

Structured Electronic Design

Outline of the Design Approach

Basic functions

Basic functions

Electronic information processing systems can be composed from a limited number of basic functions

Basic functions

Electronic information processing systems can be composed from a limited number of basic functions

The functional behavior is the idealized behavior of its implementation (embodiment, object)

Basic functions

Electronic information processing systems can be composed from a limited number of basic functions

The functional behavior is the idealized behavior of its implementation (embodiment, object)

Physical operating mechanisms form the basis for its implementation

Basic functions

Electronic information processing systems can be composed from a limited number of basic functions

The functional behavior is the idealized behavior of its implementation (embodiment, object)

Physical operating mechanisms form the basis for its implementation

Amplification is an (important) analog information processing function

Basic functions

Electronic information processing systems can be composed from a limited number of basic functions

The functional behavior is the idealized behavior of its implementation (embodiment, object)

Physical operating mechanisms form the basis for its implementation

Amplification is an (important) analog information processing function

Amplifiers are the physical objects that perform this function

Basic functions

Electronic information processing systems can be composed from a limited number of basic functions

The functional behavior is the idealized behavior of its implementation (embodiment, object)

Physical operating mechanisms form the basis for its implementation

Amplification is an (important) analog information processing function

Amplifiers are the physical objects that perform this function

Other basic functions and their associated objects are listed in Chapter 1

Basic functions

Electronic information processing systems can be composed from a limited number of basic functions

The functional behavior is the idealized behavior of its implementation (embodiment, object)

Physical operating mechanisms form the basis for its implementation

Amplification is an (important) analog information processing function

Amplifiers are the physical objects that perform this function

Other basic functions and their associated objects are listed in Chapter 1

Performance limitations

Performance limitations

The amount of information that can be processed by a physical system is limited

Performance limitations

The amount of information that can be processed by a physical system is limited

Fundamental physical limitations:

Performance limitations

The amount of information that can be processed by a physical system is limited

Fundamental physical limitations:

Addition of noise

Performance limitations

The amount of information that can be processed by a physical system is limited

Fundamental physical limitations:

Addition of noise

Limitation of the power of a signal

Performance limitations

The amount of information that can be processed by a physical system is limited

Fundamental physical limitations:

Addition of noise

Limitation of the power of a signal

Limitation of the rate of change of a signal

Performance limitations

The amount of information that can be processed by a physical system is limited

Fundamental physical limitations:

- Addition of noise

- Limitation of the power of a signal

- Limitation of the rate of change of a signal

Technological limitations:

Performance limitations

The amount of information that can be processed by a physical system is limited

Fundamental physical limitations:

- Addition of noise

- Limitation of the power of a signal

- Limitation of the rate of change of a signal

Technological limitations:

- Imperfections in the physical operating principle

Performance limitations

The amount of information that can be processed by a physical system is limited

Fundamental physical limitations:

- Addition of noise

- Limitation of the power of a signal

- Limitation of the rate of change of a signal

Technological limitations:

- Imperfections in the physical operating principle

Cost factors

Cost factors

The processing of information is not free of costs (resources)

Cost factors

The processing of information is not free of costs (resources)

Operational cost factors:

Cost factors

The processing of information is not free of costs (resources)

Operational cost factors:

Time

Cost factors

The processing of information is not free of costs (resources)

Operational cost factors:

Time

Energy

Cost factors

The processing of information is not free of costs (resources)

Operational cost factors:

Time

Energy

Space

Cost factors

The processing of information is not free of costs (resources)

Operational cost factors:

Time

Energy

Space

Matter

Cost factors

The processing of information is not free of costs (resources)

Operational cost factors:

Time

Energy

Space

Matter

Error reduction techniques

Error reduction techniques

The performance-to-costs ratio of a system can be improved through application of a limited number of error reduction techniques

Error reduction techniques

The performance-to-costs ratio of a system can be improved through application of a limited number of error reduction techniques

Maintain the way the information
is embedded in the signal (data)

Error reduction techniques

The performance-to-costs ratio of a system can be improved through application of a limited number of error reduction techniques

Maintain the way the information is embedded in the signal (data)

Reduction of imperfections of the function implementations

Error reduction techniques

The performance-to-costs ratio of a system can be improved through application of a limited number of error reduction techniques

Maintain the way the information is embedded in the signal (data)

Reduction of imperfections of the function implementations

Compensation

Error reduction techniques

The performance-to-costs ratio of a system can be improved through application of a limited number of error reduction techniques

Maintain the way the information is embedded in the signal (data)

Reduction of imperfections of the function implementations

Compensation

Error-feedforward

Error reduction techniques

The performance-to-costs ratio of a system can be improved through application of a limited number of error reduction techniques

Maintain the way the information is embedded in the signal (data)

Reduction of imperfections of the function implementations

Compensation

Error-feedforward

Negative feedback

Error reduction techniques

The performance-to-costs ratio of a system can be improved through application of a limited number of error reduction techniques

Maintain the way the information is embedded in the signal (data)

Change of the way the information is embedded in the signal (data)

Reduction of imperfections of the function implementations

Compensation

Error-feedforward

Negative feedback

Error reduction techniques

The performance-to-costs ratio of a system can be improved through application of a limited number of error reduction techniques

Maintain the way the information is embedded in the signal (data)

Change of the way the information is embedded in the signal (data)

Reduction of imperfections of the function implementations

Reduction of the susceptibility of the signal for system imperfections

Compensation

Error-feedforward

Negative feedback

Error reduction techniques

The performance-to-costs ratio of a system can be improved through application of a limited number of error reduction techniques

Maintain the way the information is embedded in the signal (data)

Reduction of imperfections of the function implementations

Compensation

Error-feedforward

Negative feedback

Change of the way the information is embedded in the signal (data)

Reduction of the susceptibility of the signal for system imperfections

Modulation

Error reduction techniques

The performance-to-costs ratio of a system can be improved through application of a limited number of error reduction techniques

Maintain the way the information is embedded in the signal (data)

Reduction of imperfections of the function implementations

Compensation

Error-feedforward

Negative feedback

Change of the way the information is embedded in the signal (data)

Reduction of the susceptibility of the signal for system imperfections

Modulation

Digitization

Error reduction techniques

The performance-to-costs ratio of a system can be improved through application of a limited number of error reduction techniques

Maintain the way the information is embedded in the signal (data)

Change of the way the information is embedded in the signal (data)

Reduction of imperfections of the function implementations

Reduction of the susceptibility of the signal for system imperfections

Compensation

Modulation

Error-feedforward

Digitization

Negative feedback

Orthogonalization

Orthogonalization

Straightforward, subsequent design of the various performance aspects

Orthogonalization

Straightforward, subsequent design of the various performance aspects

Requires knowledge of performance limitations in the implementation technology

Orthogonalization

Straightforward, subsequent design of the various performance aspects

Requires knowledge of performance limitations in the implementation technology

Requires knowledge of the error reduction capabilities of the error reduction techniques

Orthogonalization

Straightforward, subsequent design of the various performance aspects

Requires knowledge of performance limitations in the implementation technology

Requires knowledge of the error reduction capabilities of the error reduction techniques

In this course:

Orthogonalization

Straightforward, subsequent design of the various performance aspects

Requires knowledge of performance limitations in the implementation technology

Requires knowledge of the error reduction capabilities of the error reduction techniques

In this course:

Technology:

Orthogonalization

Straightforward, subsequent design of the various performance aspects

Requires knowledge of performance limitations in the implementation technology

Requires knowledge of the error reduction capabilities of the error reduction techniques

In this course:

Technology:

PCAs with operational amplifiers
and passive components

Orthogonalization

Straightforward, subsequent design of the various performance aspects

Requires knowledge of performance limitations in the implementation technology

Requires knowledge of the error reduction capabilities of the error reduction techniques

In this course:

Technology:

PCAs with operational amplifiers
and passive components

Error reduction technique:

Orthogonalization

Straightforward, subsequent design of the various performance aspects

Requires knowledge of performance limitations in the implementation technology

Requires knowledge of the error reduction capabilities of the error reduction techniques

In this course:

Technology:

PCAs with operational amplifiers
and passive components

Error reduction technique:

Negative feedback

Orthogonalization

Straightforward, subsequent design of the various performance aspects

Requires knowledge of performance limitations in the implementation technology

Requires knowledge of the error reduction capabilities of the error reduction techniques

In this course:

Technology:

PCAs with operational amplifiers
and passive components

Error reduction technique:

Negative feedback