P. 1: Instructions on Course Final Project
Sec 2 – Sample/default IoT Course Projects

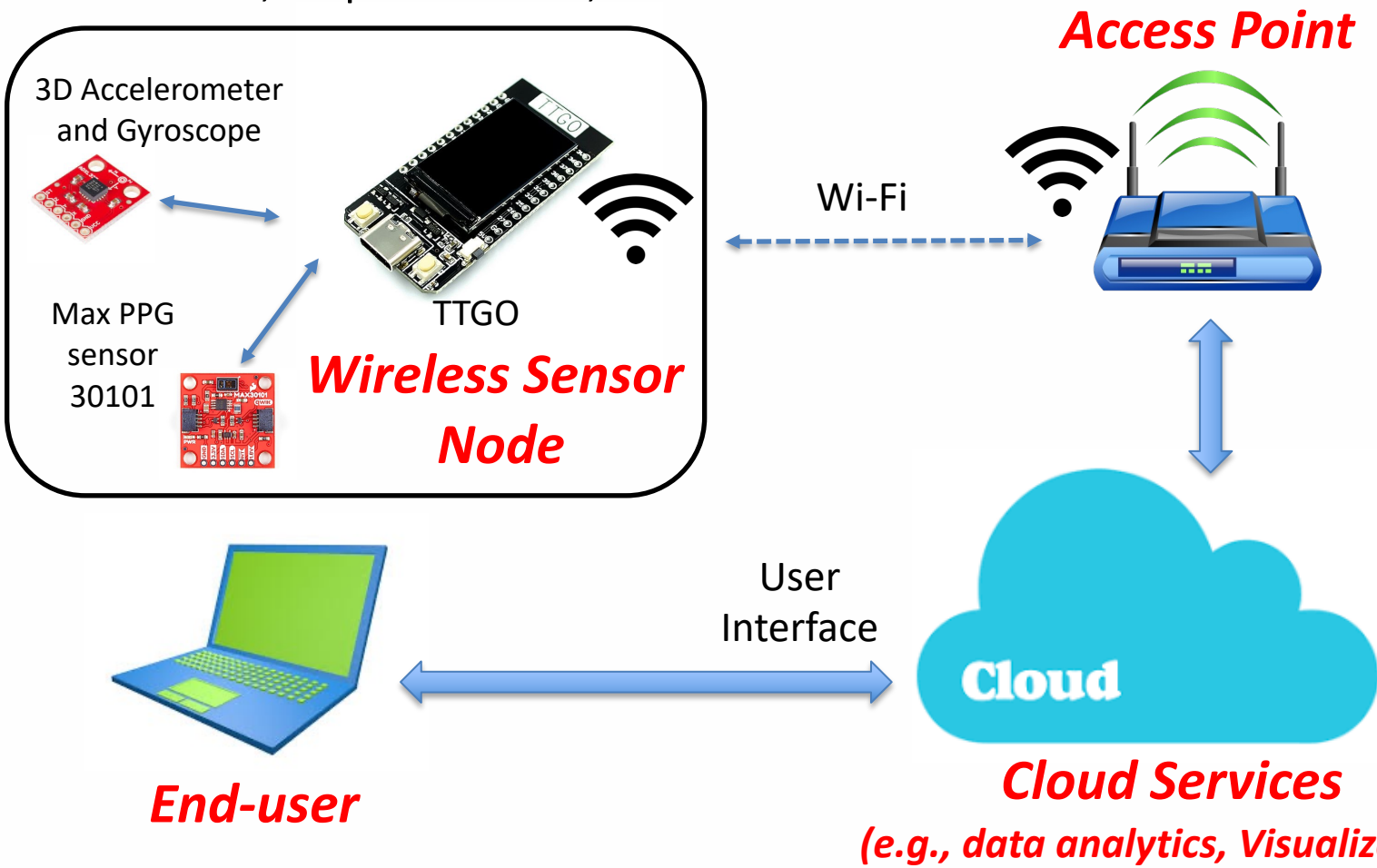
COMPSCI 147
Internet-of-Things; Software and Systems

3 DEFAULT PROJECTS TO CHOOSE FROM

1. Health Monitoring
2. Smart Building
3. Outdoor Plant Monitoring

1. HEALTH MONITORING

- Vital sign and activity monitoring
  - Step counts, sitting too long, fall detection, …
  - Heart rate, respiration rate, …

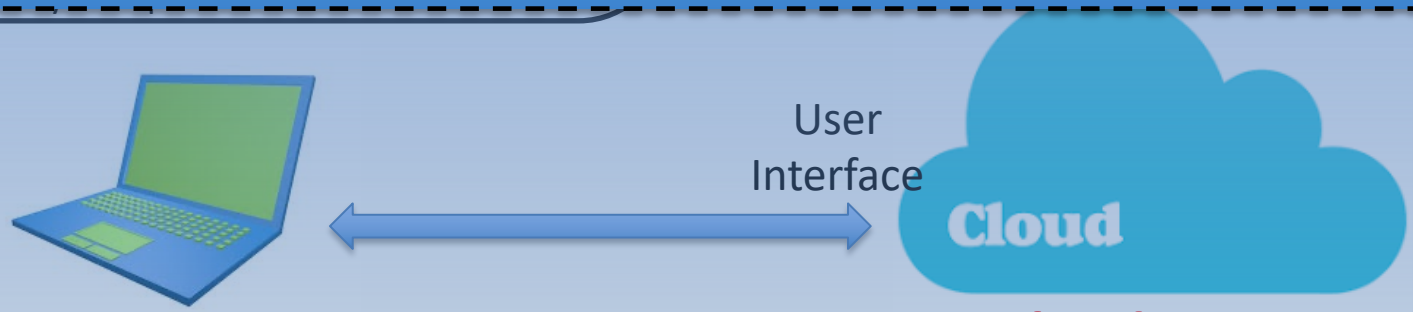


HEALTH MONITORING

- Vital sign and activity monitoring
  - Heart rate, respiration rate, …
  - Step counts, sitting too long, fall detection, …

Possible ways to make it more challenging:

- **Display colored dashboard on OLED**
- **Adding extra functionalities such as calculating SpO2 (i.e., Oxygen Saturation) using PPG, or sleep monitoring using 3D Acc and Gyr**
- **Real-time streaming at the user interface**
- **Building also a cloud-connected mobile app**
- **…**



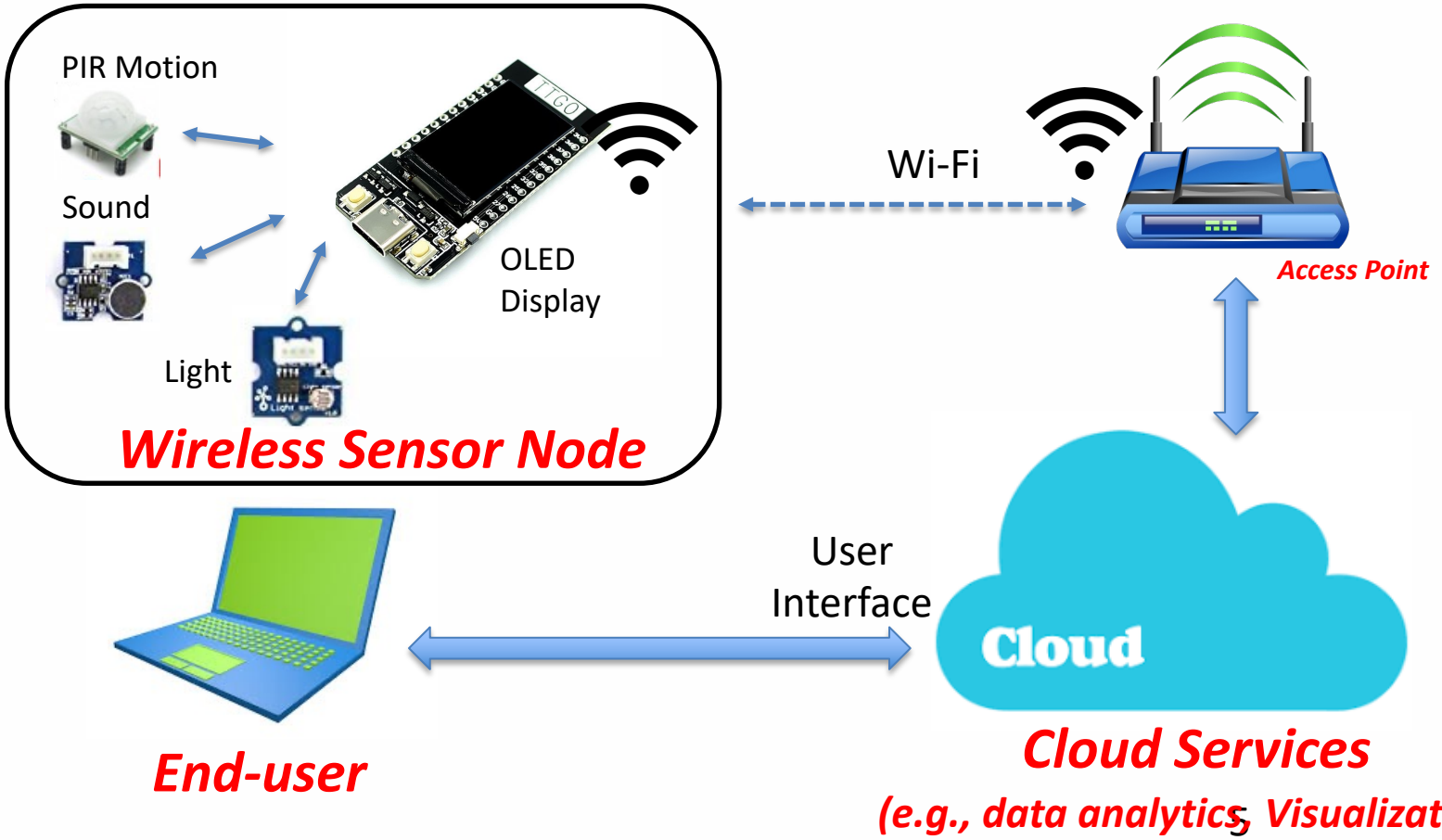
End-user

Cloud Services

(e.g., data analytics, Visualization)

2. SMART BUILDING

- Activity detection (using sound and PIR) and ambient light monitoring of buildings
  - Instead of actuators like light, show their status on an OLED. Assume at 100% usage they consume 50W Power.
  - Measure ambient activity and sound to automatically reduce electricity consumption when actuators are not required.
  - Have custom sound commands (Ex: 2claps turn on light) to control actuators.
  - Use NTP protocol to get current time from NTP servers. In the OLED interface, show average energy-usage across days of the week.

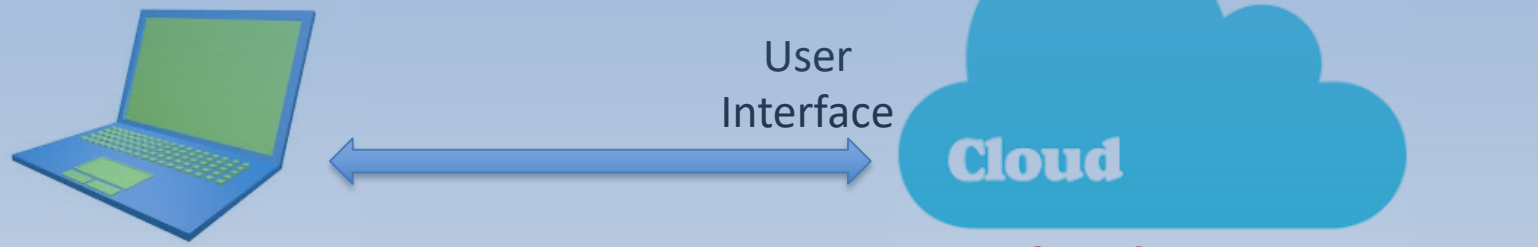


SMART BUILDING

- Activity detection (using sound and PIR) and ambient light monitoring of buildings
  - Instead of actuators like light, show their status on an LCD display. Assume at 100% usage they consume 50W Power.
  - Measure ambient activity and sound to automatically reduce electricity consumption when actuators are not required.
  - Have custom sound commands (Ex: 2claps turn on light) to control actuators.
  - Use N… days of the week.

Possible ways to make it more challenging:

- Use external (high frequency) ADC + microphone to p**erform signal processing on the audio data to understand if it is a human voice and extract control commands.**
- **Building a cloud-connected mobile app to control actuators**
- **…**



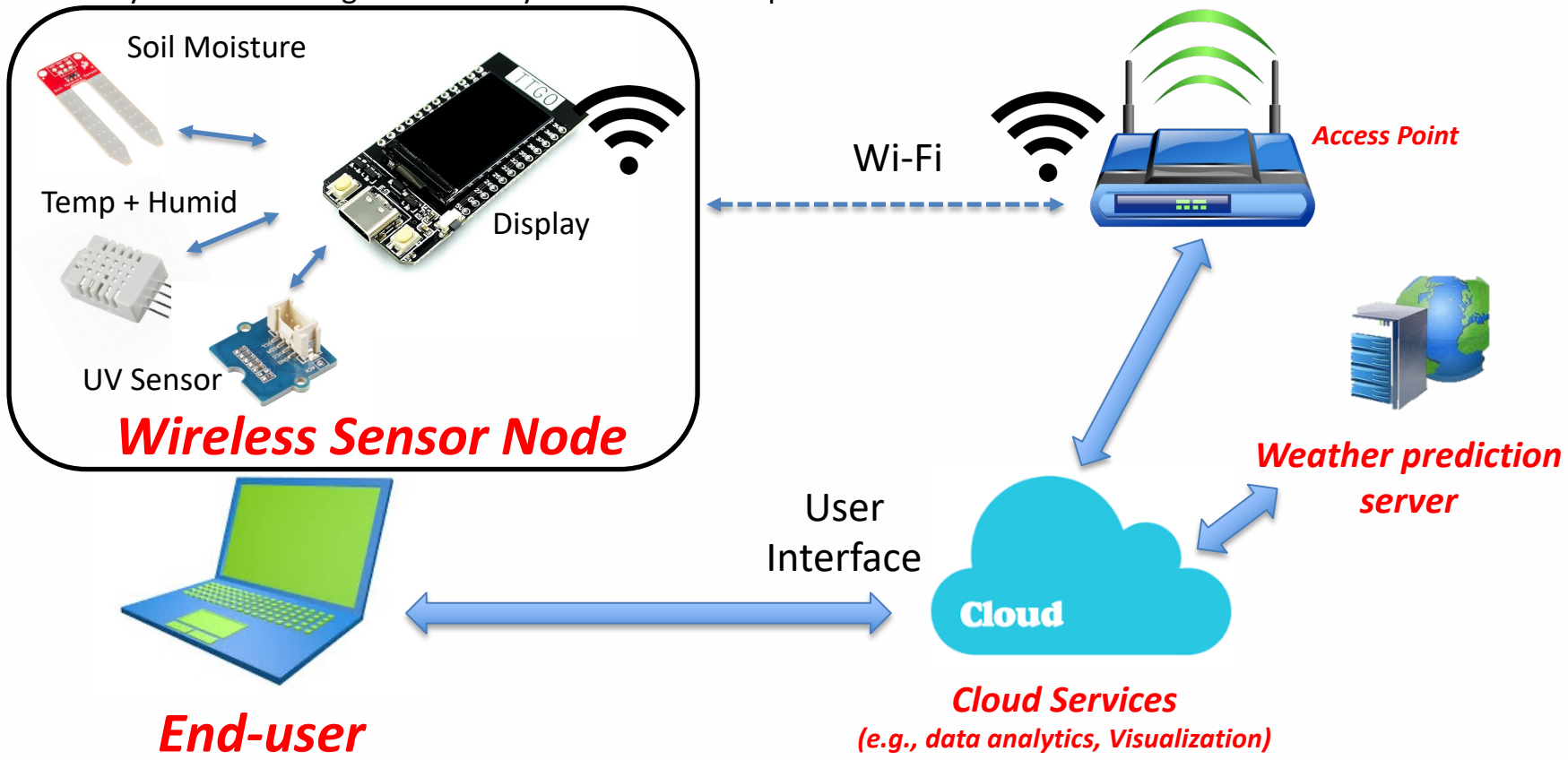
End-user

Cloud Services

(e.g., data analytics, Visualization)

3. OUTDOOR PLANT MONITORING

- Measure soil and environment characteristics
  - Use OLED to report current condition and when watering is required
  - Use UV sensor to decide if sunlight is adequate
  - Develop a composite score combing the conditions and show it in the display
  - Analyze humidity and UV data, along with weather forecast to decide with what probability watering is required. Report probability for immediate requirement, and in the next 7 days.
  - Analyze rate of change in humidity and UV to make prediction more realistic.

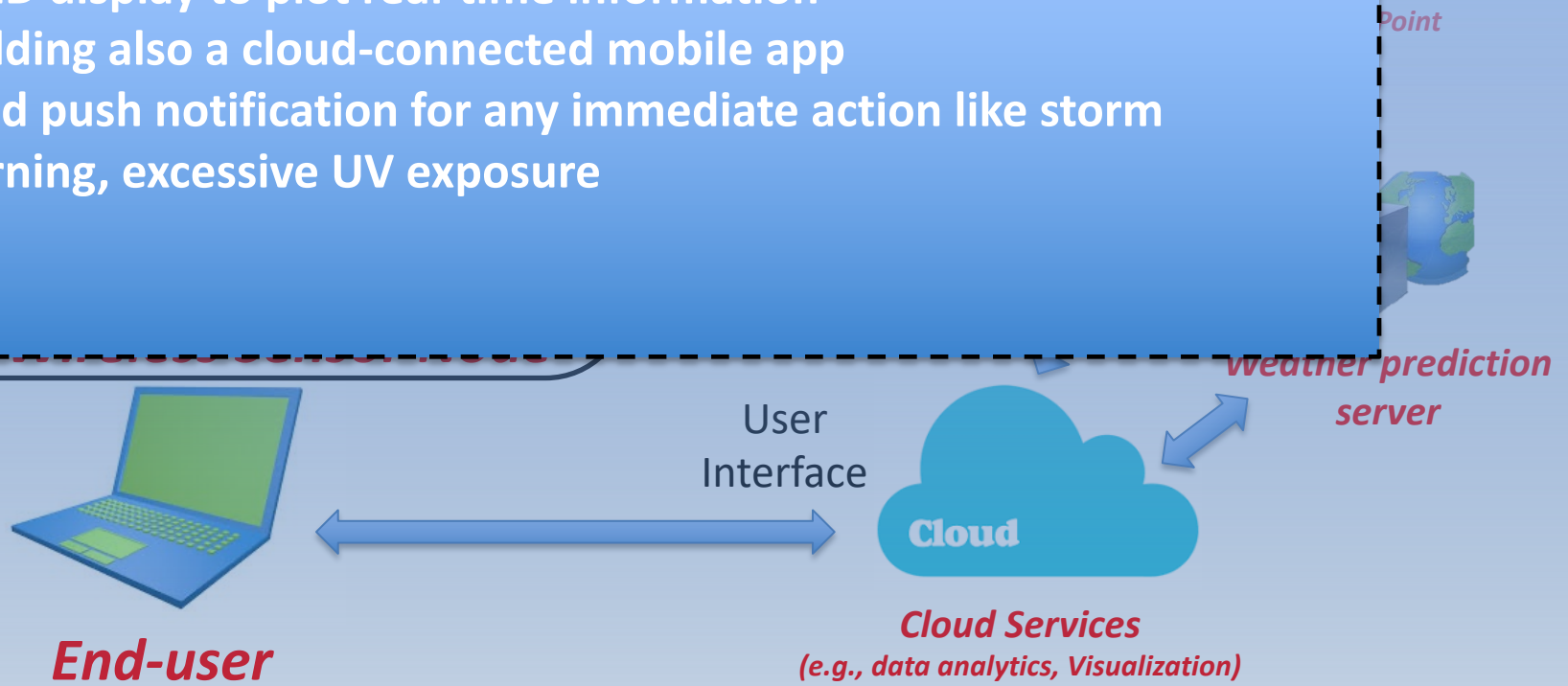


OUTDOOR PLANT MONITORING

- Measure soil and environment characteristics
  - Use LCD to report current condition and when watering is required
  - Use UV sensor to decide if sunlight is adequate
  - Develop a composite score combing the conditions and show it in the UX
  - Analyze humidity and UV data, along with weather forecast to decide with what probability watering is required. Report probability for immediate requirement, and in the next 7 days.

Possible ways to make it more challenging:

- **OLED display to plot real-time information**
- **Building also a cloud-connected mobile app**
  Send push notification for any immediate action like storm warning, excessive UV exposure



Prepare ahead

- Depending on the selected project, very likely you have to buy 1 or 2 additional sensors/actuators.
- If you have some hardware lying around, please feel free to think of innovative projects beyond what is provided as default.
- Refer to the “Project Requirements” slide to understand the 4 major components.