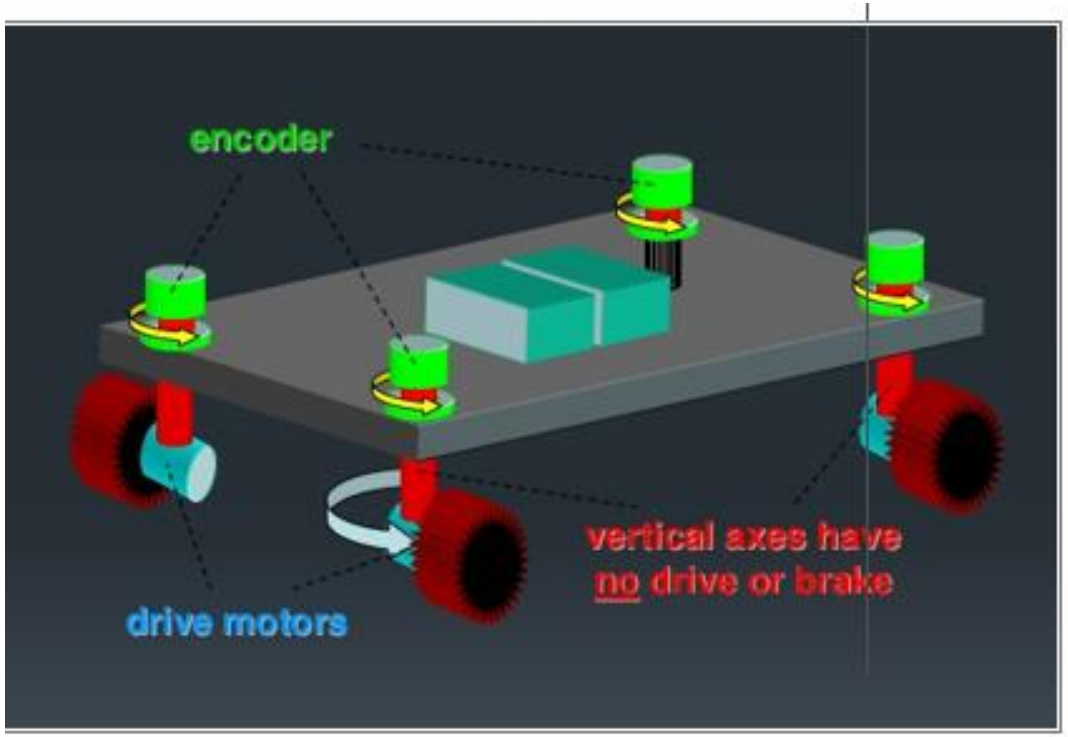
MORE DESIGNS

FORKLIFT AGV & TOWING AGV

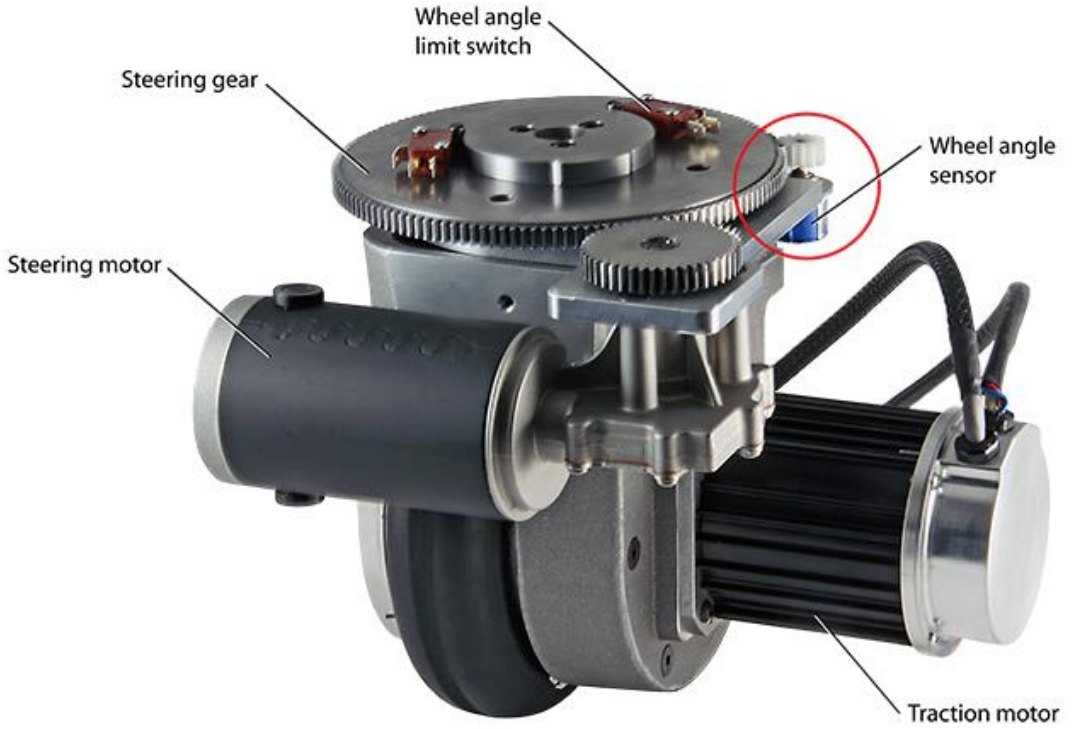
Propulsion system

- Driving unit
- made up from reducer, arrester, wheels, chain wheel, spring, chassis bracket, guidance sensor bracket, etc

ACTUATOR



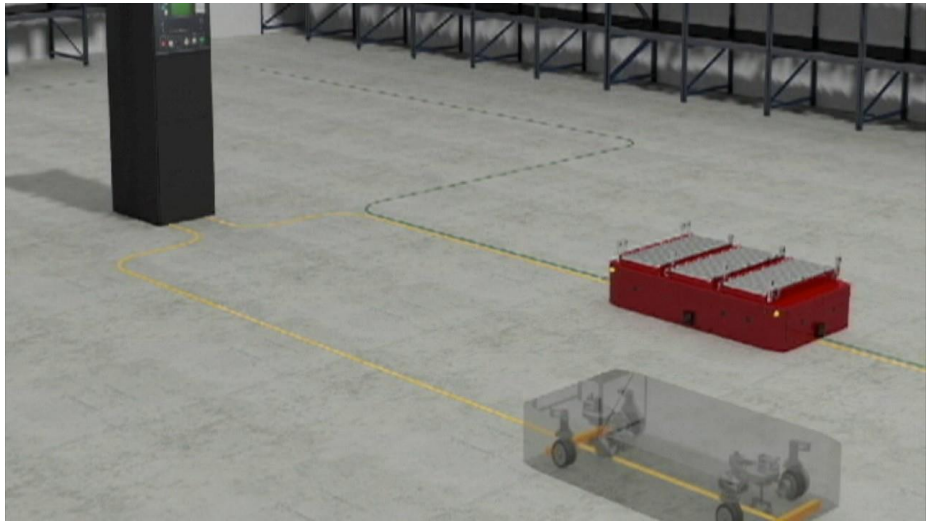
Integrated traction-wheel



This is stering wheel , it able to move and steer at the same time allowing the movement of the agv

NAVIGATION AND CONTROL SYSTEM (PART 1)

1. **Wired**
   - a slot is cut into the floor and a wire is placed below the surface
   - wire is used to transmit a radio signal
   - a sensor is installed on the bottom of the AGV close to the ground and detects the relative position

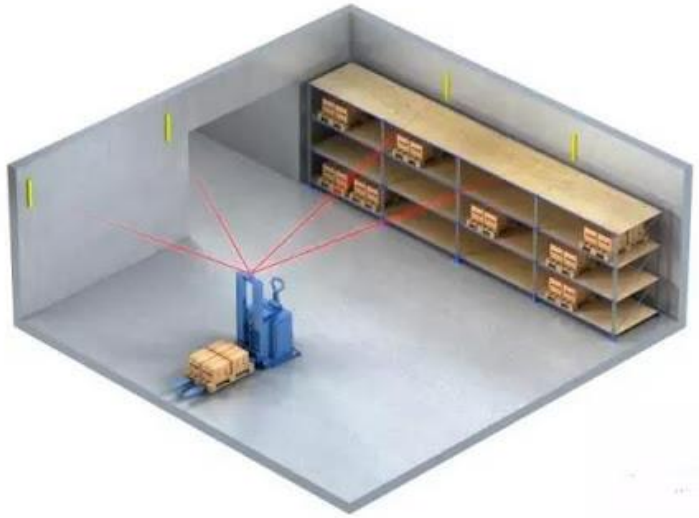


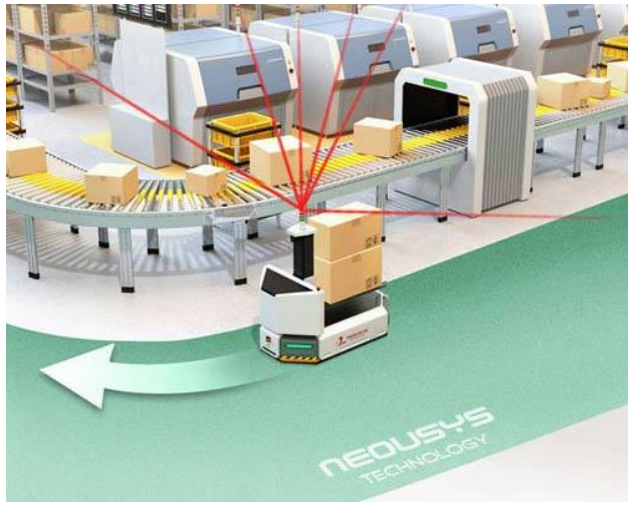
AGV requires a navigation system that provides the ability for the vehicle to identify its position.

NAVIGATION AND CONTROL SYSTEM (PART 1)

2. Laser target navigation

- The navigation is done by mounting reflective tape on walls, poles or fixed machines\
- The AGV carries a laser transmitter and receiver on a rotating turret.
- The laser is transmitted and received by the same sensor.

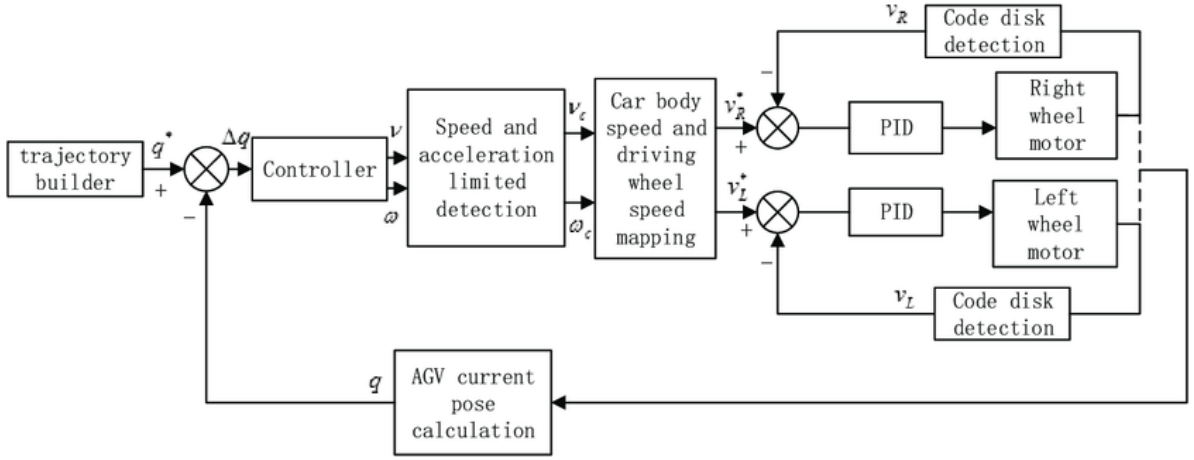




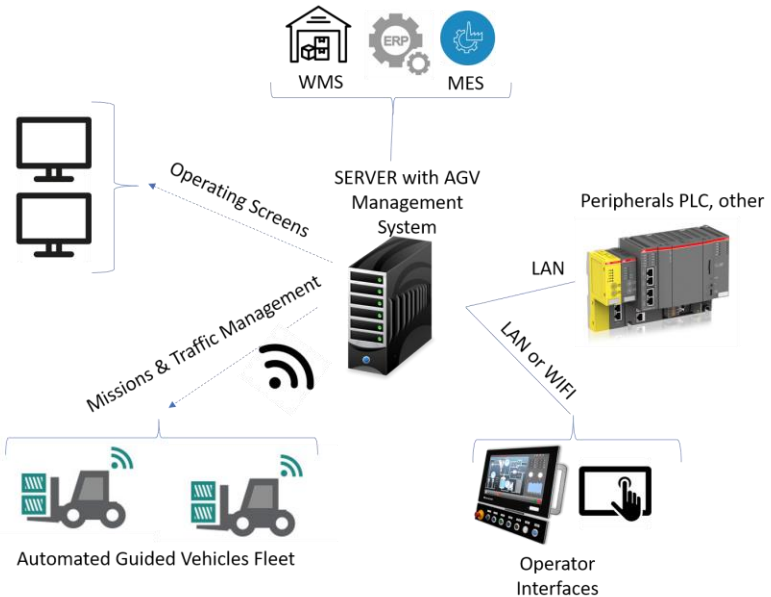
3. Others:

GPS, Tape, geoguidance, vision guidance

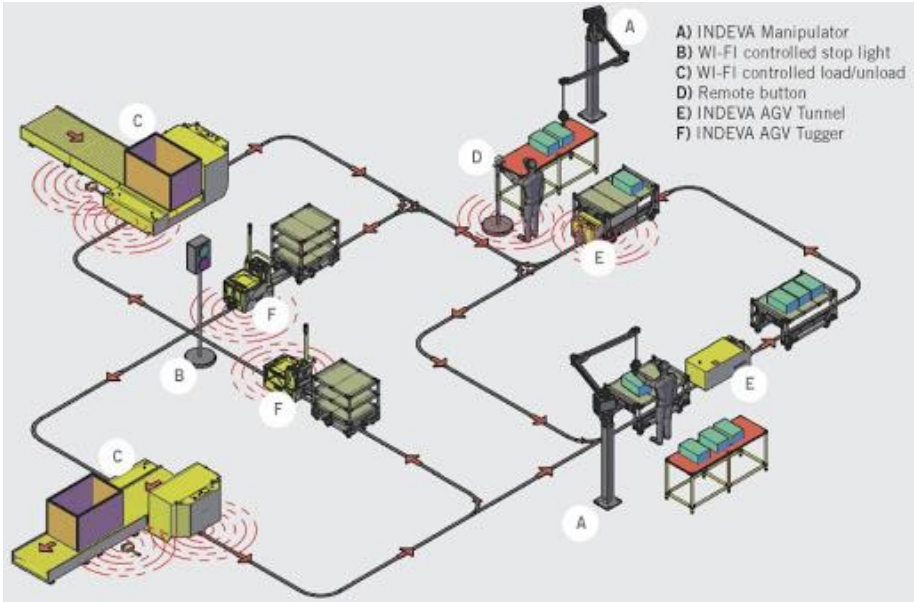
NAVIGATION AND CONTROL SYSTEM (PART 2)



Block diagram of AGV control system



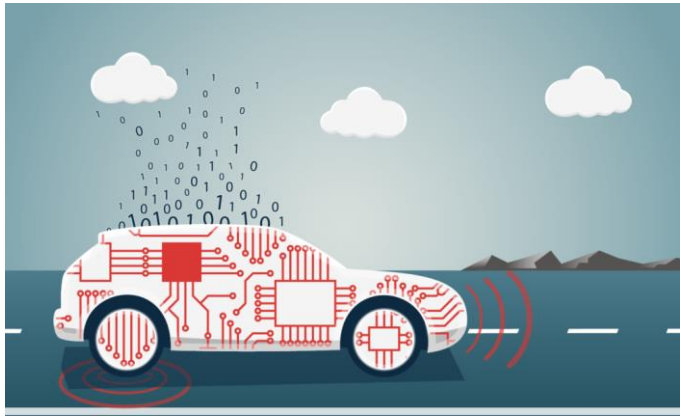
AGV Management system (eg: in Hospital)

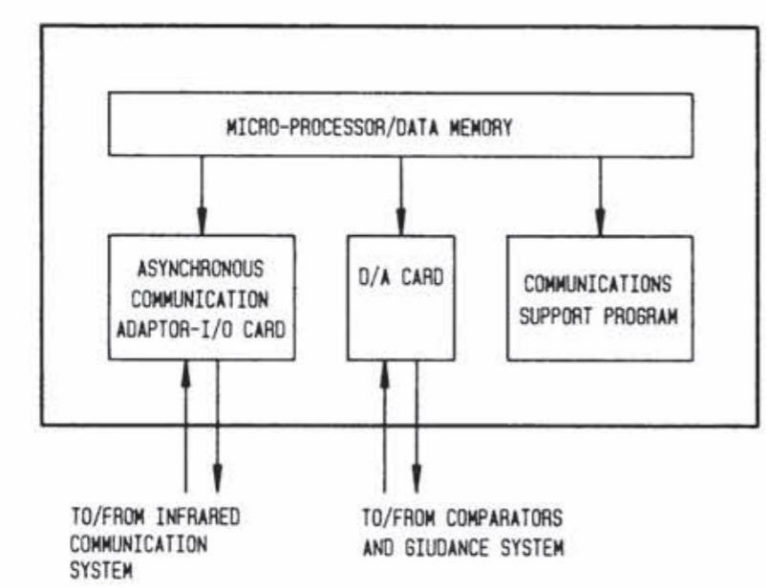


Navigation System for Industrial AGVs

DATA TRANSMISSION AND COLLECTION

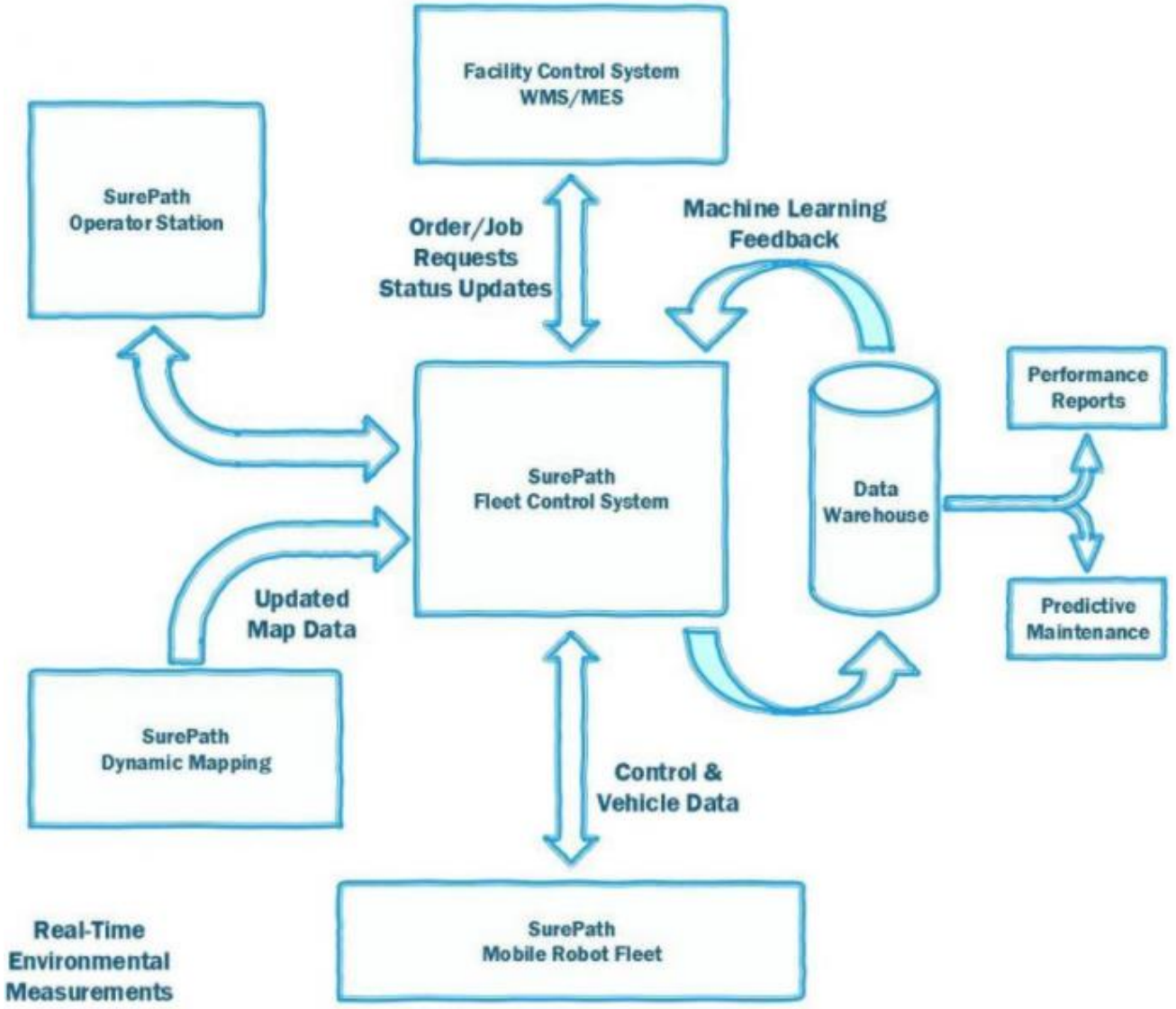
- It is performed by a software communication package.
- Data is sent in a serial format generated by the off-board computer's asynchronous I/O card and received on-board by another asynchronous I/O card.
- For data processing, no common clock time between sender and receiver is needed. However, baud rates should be kept identical .





On- board microprocessor data transfer

Data transmission and collection (Data Path)



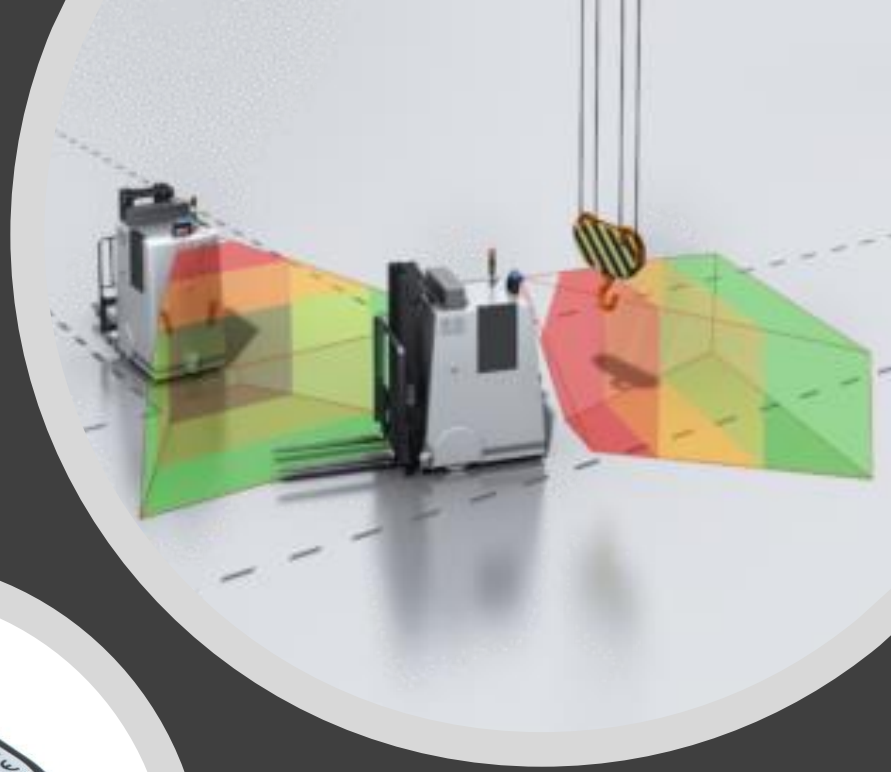
DATA COLLECTION

- Via sensors
- IoT sensors embedded in fleet vehicles are enabling fleet managers to capture and analyze data via predictive analytics

Software that used for AGV

DATA COLLECTION (EXAMPLE: DETECTING OBSTACLE)

- A sensor detects the presence or the absence of an obstacle by radiating a laser beam to the outside of a casing through a light projecting mirror and by letting the reflected light from an obstacle enter a light receiving element through a light receiving mirror.



DATA TRANSMISSION

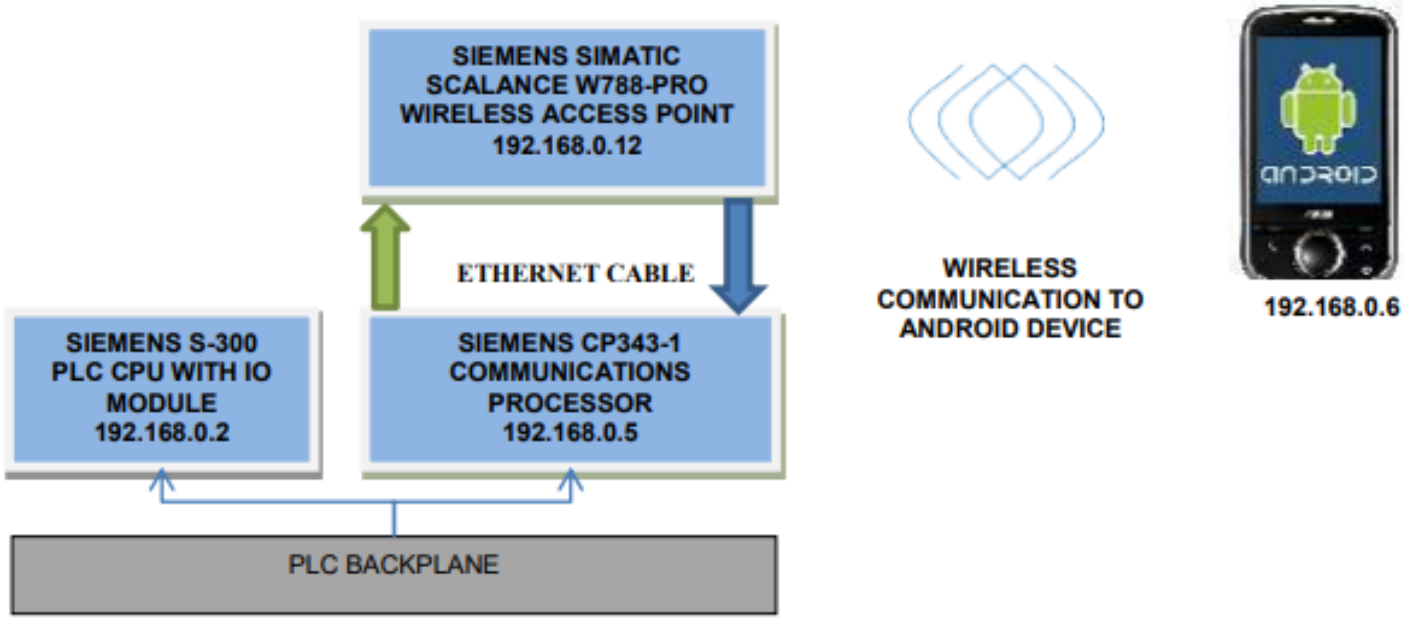
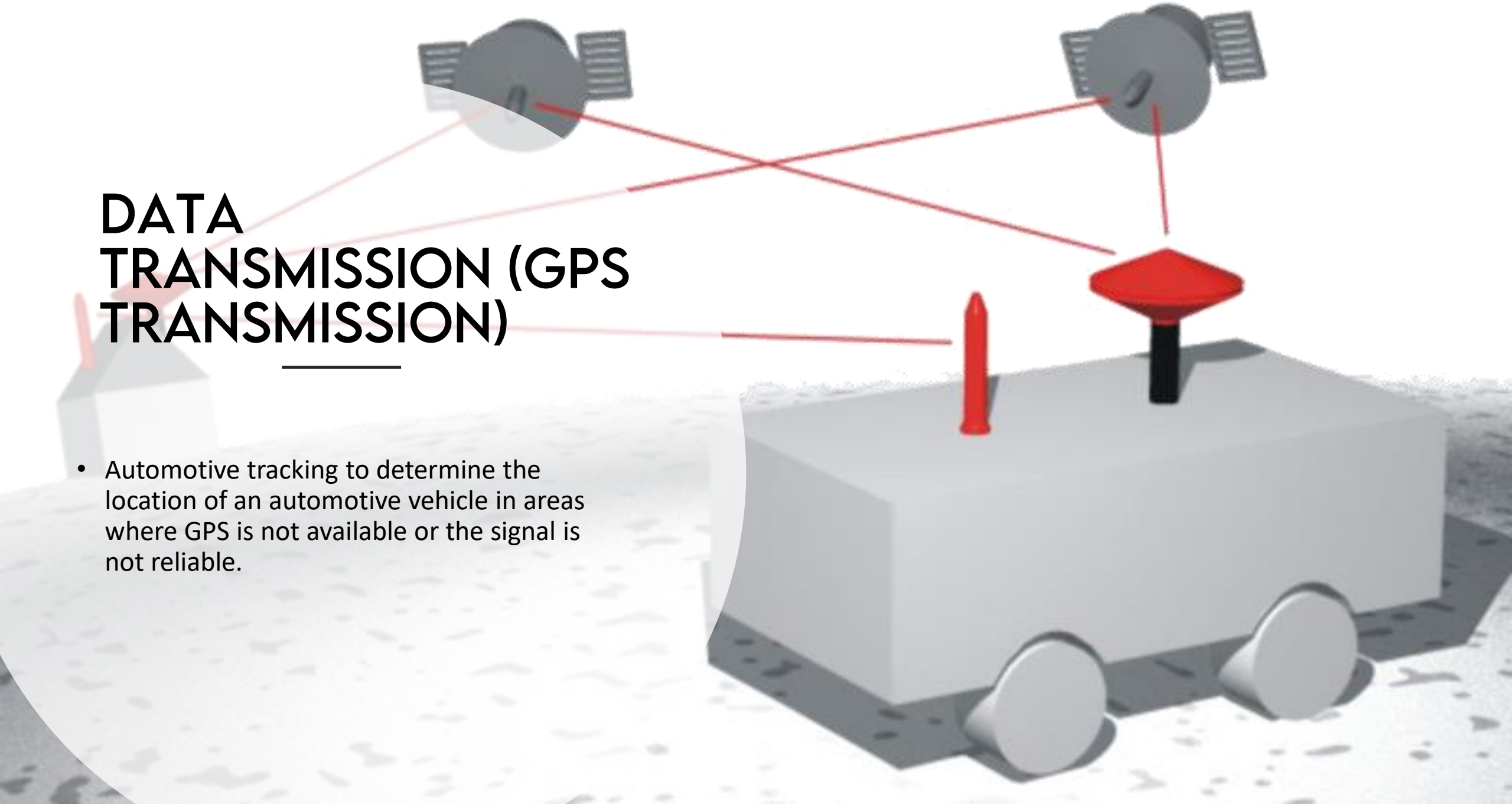


Figure 3.7: Network Block Diagram

- Made up of a normal LAN setup, combining WLAN for
- integration to the Android phone. Also, it can be implemented for integration of SCADA system.

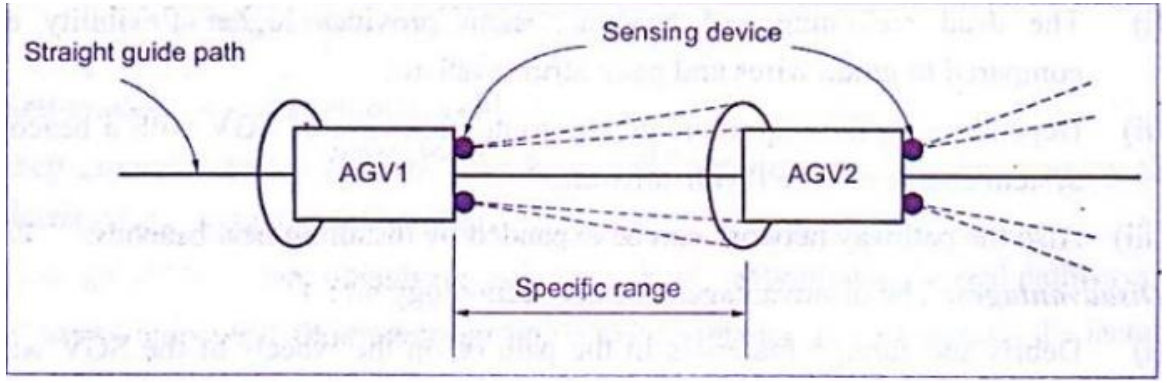
DATA TRANSMISSION (GPS TRANSMISSION)

- Automotive tracking to determine the location of an automotive vehicle in areas where GPS is not available or the signal is not reliable.

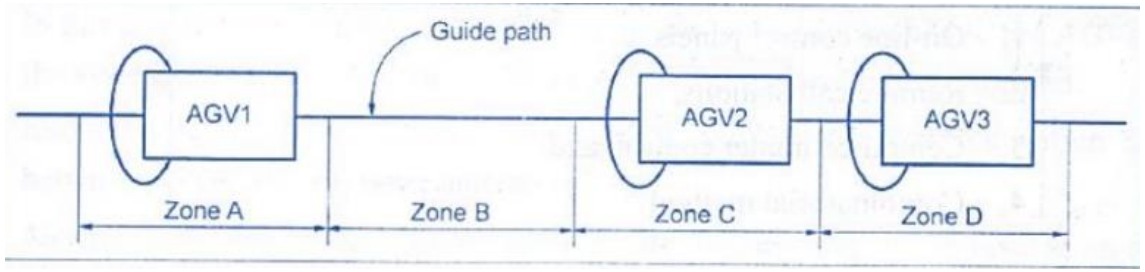


VEHICLE MANAGEMENT

- **Traffic control**
  - To minimise interference between vehicles and prevent collision.
  - Method used:
    - Forward-sensing control
    - Zone-sensing control
    - Combination control



Forward sensing control

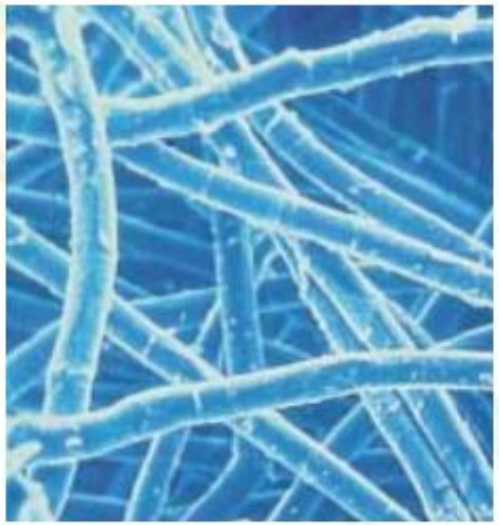


Zone-sensing control

POWER MANAGEMENT (BATTERY)

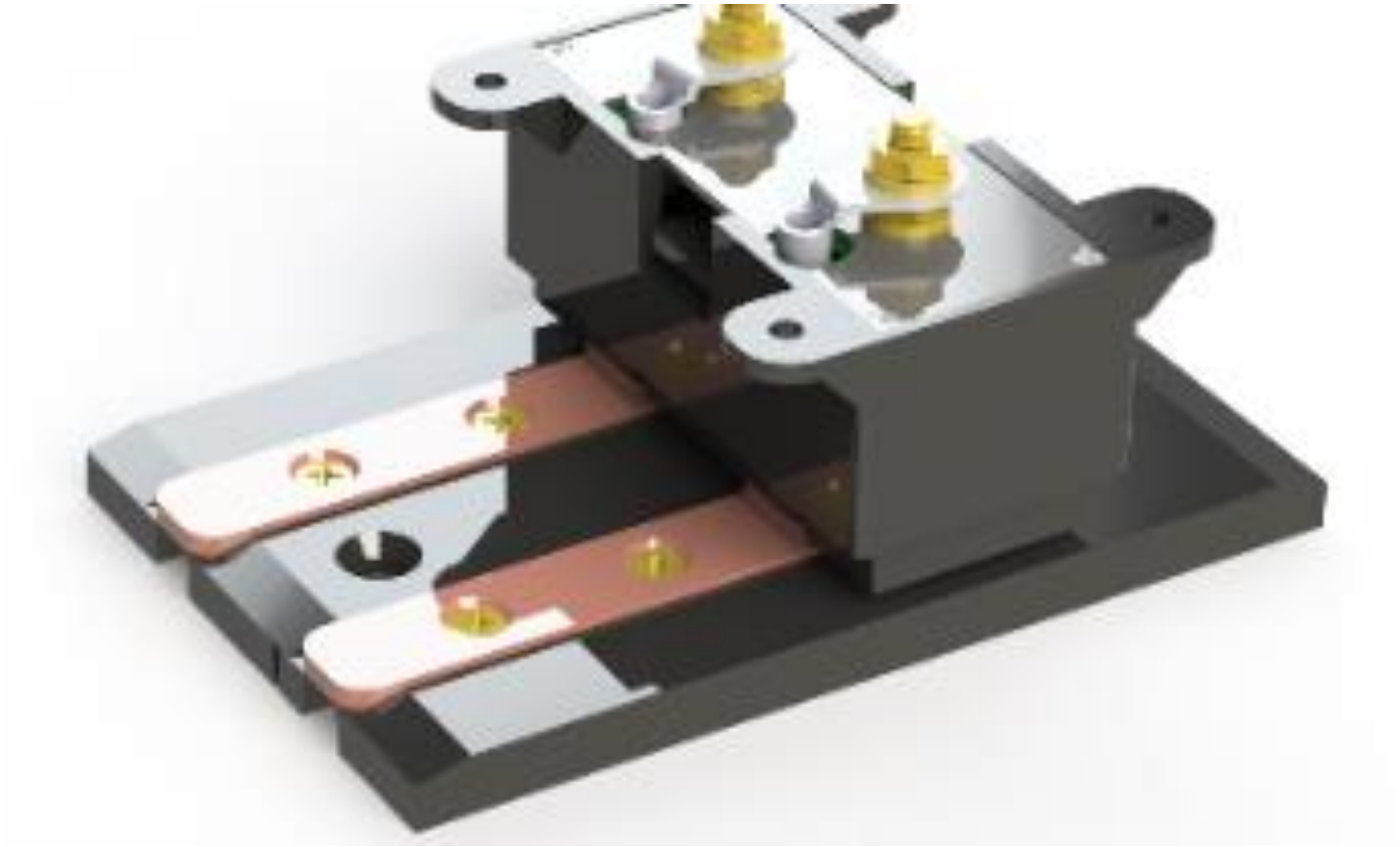
- NiCd Batteries - robust, have a high cycle ability, a high performance and are easy to maintain
- Typical source of battery
- high capacity, maintenance-free, and long working time

FNC®-T



fibre-structured electrode

POWER MANAGEMENT (CHARGING PAD)



- Mostly, charge docking system utilizes magnets to control the connection and disconnection action automatically while using no additional power from the mobile systems batteries