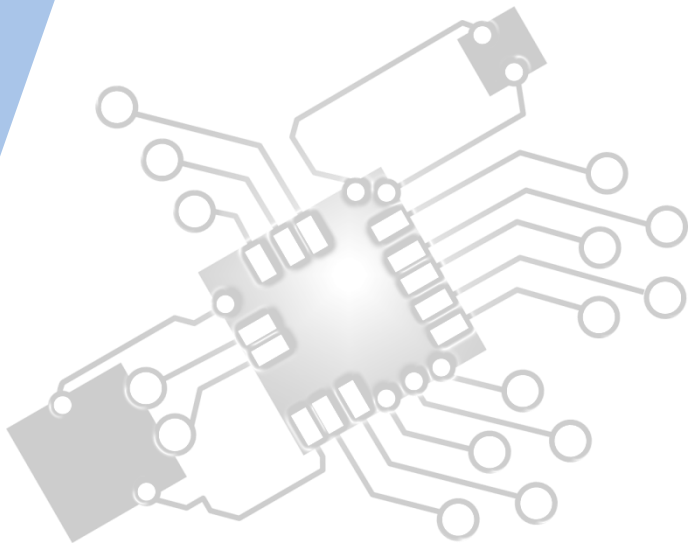
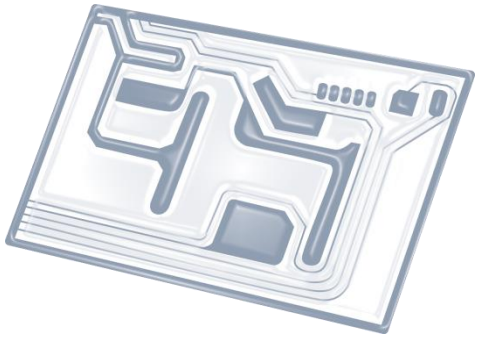
Control Systems

IB Computer Science



Content developed by
Dartford Grammar School
Computer Science Department

HL Topics 1-7, D1-4



1: System design

2: Computer Organisation

3: Networks

4: Computational thinking

5: Abstract data structures

6: Resource management

7: Control

D: OOP

HL only 7 Overview

Centralized control systems

7.1.1 Discuss a range of control systems

7.1.2 Outline the uses of microprocessors and sensor input in control systems

7.1.3 Evaluate different input devices for the collection of data in specified situations

7.1.4 Explain the relationship between a sensor, the processor and an output transducer

7.1.5 Describe the role of feedback in a control system

7.1.6 Discuss the social impacts and ethical considerations associated with the use of embedded systems

Distributed systems

7.1.7 Compare a centrally controlled system with a distributed system

7.1.8 Outline the role of autonomous agents acting within a larger system

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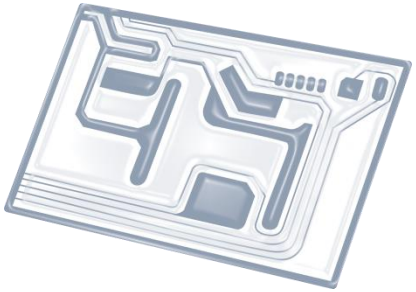
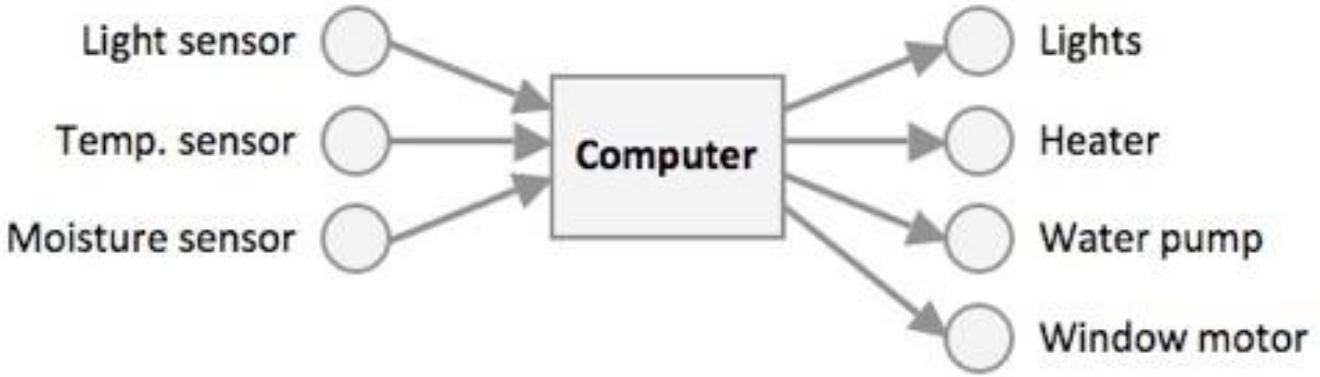


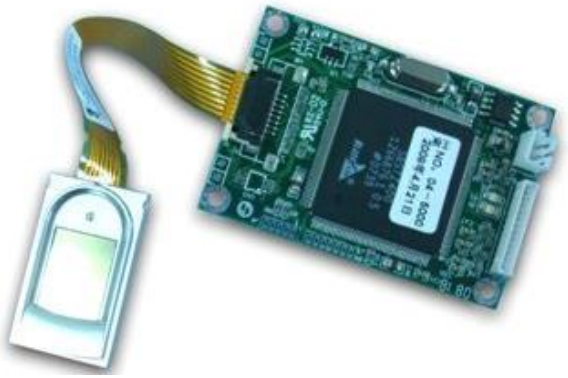
Topic 7.1.2

Outline the uses of **microprocessors** and **sensor input** in control systems

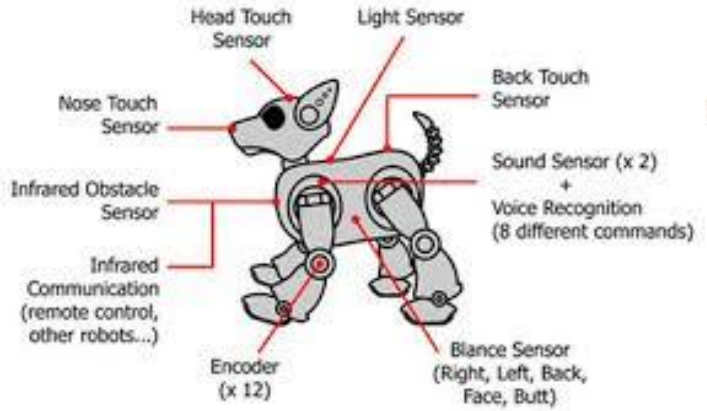


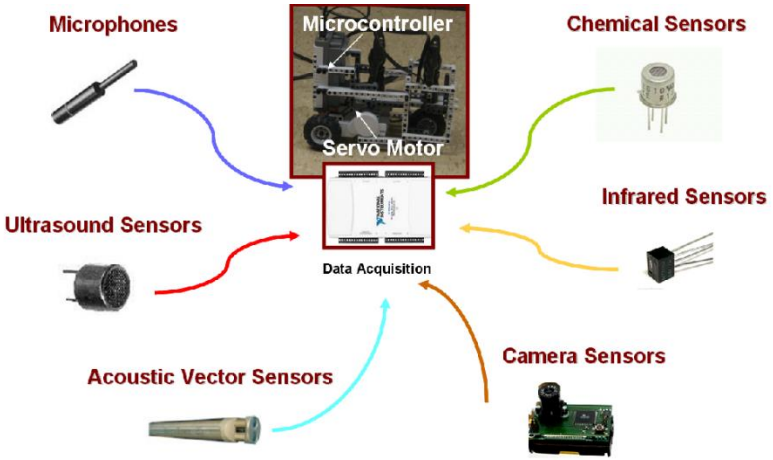
Key definitions

- **Microprocessor**: an integrated circuit that contains all the functions of a central processing unit of a computer
- **Sensor**: a device which detects or measures a physical property and records, indicates, or otherwise responds to it.

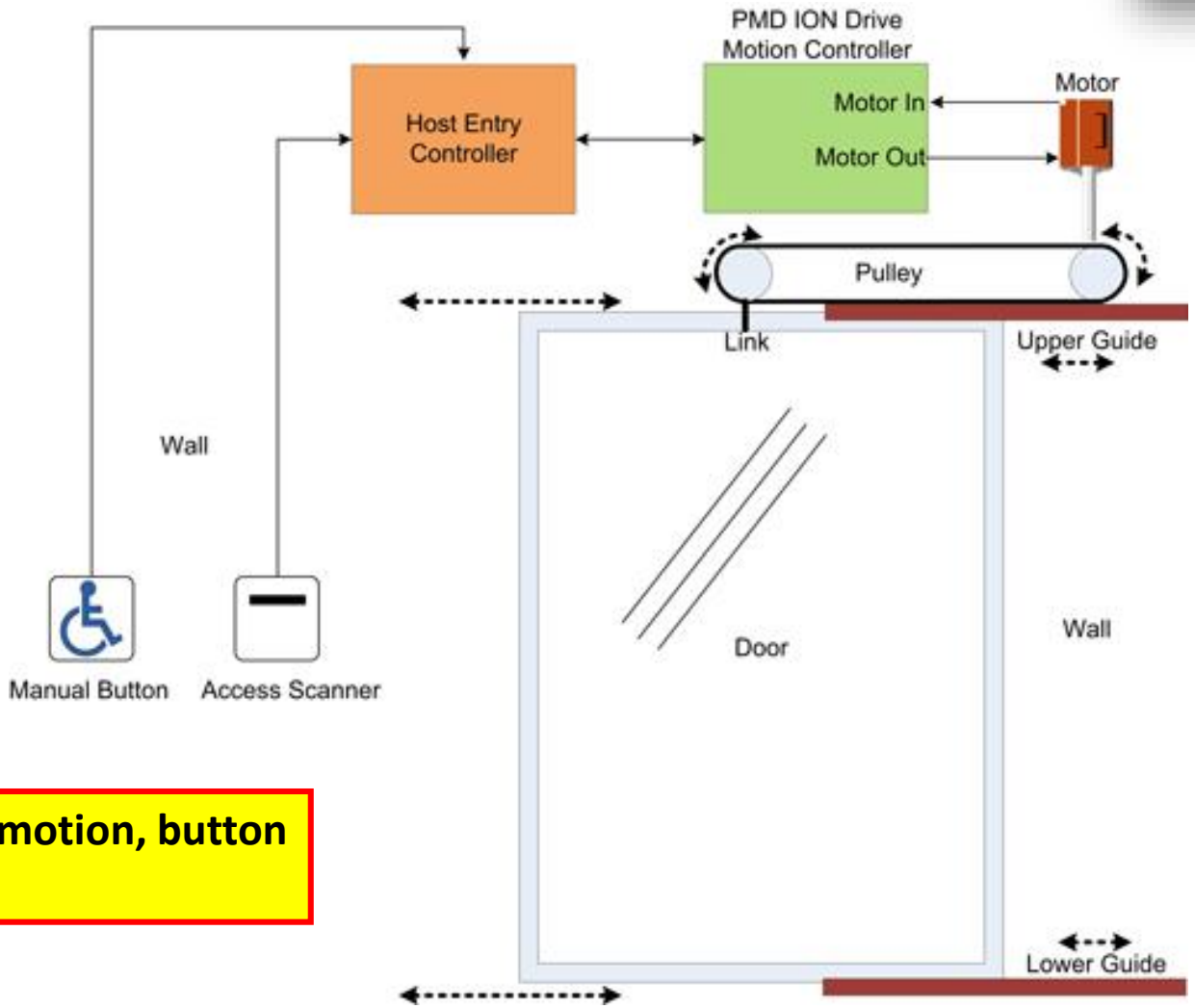


Types of sensors



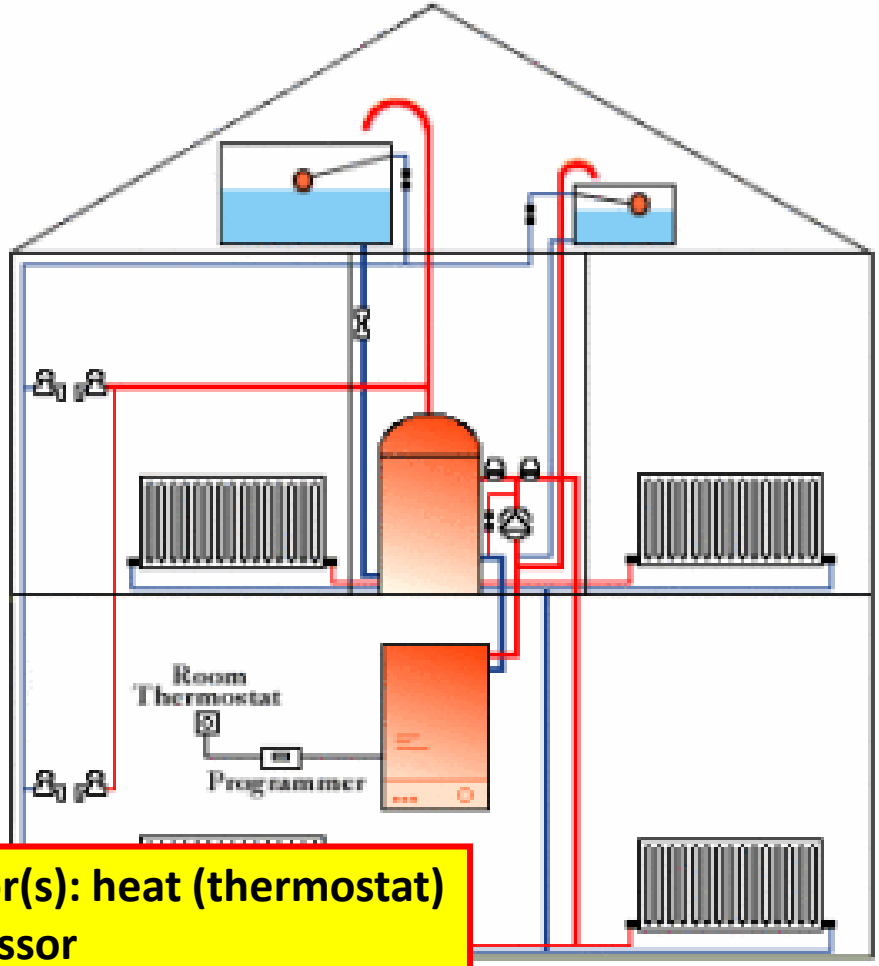


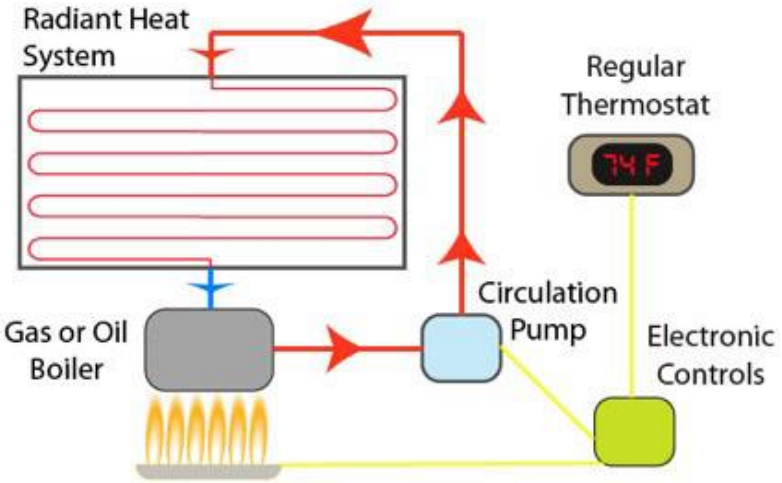
Automated doors



Sensor(s): motion, button
Processor

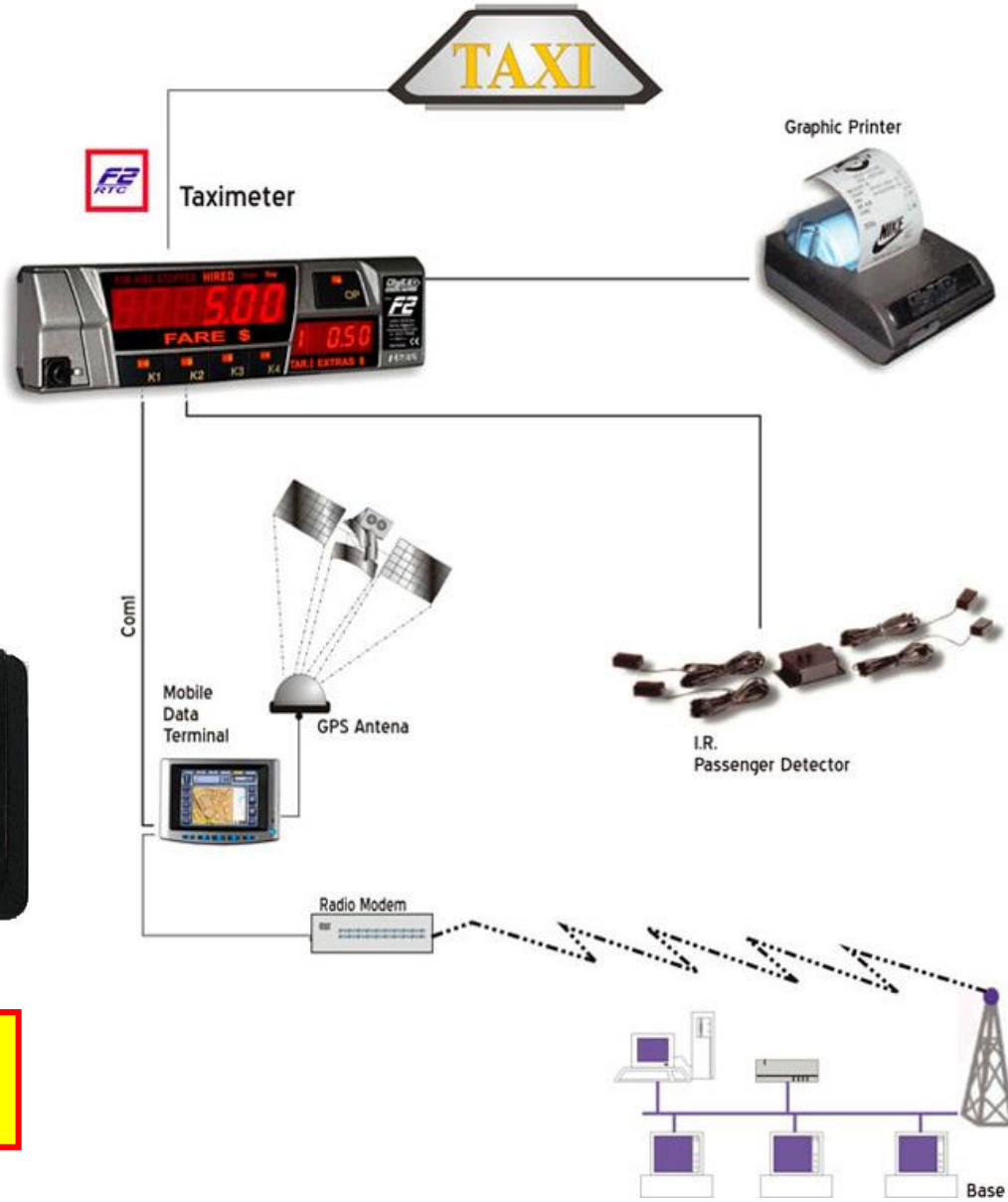
Heating system





Sensor(s): heat (thermostat)
Processor

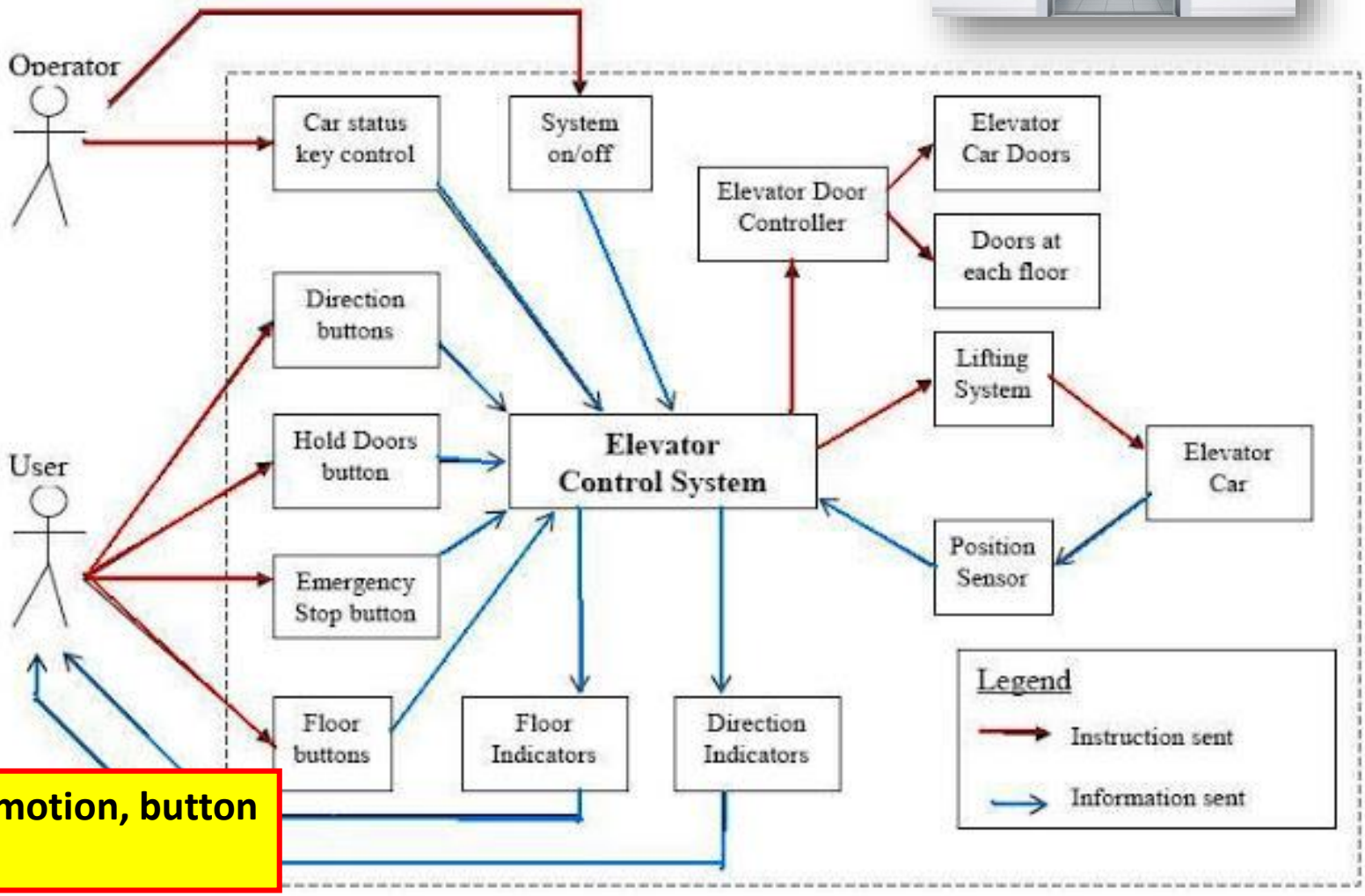
Taxi meter



Sensor(s): speedometer, button, GPS
Processor

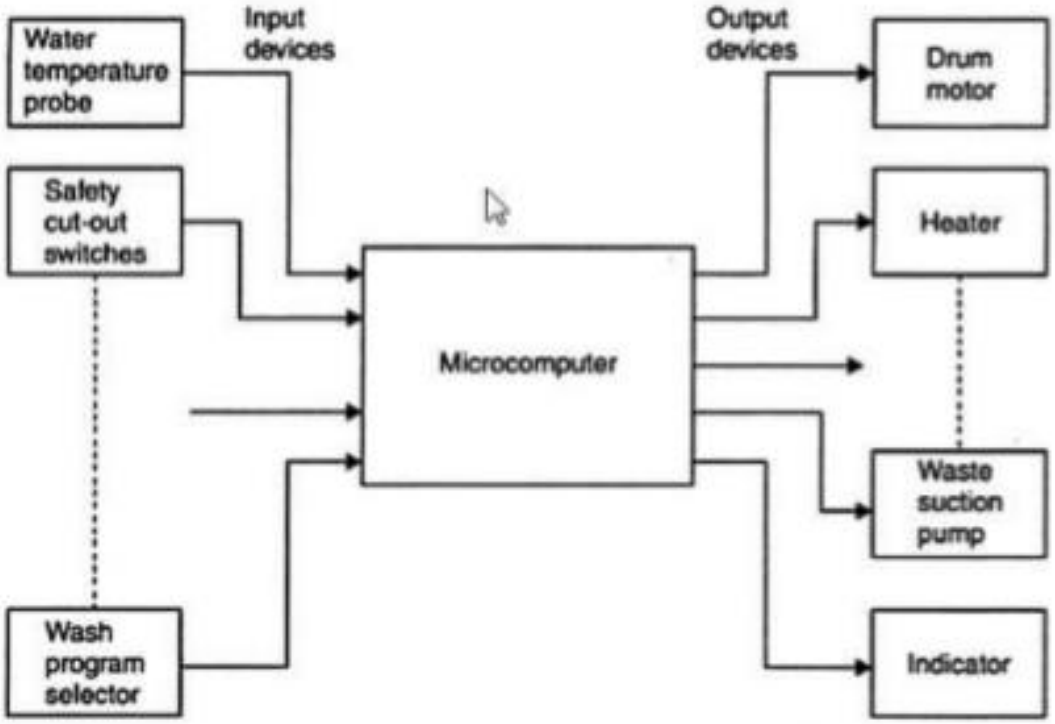
http://auto.howstuffworks.com/taxi-meter.htm

Elevator



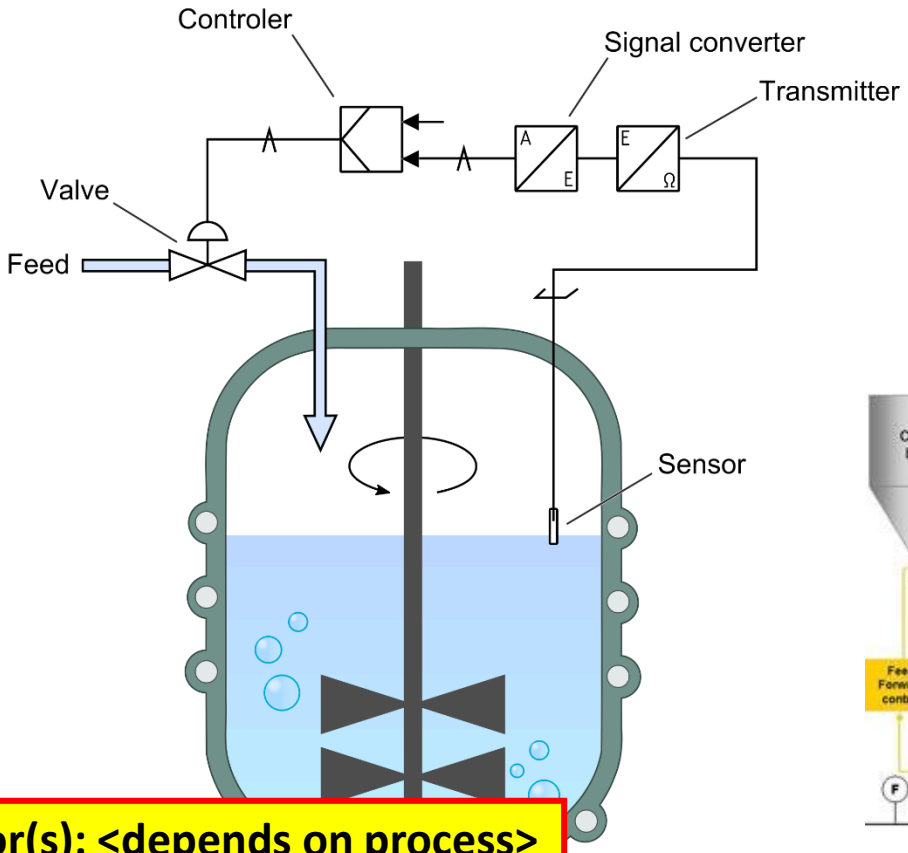
Sensor(s): motion, button
Processor

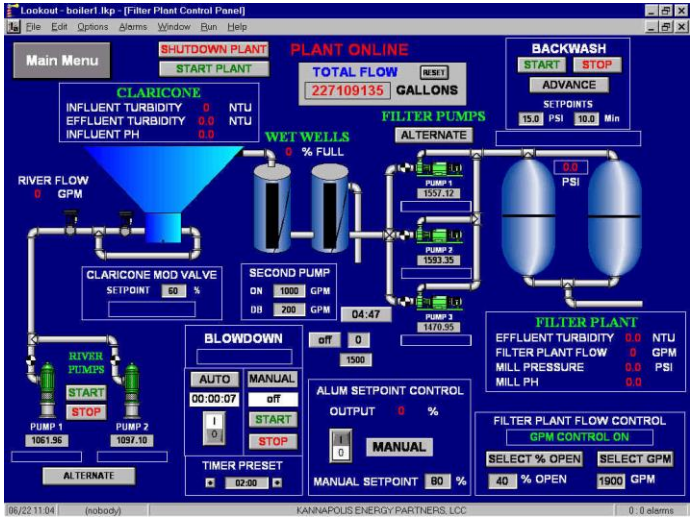
Washing machine

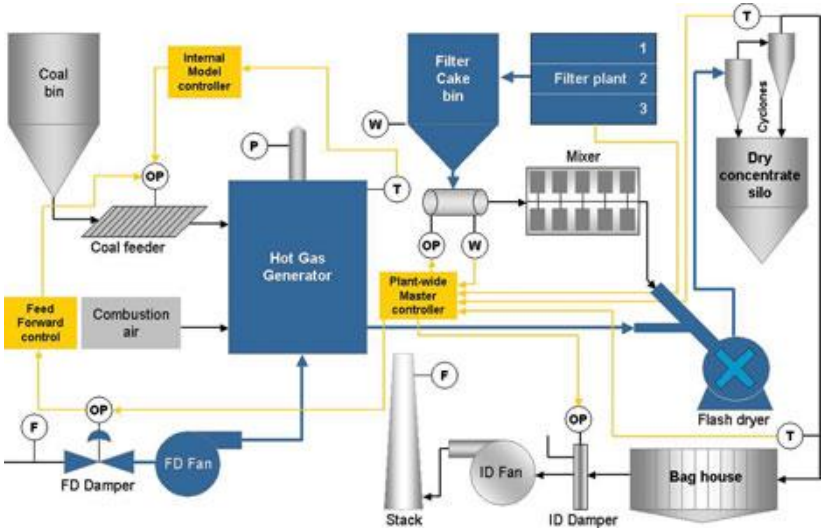


Sensor(s): heat (thermometer), timer, button
Processor

Process control

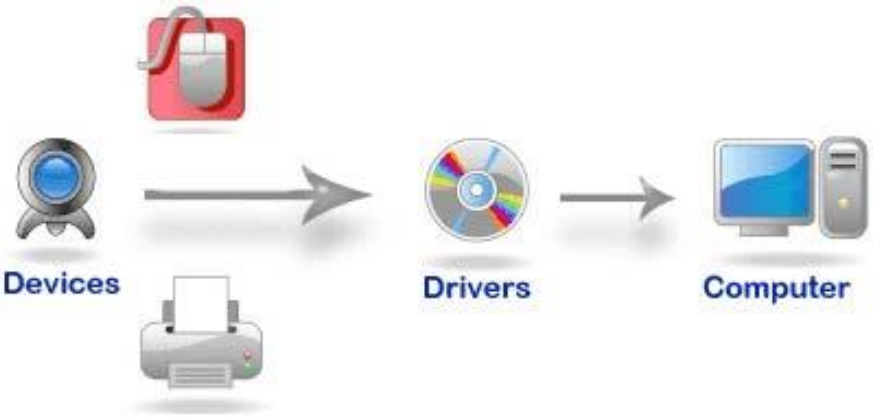




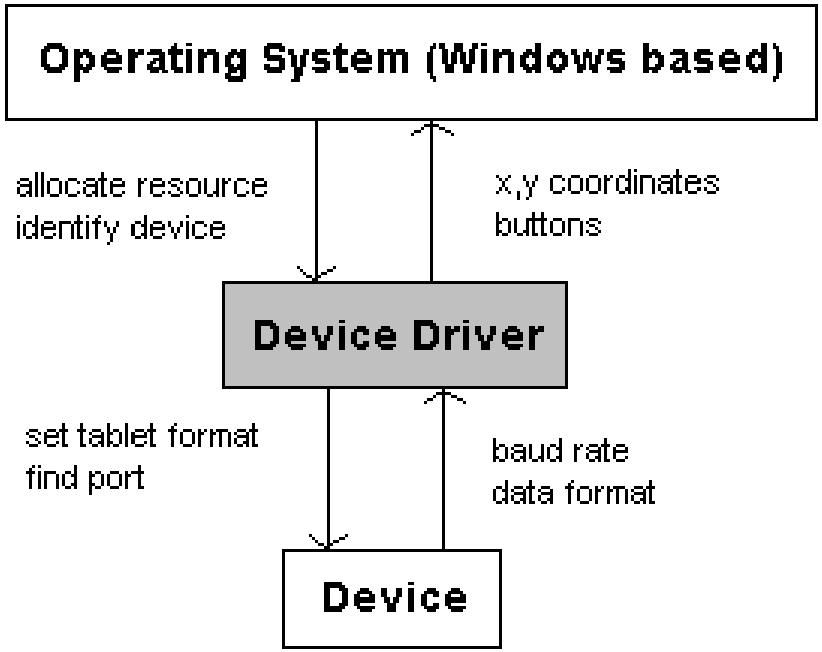


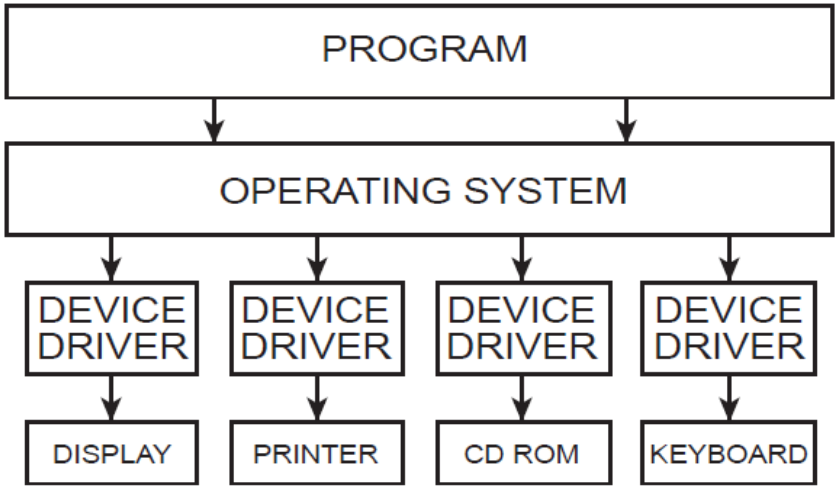
Sensor(s): <depends on process>
Processor

Device driver



Simple Device Driver Model





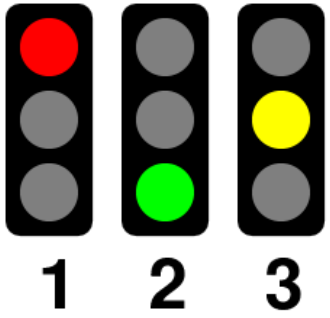
Sensor(s): <depends on device>
Processor

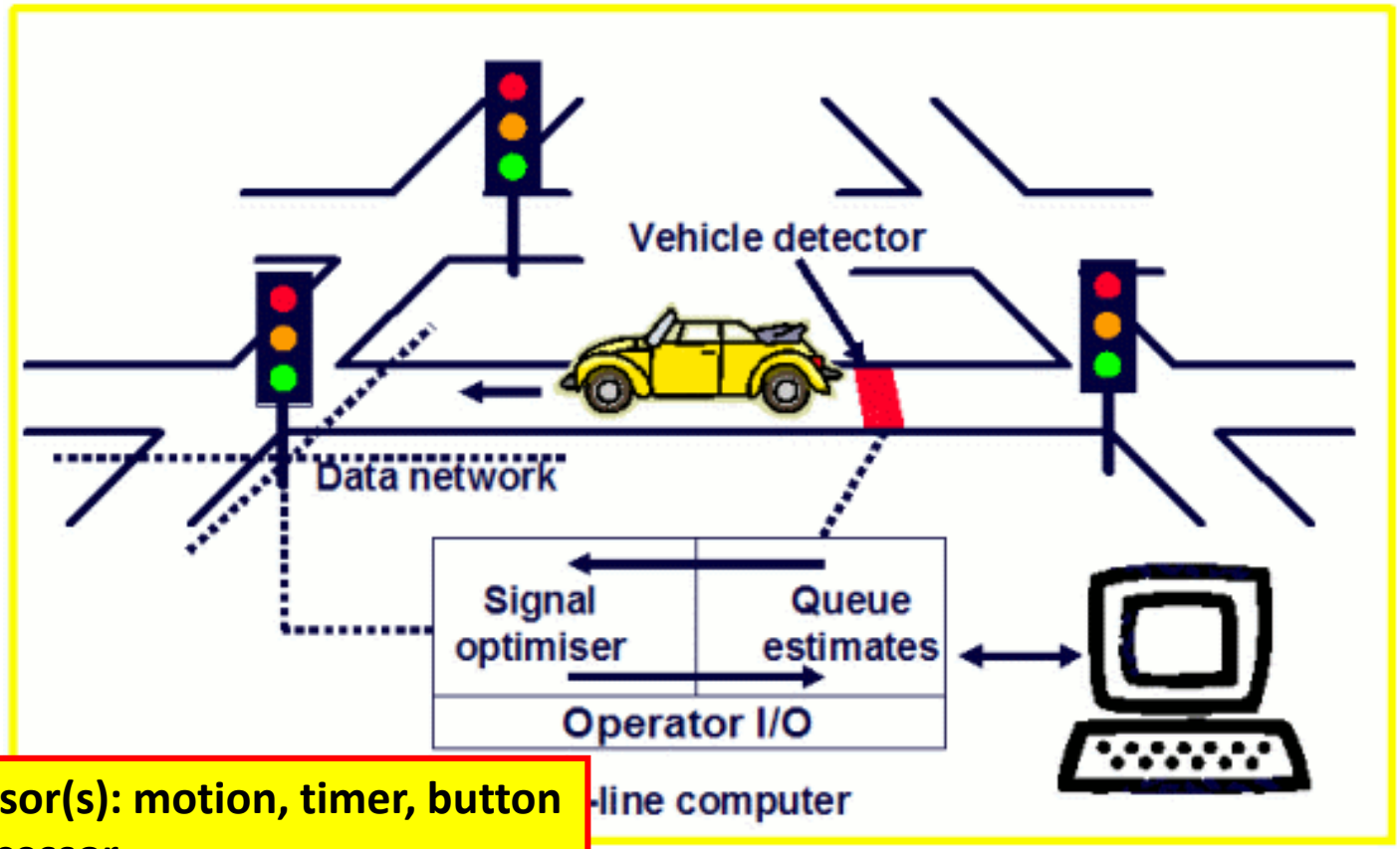
Video: GPS (Global Positioning System)

Sensor(s): GPS sensor, compass, timer
Processor

Link (YouTube): https://youtu.be/2iAgggixkO8

Traffic lights





Sensor(s): motion, timer, button
Processor