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Robotics and Internet of Things (IoT)

Topic 3: Functionality of IoT Devices and Robots

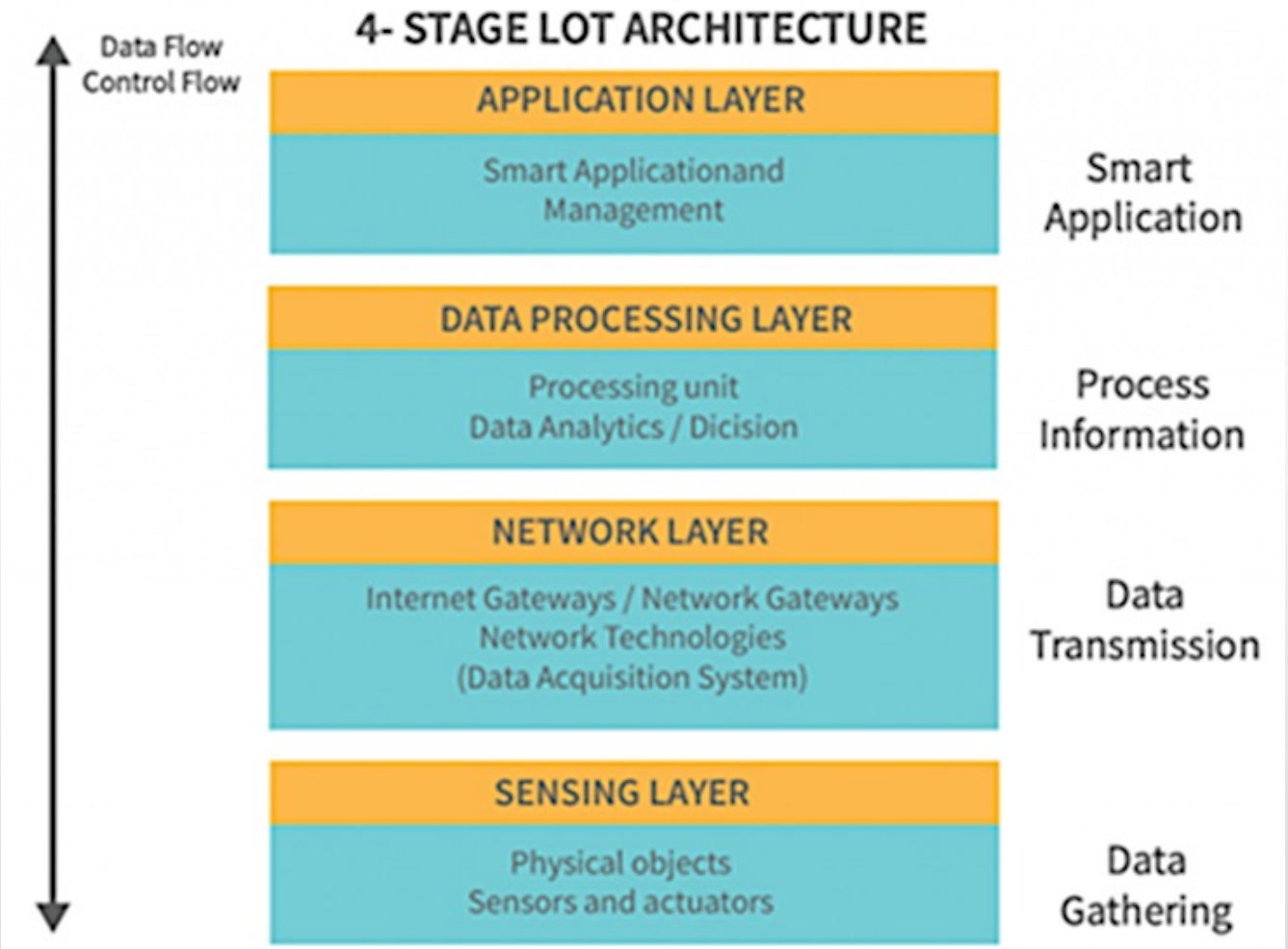
Content

3.1 The Components of an IoT Architecture

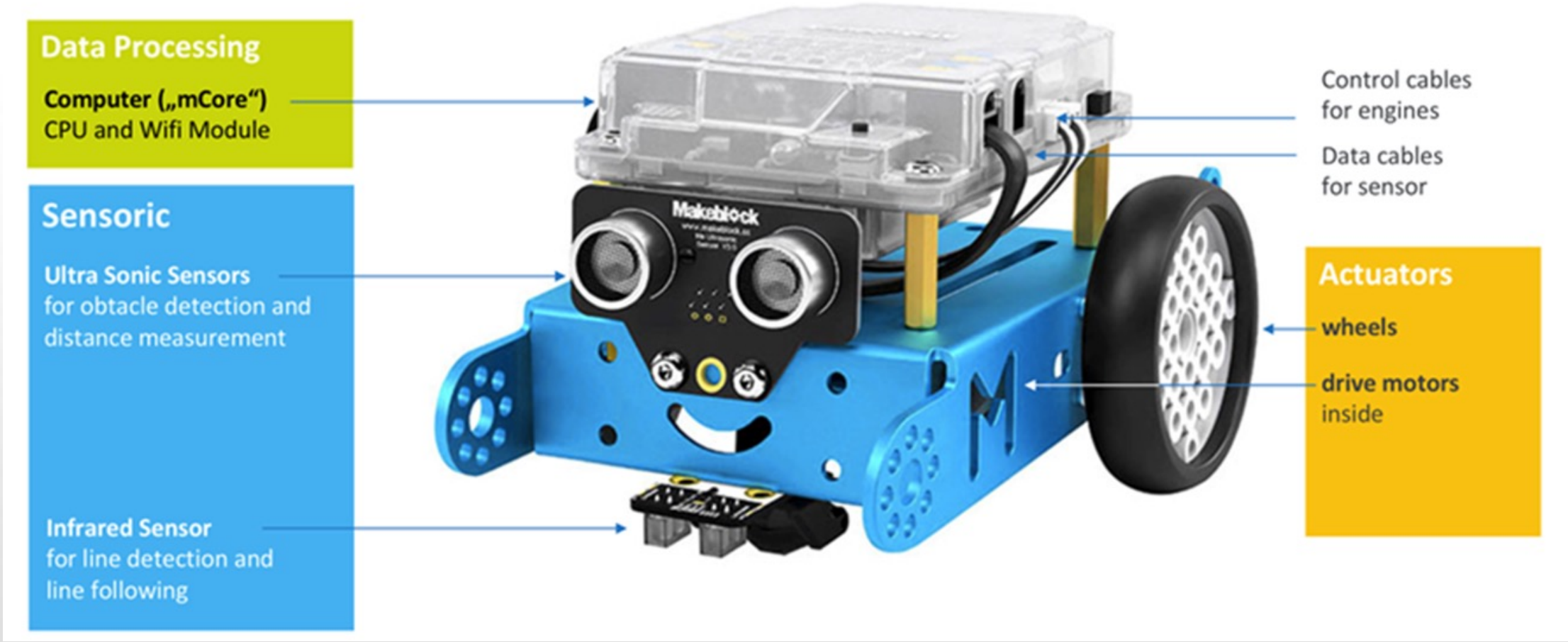
A typical IoT Architecture generally consists of four layers:

1. Things/Devices
2. Gateways and Networks
3. Data Processing with two different locations:
    - Edge IT – located close to the IoT devices, Cloud IT
    - Global – large-scale storage and computing
4. Applications

3.1 The Components of an IoT Architecture

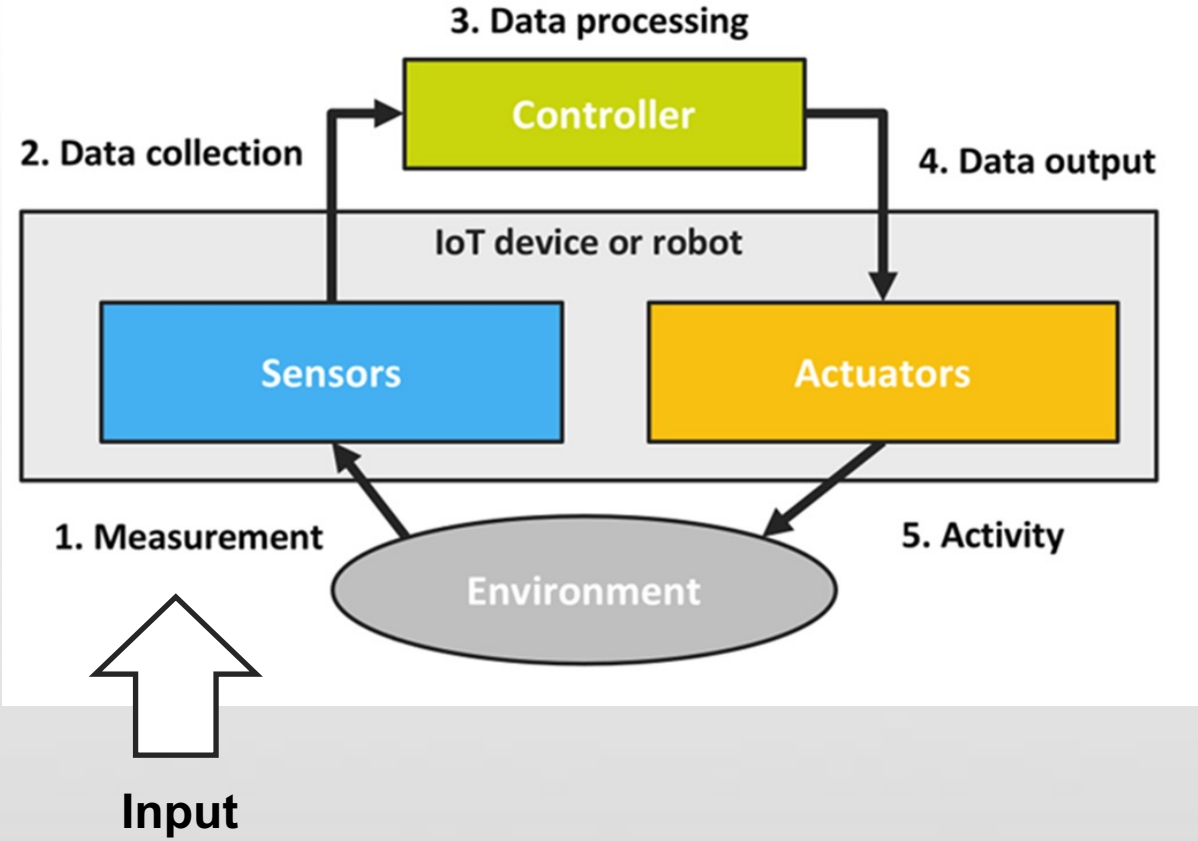


3.2 The functional Components of a Robot



3.3 The feedback loop - how robots and IoT systems regulate themselves

1. Input or Action
2. Measurement
3. measurment
4. Correction
5. Repetition



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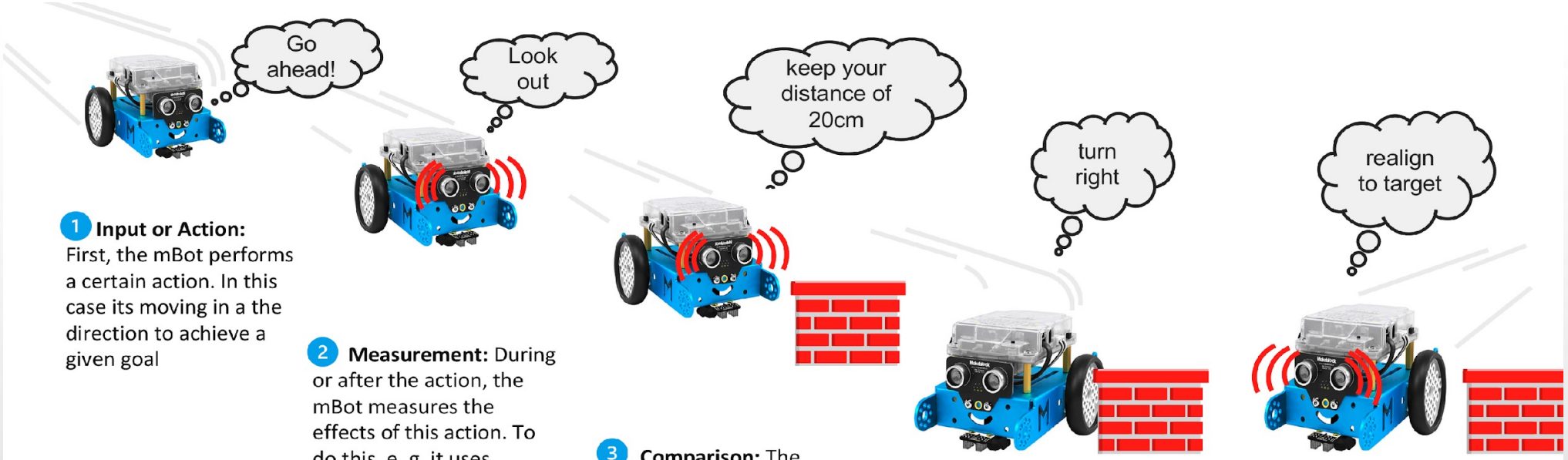


1 **Input or Action:** First, the mBot performs a certain action. In this case its moving in a the direction to achieve a given goal

2 **Measurement:** During or after the action, the mBot measures the effects of this action. To do this, e. g. it uses ultrasonic sensors, that measure the distance to an obstacle.

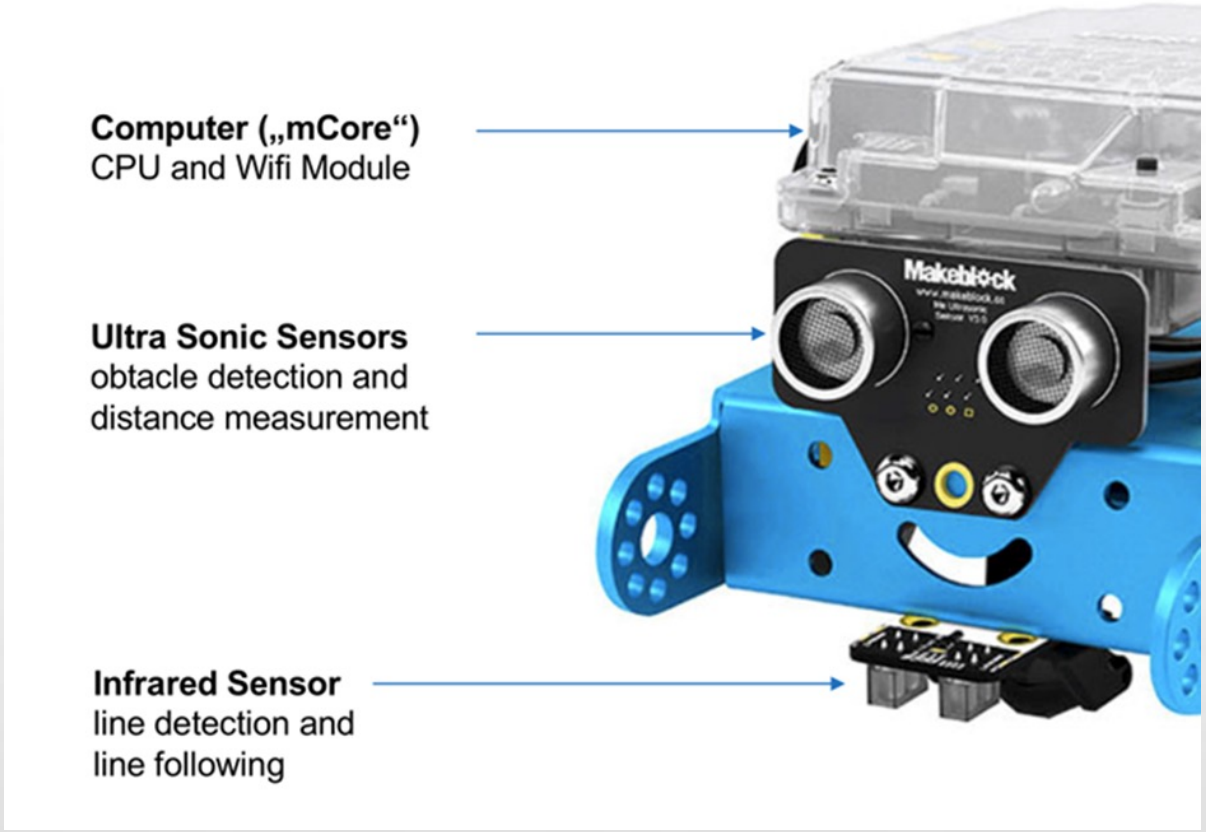
3 **Comparison:** The measured values are compared with the desired target values. For example, if themBot is supposed not to fall below a certain distance to an obstacle, it is continously checked whether it has reached that Set-point.

4 **Correction:** If the set-point has been reached or exceeded the robot's action is corrected accordingly. In this case the mBot steers in a different direction to avoid the obstacle and then he pursues his goal again.

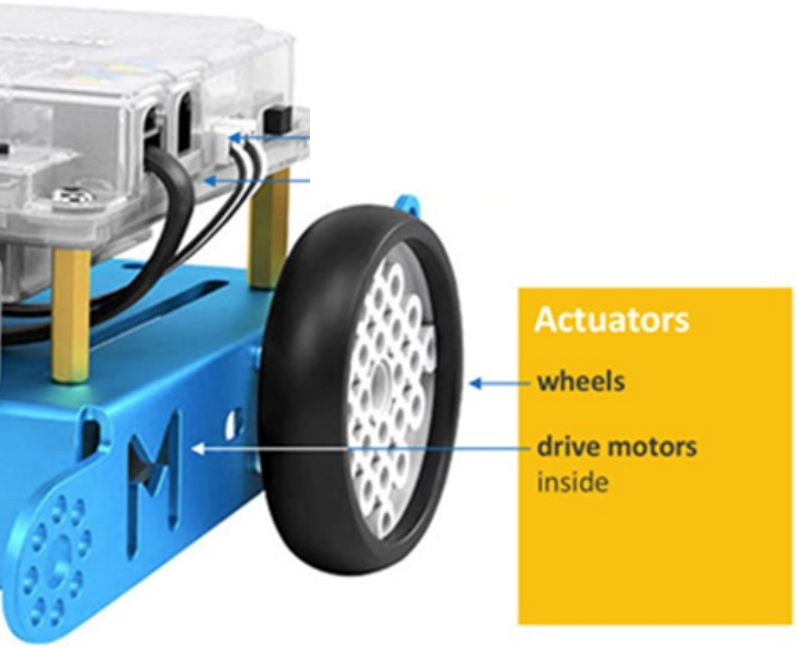
5 **Repetition:** This process repeats constantly. This way, the mBot can continuously adapt and improve its actions.

3.4 Sensors: how robots perceive their environment

- **Optical sensors** Light intensity, Infrared, Image Measurement
- **Environmental sensors** Humidity, Moisture, Gas, Pressure, Temperature
- **Acoustic and impulse sensors** Acoustic, Ultrasonic, Vibration
- **Motion and orientation sensors** Gyroscope, Proximity, Motion, Accelerometer, Force or load



3.5 Actuators: how robots act in their environment



1. Motors
2. Linear movement
3. Complex movement
4. Solenoids
5. Pneumatic
6. Hydraulic
6. Piezoelectric
7. Shape Memory Alloys
8. LED lights
9. Audio system
10. Video monitor
11. Sound system

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Thank you for attention