

# **Structured Electronic Design**

EE3C11

Performance and Costs  
of Physical Systems

*Anton J.M. Montagne*

# Performance and costs

## Performance and costs

The amount of information that can be processed by physical systems is limited:

# Performance and costs

The amount of information that can be processed by physical systems is limited:

Physical limitations

# Performance and costs

The amount of information that can be processed by physical systems is limited:

Physical limitations

Noise addition

# Performance and costs

The amount of information that can be processed by physical systems is limited:

Physical limitations

Noise addition

Power limitation  
and losses

# Performance and costs

The amount of information that can be processed by physical systems is limited:

Physical limitations

Noise addition

Power limitation  
and losses

Speed limitation  
(rate of change)

# Performance and costs

The amount of information that can be processed by physical systems is limited:

Physical limitations

Technological limitations

Noise addition

Power limitation  
and losses

Speed limitation  
(rate of change)



# Performance and costs

The amount of information that can be processed by physical systems is limited:

Physical limitations

Technological limitations

Noise addition

Limited availability and/or  
imperfect implementation  
of the operating principle  
in available technology

Power limitation  
and losses

Speed limitation  
(rate of change)

# Performance and costs

The amount of information that can be processed by physical systems is limited:

Physical limitations

Technological limitations

Economical constraints

Noise addition

Limited availability and/or  
imperfect implementation  
of the operating principle  
in available technology

Power limitation  
and losses

Speed limitation  
(rate of change)

# Performance and costs

The amount of information that can be processed by physical systems is limited:

Physical limitations

Technological limitations

Economical constraints

Noise addition

Limited availability and/or imperfect implementation of the operating principle in available technology

The price we need to pay for its performance

Power limitation and losses

Speed limitation (rate of change)

# Performance and costs

The amount of information that can be processed by physical systems is limited:

Physical limitations

Noise addition

Power limitation  
and losses

Speed limitation  
(rate of change)

Technological limitations

Limited availability and/or  
imperfect implementation  
of the operating principle  
in available technology

Economical constraints

The price we need to  
pay for its performance

Total result of cost factors  
such as:

# Performance and costs

The amount of information that can be processed by physical systems is limited:

## Physical limitations

Noise addition

Power limitation  
and losses

Speed limitation  
(rate of change)

## Technological limitations

Limited availability and/or  
imperfect implementation  
of the operating principle  
in available technology

## Economical constraints

The price we need to  
pay for its performance

Total result of cost factors  
such as:

Dimensions

Weight

Power consumption

# Performance and costs

The amount of information that can be processed by physical systems is limited:

Physical limitations

Technological limitations

Economical constraints

Noise addition

Limited availability and/or imperfect implementation of the operating principle in available technology

The price we need to pay for its performance

Power limitation and losses

Total result of cost factors such as:

Speed limitation (rate of change)

Dimensions

Weight

Power consumption

Quality expressed in performance measures

# Performance and costs

The amount of information that can be processed by physical systems is limited:

Physical limitations

Noise addition

Power limitation  
and losses

Speed limitation  
(rate of change)

Technological limitations

Limited availability and/or  
imperfect implementation  
of the operating principle  
in available technology

Economical constraints

The price we need to  
pay for its performance

Total result of **cost factors**  
such as:

Dimensions

Weight

Power consumption

Quality expressed in performance measures

$$\text{Figure Of Merit} = \frac{\text{Weighted product of performance measures}}{\text{Weighted product of **cost factors**}} \left[ \frac{\text{Bits}}{\text{Joule} \cdot \text{Euro}} \right]$$