Introduction to Internet of Things

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Agenda for Discussion

1. What is IoT?
2. Why IoT?
3. Major Challenges
4. Details

What is IoT?

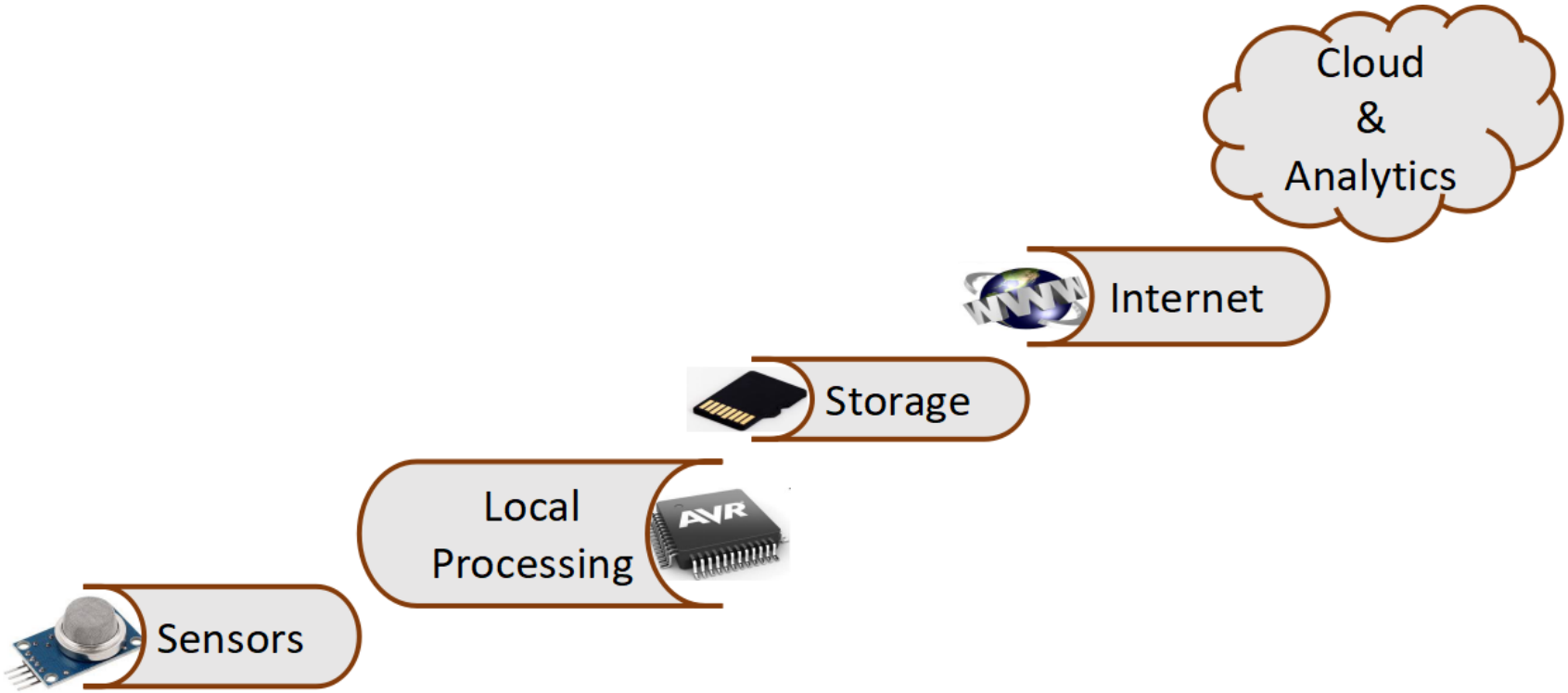
The Internet of things (IoT) describes the network of physical objects - "things" - that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet.

What is IoT?

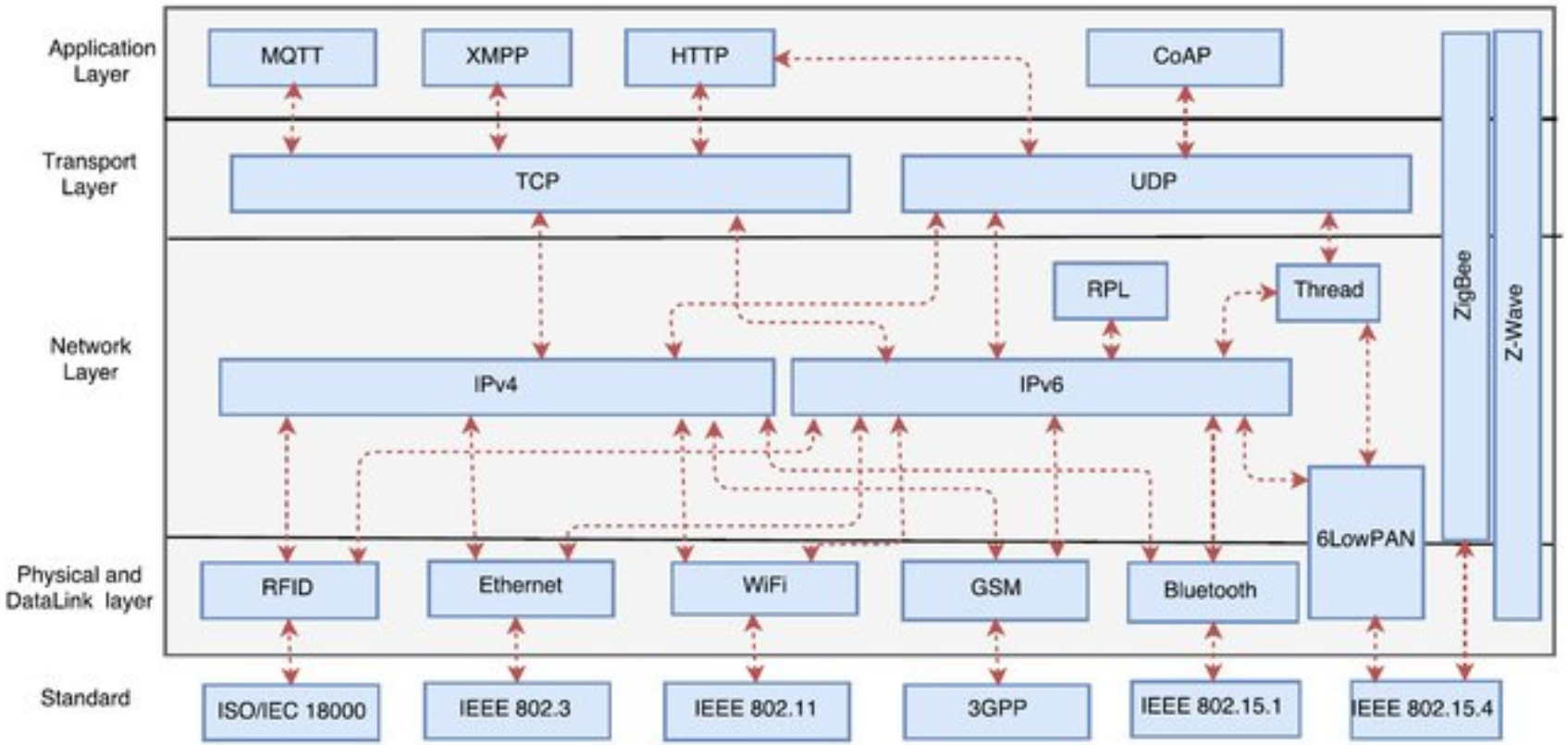
IoT allows us to

- sense and control things from a remote location.
- automate things.
- see the data and make meaningful decisions.

Layers in an IoT Project



IoT Protocol Stack



Why IoT?

- More Data = Better Decisions
- Improve customer or end-user experience.
- Improve quality of life.
- Increase efficiency of business processes, save resources, and man-power thereby saving money.

https://www.youtube.com/watch?v=Q3FOswhPhq0

Applications: Agriculture, Smart Buildings, Medicine and Health Services, Automation & Transportation, Sensor Networks, etc.

Why IoT?

Without big data analytics, companies are blind and deaf, wandering out onto the web like deer on a freeway.

- Geoffrey Moore (American Consultant)

Big data is mostly about taking numbers and using those numbers to make predictions about the future. The bigger the data set you have, the more accuracte predictions about the future will be.

- Anthony Goldbloom (CEO of Kaggle)

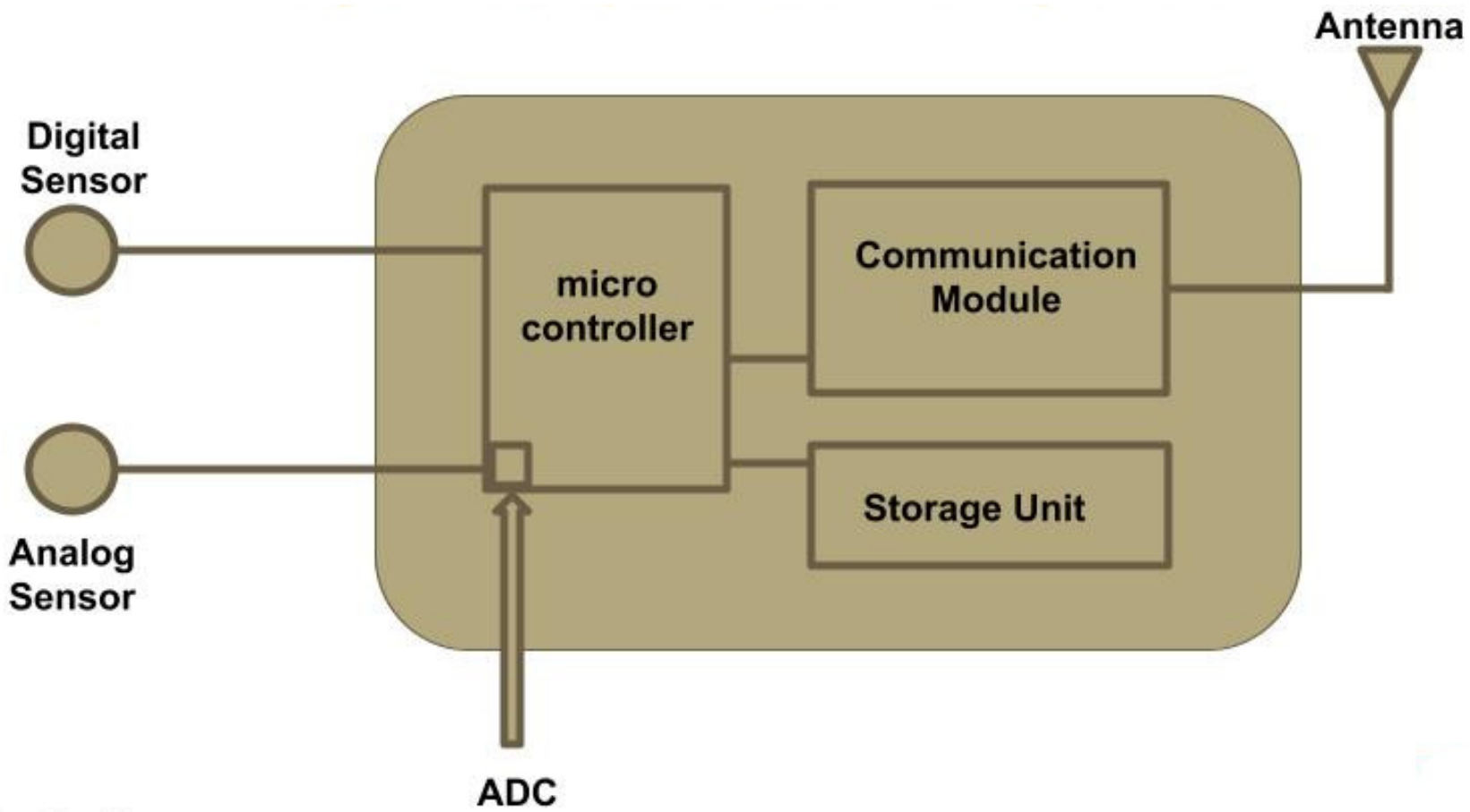
Major Challenges

IoT is interdisciplinary. Challenges in IoT are a union of challenges of individual disciplines.

Some of the major challenges are listed below:

- Security
- Connectivity
- Compatibility and longevity
- Standards
- Analysis and Action

Major Component of any IoT Device



Sensor

- Analog interface
- Digital interface
- Low power
- Serial interface

Temperature + Humidity

Moisture

Distance

Motion

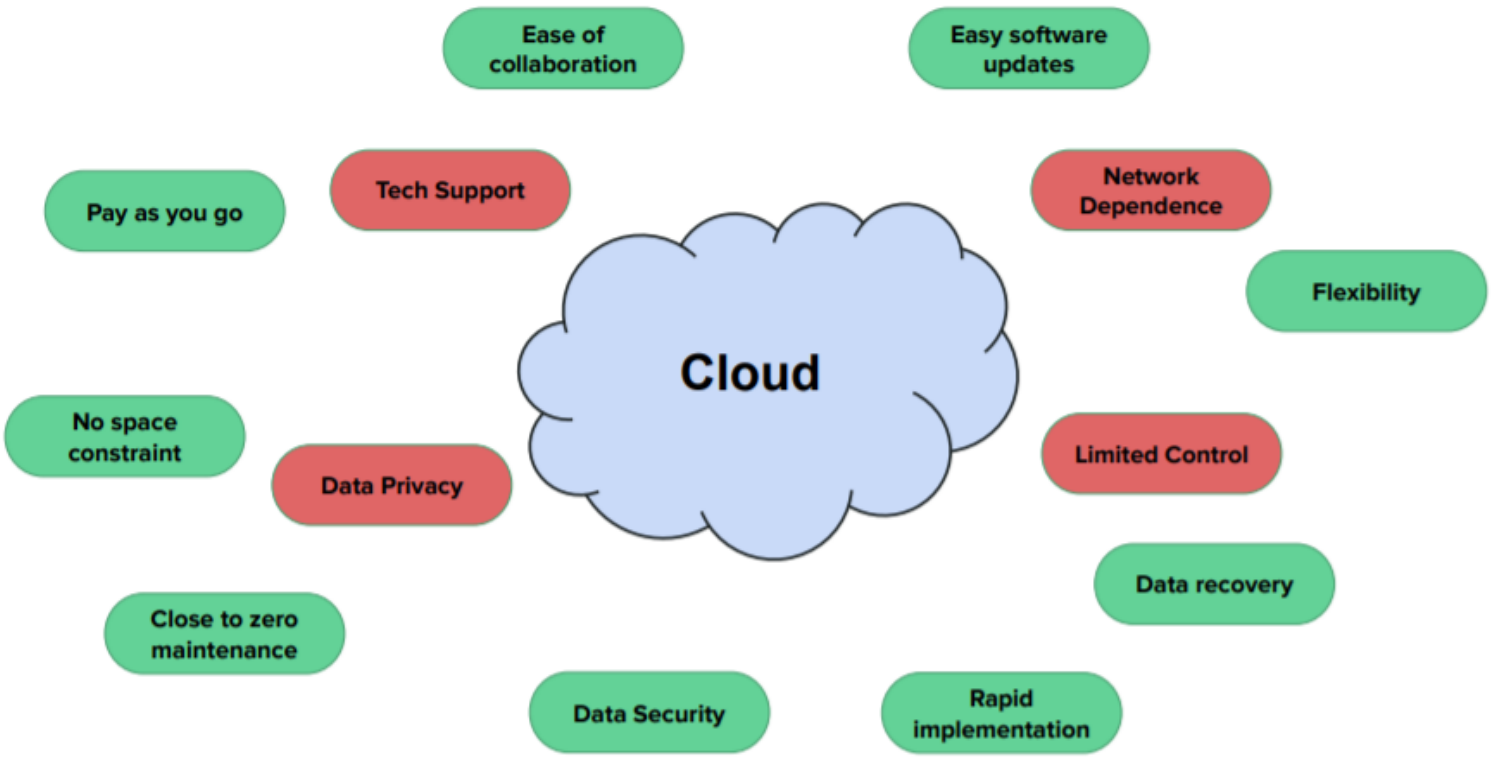
LDR

IMU

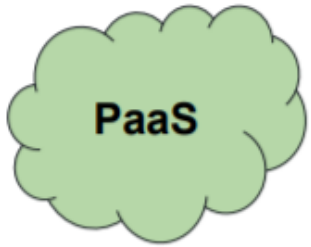
Local Processing, Storage & Communication Module

- Microcontroller/Processor
- Get sensor data
- Process data
- Storage space
- Connect to internet and send data

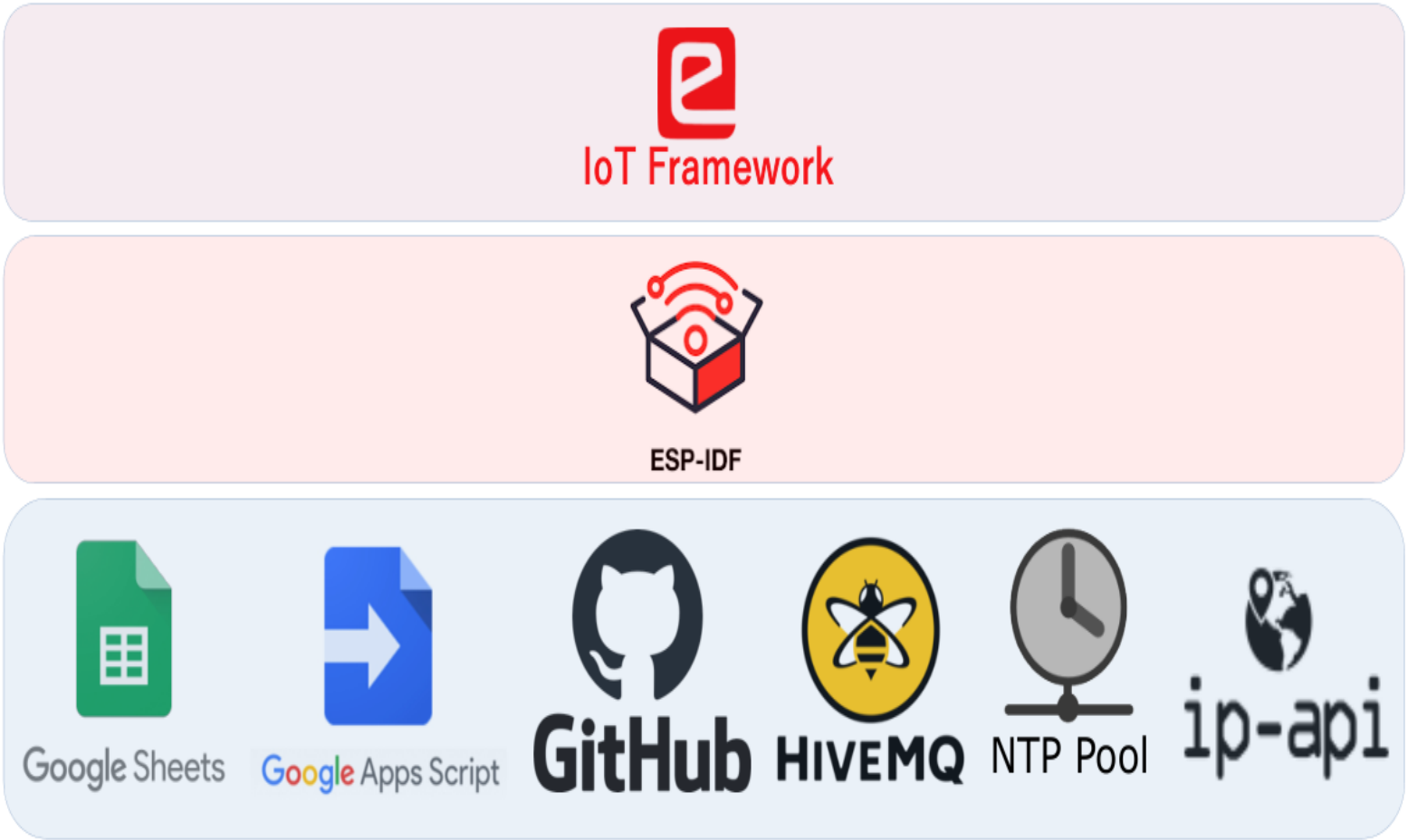
Cloud


Cloud
Ease of collaboration
Easy software updates
Pay as you go
Tech Support
Network Dependence
Flexibility
No space constraint
Data Privacy
Limited Control
Data recovery
Close to zero maintenance
Data Security
Rapid implementation

Cloud Providers Services



e-Yantra IoT Framework



Messaging Protocols for IoT

- HTTP, MQTT, CoAP
- Considerations (which protocol is good?)
  - Should run on resource-constrained devices - small footprint
  - Low power and bandwidth
  - Speed and message delivery guarantee
  - Application

Device Management & Visualization

- **Thingsboard**
- **AWS IoT**
- IBM Bluemix
- ThingSpeak

References

- https://en.wikipedia.org/wiki/Internet_of_things
- https://www.researchgate.net/publication/334195397_Access_control_in_Internet-of-Things_A_survey
- https://mobilestack.com/blog/three-software-stacks-for-iot-solutions/
- IoT Summer School - Wyliodrin (Youtube Playlist)
- Lectures by Dr. Sudip Misra, IIT KGP (NPTEL Lecture Series)
- http://www.steves-internet-guide.com/mqtt/
- https://mosquitto.org/documentation

Thank You!

Post your queries on: helpdesk@e-yantra.org