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Department for  
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## **FOREIGN LANGUAGE (PROFESSIONAL) ENGLISH**

Methodological instructions for performing term paper assignments for Master  
course students of all specialties

Almaty 2017

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These guidelines are intended for performing term paper assignments for Master course students of all specialties. The main focus is on working with authentic, professionally - oriented texts to translate them and formulate a lexical minimum. Key-patterns and recommendations for writing annotations on texts are given.

Reviewer: Associate Professor Nurkhodzhaeva H.A.

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## Unit 1

Self-study assignment:

- 1) Read and translate the text.

### **Intelligent UK launches flexible RF and microwave support service**

*Intelligent RF & Microwave Solutions, a specialist in RF and microwave services, has announced the launch of a flexible support service to meet both the test equipment and skills requirements of the UK RF and microwave industry.*

“A shortage of skills and resources is one of the biggest challenges facing the industry today”, said Oren Hagai, the president of Interlligent. “The rapid growth in wireless communications and the advent of 5G, the IoT and the Connected Car mean that even companies without a background in RF technology are facing the need to acquire RF skills, and microwave engineers need to learn how to work at millimetric frequencies. We believe that the electronics community is looking for a more personal approach to meeting these challenges, and this includes sourcing test equipment as well as training solutions”.

Intelligent UK provides test equipment for both rental and sale, along with advanced technical training courses and support services that are tailored to meet the customer’s specific needs. *Interlligent’s integrated support service is unique in the industry, where there are many companies focusing on either test equipment or training but none offering this type of unified platform.*

*This specialized personal approach means that Interlligent UK works with companies to identify their test and measurement challenges and supply the best solution – not just the equipment itself but also accessories and focused training, backed up with ongoing support and service.* Because Interlligent’s engineers are in daily contact with R&D teams and are familiar with a wide range of applications, they are well-placed to understand customers’ training needs, and can build customized courses to suit these requirements.

*The shortage of qualified electronics engineers in the UK, particularly those with RF skills, has been well-documented.* It is forecast that tens of thousands of new engineers will be needed in the next ten years to meet the ongoing demand for new product development. Engineers already in the industry need to continually update their skills –for example digital designers need to learn about analogue and RF technology, while RF designers are expected also to understand the principles of digital design. With the introduction of 5G, engineers will need the requisite skills to integrate off-the shelf millimetre-wave components, and this may be a steep learning curve for those used to working at lower frequencies.

*Companies addressing these new technologies will also need access to the latest measurement technology, while wishing to minimize their capital outlay.* Interlligent has built up an international reputation as a provider of RF test equipment rentals and support services, and its UK facility offers an extensive

inventory of test equipment and accessories, backed by first-class RF engineering support and flexible business plans to suit customers' needs.

“Our customers expect a specialist RF and microwave service provider to have the expertise and knowledge to provide the most suitable, cost-effective solution backed up by first-class ongoing support”, said Oren Hagai. “Our philosophy is to provide not just a box but an integrated resource package that includes test equipment, training and technical support and to foster an ongoing relationship that continues to fulfill their resourcing needs”.

- 2) Prepare the glossary (15 terms).
- 3) Write an abstract (see Unit 11).
- 4) Identify Tense and Voice in highlighted sentences.

## Unit 2

Self-study assignment:

- 1) Read and translate the text.

### **EU's TULIPP project targets embedded systems for image processing**

*The TULIPP (Towards Ubiquitous Low-power Image Processing Platforms) project, a new initiative targeting the development of high performance, energy-efficient embedded systems for the growing range of increasingly complex image processing applications, has been announced. The Tulipp project is being funded with nearly €4 million from Horizon 2020, the European Union's biggest research and innovation program to date.*

TULIPP will focus on developing a reference platform for vision-based system designers that defines a set of guidelines for the selection of relevant combinations of computing and communication resources to be instantiated in the platform while minimizing energy resources and reducing development costs and time-to-market.

*These guidelines will tackle the design issue complexities surrounding the next generation of embedded image processing applications that are emerging in a range of industry sectors.* From an applications perspective, these complexities relate to the need for guaranteed, high performance computing power coupled with greater power efficiency within the context of embedded design requirements. In terms of the available target silicon, software designers must be able to deal easily with parallel programming issues presented by multicore devices as well as the heterogeneity of different programming models and APIs.

*The guidelines for the reference platform define what a piece of hardware or software must look like in order to be TULIPP - compliant.* As part of the project, Tulipp will use these guidelines to develop an instance of the TULIPP reference platform comprising a scalable low-power board designed to meet typical embedded systems requirements of size, weight and power (SWaP), a low-power

operating system and image processing libraries, and an energy-aware tool chain. In addition, TULIPP will develop three use case demonstrators as proof-of-concept and validation of the reference platform. These use cases will cover different industrial domains with emerging complex image processing requirements and will include: a medical imaging surgical X-ray system designed to significantly reduce radiation doses by 75%; a smart automotive embedded vision system for advanced driver assistance (ADAS) that, in addition to the low-level image processing, intelligently interprets what is on the images to deliver safer driving experiences; and an embedded image processing system to create smart drones and Unmanned Aerial Vehicles (UAVs) for the intelligent search and rescue of survivors at disaster incidents.

By the end of the project in 2018, TULIPP expects its work to extend the peak performance per Watt of image processing applications by 4x and average performance per Watt by 10x. *Beyond the official completion of the TULIPP project, it is expected that this will be extended to 100x and 200x by 2023.*

The TULIPP consortium members are drawn from both industry and academia and include Thales (France) as the project lead and coordinator, with Efficient Innovation SAS (France), Fraunhofer IOSB (Germany), Hipperos (Belgium), Norges Teknisk-Naturvitenskapelige Universitet (Norway), Ruhr-Universität Bochum (Germany), Sundance Multiprocessor Technology (United Kingdom), and Synective Labs (Sweden), providing the additional inter-disciplinary expertise required to make the project a success.

TULIPP will work closely with various standards organizations to propose the formal adoption, on an industry-wide basis, of new standards derived from its reference platform. TULIPP is also seeking to establish an Advisory Board of vision-based systems stakeholders to review the work of the project on a progressive basis and help extend the reach of image processing applications into new and additional industry sectors.

“Image processing applications stretch across an increasingly broad range of industrial domains and are reaching a higher level of complexity than ever before”, said Philippe Millet of Thales and TULIPP’s Project Coordinator. “The TULIPP reference platform will give rise to significant advances in system integration, processing innovation and idle power management to cope with the challenges this presents in increasingly complex vision-based systems”.

- 2) Prepare the glossary (15 terms).
- 3) Write an abstract (see Unit 11).
- 4) Identify Tenses in highlighted sentences.

### **Unit 3**

Self-study assignment:

- 1) Read and translate the text.

## **Cache-coherent network-on-chip IP supercharges heterogeneous SoC design**

*Net Speed Systems has announced the release of its Gemini 3.0 cache-coherent network-on-chip IP that maximizes the performance of heterogeneous multicore system-on-chip (SoC) designs for cloud computing, automotive, mobile and IoT applications.*

Many of today's applications build in human-like comprehension and decision-making capabilities. Applications such as Advanced Driver Assistance Systems (ADAS) offer users an augmented experience of the physical, real-world environment and include computer-generated sensory input such as sound, video, graphics or GPS data. *The technologies underlying these applications, such as computer vision, facial recognition, voice recognition and other machine learning based capabilities require far more processing performance and much better power efficiency than is attainable with traditional multicore processor platforms.*

"Processors are becoming increasingly specialized to meet the needs of their target applications", *said Linley Gwennap, principal analyst at the Linley Group.* "To satisfy complex application requirements, many SoCs now include a mix of CPU cores, computing clusters, GPUs and other computing resources and specialized accelerators. To maximize the performance of these heterogeneous designs, SoCs need a robust on-chip-network such as Gemini that optimizes the communication among the various components and arbitrates the sharing of memory and other critical resources".

"Gemini 3.0 is a next generation system-on-chip (SoC) interconnect platform that specifically addresses the complexities and the opportunities of heterogeneous system architectures", *said Anush Mohandass, vice president of marketing and business development at Net Speed.* "Gemini enables SoC architects to implement designs that can achieve more than 10x greater performance in a reasonable power envelope. This is something that is not feasible with traditional multicore designs".

"When designing a SoC, the conventional approach is to architect the system with its IP blocks and interconnect and simulate it later in the development process when most of the design decisions have been made", *said Fred Weber, former AMD CTO and industry veteran who is a member of Net Speed's board.* "This is essentially a trial and error approach that is expensive, time-consuming and risky. Gemini, on the other hand, enables system architects to perform modeling and simulation much early in development before integration begins. Net Speed's machine learning capabilities rapidly explore a multitude of models and architecture options to give system architects accurate system level performance predictions right from the beginning".

Gemini is the only SoC interconnect solution that uses machine learning to accurately model the system as whole to achieve the best application performance. *In contrast, conventional approaches tend to optimize individual subsystems in isolation, which can result in bottlenecks and systems that are overdesigned to handle worst case conditions.* Gemini uses advanced networking algorithms to

rapidly create a cache-coherent SoC interconnect that is deadlock-free and delivers quality of service (QoS) for all use cases. It offers OEMs an easier and more cost effective way to assemble robust heterogeneous SoCs that provide the performance necessary for rich and complex applications.

Gemini 3.0 offers excellent configurability allowing users to customize every component of the interconnect from IP interface to routers to topology and interface links. Gemini 3.0 supports both the ARM AMBA 5 CHI (Coherent Hub Interface) and ARM AMBA 4 AXI Coherency Extensions (ACE) on-chip interconnect standards in a single design and includes support for broadcast and multicast which can dramatically improve performance.

It supports up to 64 fully cache-coherent CPU clusters, GPU blocks and other coherent compute blocks and up to 200 I/O coherent and non-coherent agents. It can handle cache-coherent, I/O-coherent, and non-coherent traffic in a single SoC interconnect design platform. It offers unique system level optimizations including integrated DMA, on-chip RAM and Last Level Cache (LLC) IPs with runtime configurability. “We are committed to bringing a variety of competitive options to our partners through our strong ecosystem and Net Speed's Gemini 3.0 is one more example of this approach”, said Ian Ferguson, vice president of worldwide marketing and strategic alliances, ARM. “Net Speed's Gemini cache-coherent interconnect, with support for ARM AMBA 4 AXI Coherency Extensions (ACE) and AMBA 5 Coherent Hub Interface (CHI) standards, will enable the development of heterogeneous SoC platforms”, “Cache coherency is becoming an integral part of heterogeneous system architectures in next generation SoC designs and it is exciting to see an ecosystem partner like Net Speed continue bringing innovative solutions to market” said Nimish Modi, Sr. VP, Marketing & Business Development at Cadence Design Systems. “The integration of solutions such as Gemini 3.0 with Cadence's comprehensive tool and design IP solutions enables SoC architects and designers to optimize performance, while getting their designs to market much faster”.

- 2) Prepare the glossary (15 terms).
- 3) Write an abstract (see Unit 11).
- 4) Identify Tenses in highlighted sentences.

#### **Unit 4**

Self-study assignment:

- 1) Read and translate the text.

#### **Update offers faster, easier Simplicity Studio software**

*Silicon Labs has released a major update of its Simplicity Studio software development tools.* The new release represents a significant redesign of the software infrastructure, making the tools faster to download and easier to install and use.

A more intuitive user interface improves the overall developer experience. *A comprehensive software tool set for Internet of Things (IoT) connected device applications, Simplicity Studio is the only embedded development environment that broadly supports 8- and 32-bit microcontrollers (MCUs), multiprotocol and multiband wireless SoCs, and fixed-function devices.*

Simplicity Studio simplifies the IoT development process with one-click access to everything developers need to complete their projects using an integrated development environment (IDE) based on Eclipse 4.5. It includes a powerful suite of tools for energy profiling, configuration and wireless network analysis, as well as demos, software examples, complete documentation, technical support and community forums. These integrated tools and features combine to make embedded development simple and productive for IoT developers of all skill levels. Simplicity Studio provides built-in intelligence to automatically detect the connected 8-bit or 32-bit MCU or wireless SoC, graphically configure the device, and show supported configuration options to help developers get their projects underway in minutes.

“I’m happy to see that Simplicity Studio is a cross-platform development environment that’s super-easy to download, install and launch”, said Andrew Tergis, an electrical engineer at little Bits, a New York-based hardware startup that empowers everyone—of any gender, age or technical background—to create inventions with its platform of easy-to-use electronic building blocks. “The Simplicity wizards made it easy to license the Keil compiler without much fuss. It’s a brilliant idea to have Simplicity Studio auto-detect the connected development board, and it was easy to find source code and have the project already configured for my hardware”.

*The latest software update is based on in-depth market research, developer workshops and stakeholder interviews with designers who create IoT products.* The primary goal of the update was to make Simplicity Studio more flexible, efficient and easier to use. The underlying software infrastructure of Simplicity Studio now provides custom-tailored installation options, enabling developers to download specific tools for the Silicon Labs product portfolio they are using. This flexibility helps to streamline the download process without the overhead of the full Simplicity Studio suite installation.

*Silicon Labs has enhanced Simplicity Studio to provide more intuitive content and document navigation.* Developers can now engage the software from a device or solution perspective. A developer can click on a pre-defined solution, such as a wearable device, and Simplicity Studio will automatically set its context to the key components comprising the solution, such as an EFM32 MCU, a Bluetooth module and an optical sensor. By eliminating the inefficiencies of context switching and jumping from tool to tool, it eases the development effort and preserves the designer’s investment in learning a comprehensive tool suite. “With this new release of Simplicity Studio, we’ve completely reimagined the developer experience”, said Raman Sharma, director of Simplicity Studio software at Silicon Labs. “Our latest version of Simplicity Studio tackles complex development challenges and gives IoT developers more capabilities and easier access to Silicon

Labs' full range of IoT products. Offering a rare combination of simplicity and sophistication, Simplicity Studio enables developers to create IoT applications that extend from end nodes to the cloud”.

The latest version of Simplicity Studio now supports the following Silicon Labs IoT products: Multiprotocol and multiband Wireless Gecko SoCs, Bluetooth modules, EFM32 Gecko MCU family, EFM8 MCU family and other 8-bit MCUs, Xpress fixed-function devices, EZR32 sub-GHz wireless MCUs and EM35xx mesh networking SoCs.

Simplicity Studio Tool Highlights:

- a) Energy Profiler to analyze power consumption and optimize for energy efficiency;
- b) Configurator to quickly configure MCUs and wireless MCUs and generate C-code for pinout, peripherals and mode transitions;
- c) AppBuilder to build IoT applications with ready-to-go templates;
- d) Network Analyzer with powerful wireless network analysis features and packet trace analyzer for real-time inspection of network traffic;
- e) Capacitive Sense Profiler enabling developers to fine-tune cap-touch applications;
- f) Xpress Configurator to simplify configuration of Xpress fixed-function devices.

- 2) Prepare the glossary (15 terms).
- 3) Write an abstract (see Unit 11).
- 4) Identify Tenses in highlighted sentences.

## Unit 5

Self-study assignment:

- 1) Read and translate the text.

### **Millimeter wave with continuous-sweep signal analysis to 110 GHz**

*Key sight Technologies has announced a breakthrough in spectrum and signal analysis at millimeter-wave frequencies. The Key sight N9041B UX A X-Series signal analyzer is the first to provide frequency coverage to 110 GHz with a maximum analysis bandwidth of up to 5 GHz.*

Developing off-the-shelf tools for extremely high frequencies requires Key sight's blend of measurement science and millimeter-wave expertise. *The N9041B UX A offers attributes such as advanced front-end circuitry that achieves low loss and efficient mixing, providing a displayed average noise level (DANL) as low as –150 dBm/Hz when characterizing wideband modulated signals in the millimeter-wave band.*

“This new UX A is a clear example of Key sight's leadership in providing the tools our customers need to achieve their time-to-market goals in the fast moving

communications market”, said Mike Gasparian, president, Keysight Communications Solution Group. “Together with the 802.11ad RF test solution, the UXA adds a new level of insight to millimeter-wave applications such as 5G, 802.11ad and automotive radar, and it is the next step in our program to bring technology above 50 GHz to commercial applications”.

*The challenges of designing systems at these frequencies are significant, and this increases the need for integrated tools in design, simulation, measurement and analysis.* Keysight software solutions for design and simulation provide an efficient workflow that accelerates development of next-generation devices and systems. *These tools were used in the development of the N9041B UXA and enabled first-time-correct designs of its millimeter-wave circuits.* Keysight engineers also used the company’s millimeter-wave measurement tools, including network analyzers, oscilloscopes, spectrum analyzers, signal generators and associated application software, to fully characterize their devices.

*Current applications of these tools include development of 5G wireless communications, millimeter-wave backhaul, satellite communications, automotive radar, military radar and electronic warfare systems.* Emerging applications encompass development of devices and systems capable of performing high-resolution materials measurements for manufacturing, pharmaceutical and medical.

- 2) Prepare the glossary (15 terms).
- 3) Write an abstract (see Unit 11).
- 4) Identify Tenses in highlighted sentences.

## **Unit 6**

Self-study assignment:

- 1) Read and translate the text.

### **Anritsu expands CPRI test portfolio**

*Anritsu has expanded its CPRI test portfolio with the introduction of a BBU Emulation capability for its BTS Master MT8220T that saves significant time and cost when verifying LTE cell site operation.*

*Addressing a market need for a comprehensive and accurate field test solution, the BTS Master MT8220T with BBU Emulation provides wireless technicians, engineers and contractors with all the necessary tools to validate that a RRH is installed properly and functional, before the Base Band Unit (BBU) is commissioned.* This unique combination of measurement tools expedites 4G network rollouts and reduces OpEx (Operational Expense) costs associated with new sites.

With the BBU Emulation option, the BTS Master MT8220T is a complete solution for building out, testing and troubleshooting new and installed cell sites. *It*

*can be used by wireless professionals to install and verify optical fiber, SFP, RRH, and power before the BBU is officially commissioned and the site goes live.*

The BTS Master MT8220T with the BBU Emulation option installed can test the SFP connections to validate wavelength and line rate. BBU Emulation also allows the SFPs in the analyzer and RRH to communicate to verify that the optical fiber and SFP in the RRH are operational and have a good CPRI link. Other necessary analysis, such as transmit tests, VSWR and Return Loss measurements, Pass/Fail limit values, spectrum measurements and Spectrogram measurement can be conducted with the solution.

BBU Emulation allows engineers and technicians to troubleshoot problems independent from the core network. *The RRH can be separated from the other network elements to determine if it is at fault or problems are originating from a different source.* By providing the ability to verify that all new cell sites are installed correctly and can be turned on easily when the BBU is commissioned, the BBU Emulation capability allows crews to verify and fix any issues while they still have the construction equipment on site, saving time and money.

The new BBU Emulation option requires the BTS Master MT8220T to be equipped with the CPRI LTE RF Measurements option, which allows field engineers and technicians to conduct accurate RF measurements on RRHs while remaining at ground level. *The BTS Master has been specifically developed for 4G networks as well as installed 2G, 3G and WiMAX networks.* It provides 20 MHz bandwidth modulation quality for LTE eNodeB testing and has a high-contrast, touch screen display and backlit key panel for ease of use in both bright sunlight and dim conditions.

- 2) Prepare the glossary (15 terms).
- 3) Write an abstract (see Unit 11).
- 4) Identify Tenses in highlighted sentences.

## **Unit 7**

Self-study assignment:

- 1) Read and translate the text.

### **Op Amp Output Impedance / Resistance**

The output impedance determines the load that the circuit can drive and the output level delivered to the next stage.

*If the op amp output impedance is high, and the load has a low impedance, then much of the signal will be dissipated in the source resistance or source impedance of the output circuit.* Op amp output impedance / output resistance basics.

The output impedance of an operational amplifier, often designated  $Z_o$ , arises from the fact that the output driver circuit and the associated connections have a defined impedance.

*The output impedance can be split for many applications.* The resistance element is of primary importance and is the major component of the overall impedance. However for some cases the reactance may also be an issue and this is caused mainly by the series inductance. To be fair, the reactive elements are normally small and are ignored for most op amp applications. Typically the frequencies at which op amps are used the reactance levels will be small and not affect the circuit operation unduly. *However they should not be forgotten as they may have an effect in some instances.*

Accordingly the effective equivalent circuit for an op amp with its output resistance can be seen below.

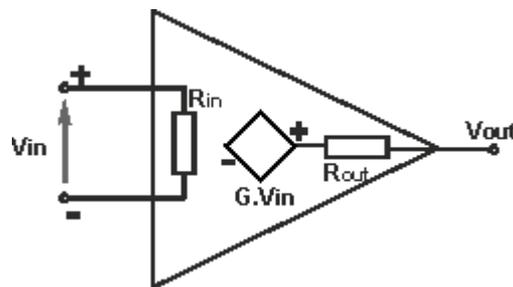


Figure 1 - Op-amp output resistance

*As can be seen from the diagram, the op amp output resistance is the DC resistance that appears in series with the output from an ideal amplifier located within the chip.* In other words the output resistance can be measured by looking at the voltage drop caused when a defined load is added to the output.

In most cases the output resistance is very low and very little drop will be seen. The major issue is normally that if reaching the limit of the current that the op amp will supply.

When looking at data sheets to discover the output impedance. Dependent upon the manufacturer, data sheets may list the output impedance under one of two different conditions. Some list closed-loop output impedance while others list open-loop output impedance. Confusingly both tend to use the designation  $Z_o$ .

For many op amps the small signal impedance values fall between from about 50  $\Omega$  and 200  $\Omega$ .

Op amp out impedance can particularly be a design issue when using rail-to-rail output op amps to drive heavy loads. Under these circumstances the op-amp is required to drive a much higher voltage range, and current levels are higher, as well as requiring the output stage to reach voltages very close to the rails. If the load is mainly resistive, the output impedance will limit how close to the rails the output can go - if voltages very close to the rails are required, this can cause problems. If the load is capacitive, the extra phase shift that this introduces can erode phase margin and lead to instability.

Op amp output drive capability. Another aspect that is linked to the output impedance of an op amp is the output drive capability.

Output drive capability is dependent upon a variety of aspects including the internal and external circuit and other conditions.

Internal factors include aspects such as the output-stage bias current, drive level, circuit architecture and capability as well as the process on which the chip was made.

External factors also influence the drive capability. However these can be controlled more easily as they are affected by the external circuit, although some are less controllable. External factors for the op amp drive capability include output voltage headroom, i.e. the voltage difference relative to supply rails; input overdrive; total supply voltage; dc- vs. ac-coupled load; and junction temperature.

*It is obviously necessary to be able to specify the drive capability.* Generally this is achieved by taking the output short-circuit current parameter. In general the manufacturer will specify the level of current that guaranteed to flow when the output is tied to ground. For situations where in a single-supply situation, the output is tied to one-half the supply voltage, called  $V_s/2$ .

Often two figures may be given, one for conditions where the op amp is sourcing current and another for the situation where the op amp is sinking current.

Using these figures it is possible to determine the behavior of the op amp where the voltage swing across the load is low, and therefore the internal output-stage is able to maintain large voltage headroom to the respective supply rails.

- 2) Prepare the glossary (15 terms).
- 3) Write an abstract (see Unit 11).
- 4) Identify Tenses in highlighted sentences.

## **Unit 8**

Self-study assignment:

- 1) Read and translate the text.

### **Transistor circuit design**

Transistor circuit design lies at the heart of today's electronics revolution. *Since the transistor was first developed in the late 1940s, it has become a part of everyday life.*

Transistor circuits are used in an ever increasing number of items of equipment ranging from radios to mobile phones, computers to washing machines, automobiles to scientific equipment and much more.

*The transistors may be in the form of discrete components, or more commonly in the form of integrated circuits.* However the same basic design principles are required whether the transistor may be found.

*Bipolar transistor basics.*

Obviously the key component in any transistor circuit is the transistor itself. *These components can be obtained in a discrete form, or they may be within an integrated circuit.*

The transistors are manufactured in a variety of formats and can be obtained to fulfill a variety of roles from small signal to high power, and audio to RF and switching. Note on the Bipolar Transistor.

*The bipolar transistor transformed the world of electronics.* It is a key component for the electronics industry. The components consist a thin base region of either n or p-type semiconductor sandwich between layers of the opposite type. They can be manufactured in many ways, often being included within integrated circuits.

*Circuit design requirements.*

Before starting on the design of the transistor circuit, it is necessary to define the requirements.

Without knowing what is required of the circuit, it is not possible to design the circuit. There are no aims for it.

There can be a number of parameters required in the requirements for the transistor circuit design:

1) *Voltage gain:* the voltage gain is often a key requirement. It is the output signal voltage divided by the input signal voltage.

2) *Current gain:* this is the gain of the transistor circuit in terms of current. For example a circuit driving a loudspeaker will need to have a large current gain to be able to provide sufficient current to drive the loudspeakers.

3) *Input impedance:* this is the impedance that the previous stage will see when it is providing a signal to this transistor circuit in question.

4) *Output impedance:* the output impedance is also important. If the transistor circuit is driving a low impedance circuit, then its output must have a low impedance, otherwise a large voltage drop will occur in the transistor output stage.

5) *Frequency response:* frequency response is another important factor that will affect the transistor circuit design. Low frequency or audio transistor circuit designs may be different to those used for RF applications. Also the choice of the transistor and capacitor values in the circuit design will be greatly affected by the required frequency response.

Many of these requirements are linked. For example low impedance outputs are likely to need a high current gain. *As a result when undertaking the design of the transistor circuit, it is necessary to have a grasp of the overall circuit and what it needs to do.*

- 2) Prepare the glossary (15 terms).
- 3) Write an abstract (see Unit 11).
- 4) Identify Tenses in highlighted sentences.

## Unit 9

Self-study assignment:

- 1) Read and translate the text.

### Transistor Darlington Pair Tutorial

The Darlington pair, or super-alpha pair consists of two devices (transistors) with the emitter of the first connected to the base of the second to give very high gain levels.

The Darlington Pair is a useful circuit configuration for many applications within electronic circuits. This circuit configuration provides a number of advantages that other forms of transistor circuit are not able to offer and as a result it is used in many areas of electronics design.

*The Darlington Pair also occasionally referred to as a super-alpha pair is renowned as a method for obtaining a very high level of current gain, using just two transistors.* It is able to provide levels of gain that are not possible using single transistors on their own, but it may not be used in all circumstances because it does have a number of limitations.

*The circuit may be used in the form of discrete components, but there are also very many integrated circuit versions often termed a Darlington transistor that may also be used.* These Darlington transistor components may be obtained in a variety of forms including those for high power applications where current levels of many amps may be required.

*The Darlington Pair has been in use for very many years. It was invented in 1953 by Sidney Darlington who was working at Bell Laboratories. He developed the idea of having two or three transistors in a single semiconductor chip, where the emitter of one transistor was connected directly to the base of the next, and all the transistors shared the same collector connection. In many ways the Darlington bore many of the hallmarks of the first integrated circuit patent, but it was too specific to the specific Darlington circuit itself to be considered as an integrated circuit.*

#### *Basics.*

When using an emitter follower in a circuit, the level of current gain, and the input impedance of the circuit is limited by the current gain that can be achieved using a single transistor. The gain of the Darlington transistor pair is that gain of the two individual transistors multiplied together.

In view of the fact that the terms  $\beta Q1$  and  $\beta Q2$  on their own can be neglected, we obtain the more familiar equation.

The basic circuit is formed by taking the emitter of the input transistor and connecting it such that its emitter drives the base of the second and then connecting both collectors together. This circuit can be used as any single transistor would be in a variety of circuits, but particularly as an emitter follower.

*Basic Darlington Pair transistor configuration.*

In many respects a Darlington pair can be treated like a single transistor with a very high gain, and in these instances it is often shown on a circuit diagram as a single component.

*Circuit symbol for a Darlington pair chip.*

While the Darlington can be viewed almost as a circuit block or component in its own right, it does have several differences between it and the basic transistor. For example it has a higher voltage difference between the overall base and emitter, i.e. from the base of the input transistor to the emitter of the output transistor.

$$V_{BE} = V_{BE1} + V_{BE2}.$$

This means that for a typical silicon device, the overall base emitter voltage required to turn the Darlington pair on is two times 0.7 volts, i.e. 1.4 volts.

A further point to note is that the saturation voltage of the Darlington configuration is about 0.7 volts. This is higher than that of a single transistor, where, for example a switching transistor may exhibit a saturation voltage of around 0.2 volts. The increased level of saturation voltage of the Darlington pair needs to be considered in some applications where high currents are passed because it may result in significant levels of power being dissipated in the device.

It is also necessary to be aware that the Darlington Pair is not as fast as a single transistor. This is because the first transistor cannot actively shut off the base current of the second transistor. In turn this makes the overall device or circuit configuration slow to reduce the current flow or switch off. To address this problem, the second transistor often has a resistor connected between the base and emitter. This resistor also helps prevent any leakage current from the input transistor from turning the output transistor on. This leakage current can be of the order of nano-amps for a small signal transistor or up to a few hundred micro-amps for a power transistor. The value of the base emitter resistor is chosen so that it does not sink a large proportion of the current intended to pass through the base of the output transistor, while not allowing the leakage current to develop a voltage equal to the turn on voltage of the output transistor to be developed. Typical values for the resistor may be a few hundred ohms for power applications for the circuit or a few thousand ohms for a small signal version.

*Darlington circuit including base resistor.*

When using a Darlington pair configuration in a new electronics design, it is necessary to account for the fact that it has a greater phase shift at high frequencies than a single transistor. This can result in the overall circuit having a greater likelihood of becoming unstable if negative feedback is used in the circuit.

Often when making a Darlington pair, the output transistor is required to be able to handle high levels of current. High power transistors typically have lower

levels of current gain than the small signal varieties. This means that often the input device is a small signal high gain variety, whereas the output transistor is a high power device with an inherently lower current gain.

Advantages and disadvantages summary.

While the Darlington pair offers many advantages they also have limitations. Accordingly when considering its use, it is necessary to weigh up both sides of the equation.

Advantages:	Disadvantages:
1) Very high current gain 2) Very high input impedance for overall circuit 3) Darlington pairs are widely available in a single package or they can be made from two separate transistors 4) Convenient and easy circuit configuration to use	1) Slow switching speed 2) Limited bandwidth 3) Introduces a phase shift that can give rise to problems at certain frequencies in circuit using negative feedback 4) Higher overall base-emitter voltage = $2 \times V_{be}$ 5) High saturation voltage (typically around 0.7 V) which can lead to high levels of power dissipation in some applications

The Darlington pair transistor circuit configuration can be very useful in electronics circuit design. Although it has speed limitations, the circuit is nevertheless very useful in many areas where high levels of current gain are required, particularly for emitter follower style applications.

Although the Darlington pair is most usually referred to by this name, the older name - the super-alpha pair may still be used on some occasions. Today, the term Darlington is the most widely used.

- 2) Prepare the glossary (15 terms).
- 3) Write an abstract (see Unit 11).
- 4) Identify Tenses in highlighted sentences.

## Unit 10

Self-study assignment:

- 1) Read and translate the text.

## Ethernet IEEE 802.3 tutorial

Ethernet, defined under IEEE 802.3, is one of today's most widely used data communications standards, and it finds its major use in Local Area Network (LAN) applications. With versions including 10 Base-T, 100 Base-T and now Gigabit Ethernet, it offers a wide variety of choices of speeds and capability. Ethernet is also cheap and easy to install. Additionally Ethernet, IEEE 802.3 offers a considerable degree of flexibility in terms of the network topologies that are allowed. Furthermore as it is in widespread use in LANs, it has been developed into a robust system that meets the needs to wide number of networking requirements.

Ethernet, IEEE 802.3 history.

*The Ethernet standard was first developed by the Xerox Corporation as an experimental coaxial cable based system in the 1970s. Using a Carrier Sense Multiple Access / Collision Detect (CSMA/CD) protocol to allow multiple users it was intended for use with LANs that were likely to experience sporadic use with occasional heavy use.*

*The success of the original Ethernet project lead to a joint development of a 10 Mbps standard in 1980. This time three companies were involved: Digital Equipment Corporation, Intel and Xerox. The Ethernet Version 1 specification that arose from this development formed the basis for the first IEEE 802.3 standard that was approved in 1983, and finally published as an official standard in 1985. Since these first standards were written and approved, a number of revisions have been undertaken to update the Ethernet standard and keep it in line with the latest technologies that are becoming available.*

The Ethernet IEEE 802.3 LAN can be considered to consist of two main elements:

*Interconnecting media:* the media through which the signals propagate is of great importance within the Ethernet network system. It governs the majority of the properties that determine the speed at which the data may be transmitted. There are a number of options that may be used:

*Coaxial cable:* this was one of the first types of interconnecting media to be used for Ethernet. Typically the characteristic impedance was around 110 ohms and therefore the cables normally used for radio frequency applications were not applicable.

*Twisted Pair Cables.* *Types of twisted pair may be used: Unshielded Twisted Pair (UTP) or a Shielded Twisted Pair (STP).* Generally the shielded types are better as they limit stray pickup more and therefore data errors are reduced.

*Fibre optic cable.* Fibre optic cable is being used increasingly as it provides very high immunity to pickup and radiation as well as allowing very high data rates to be communicated.

*Network nodes.* The network nodes are the points to and from which the communication takes place. The network nodes also fall into categories: *Data Terminal Equipment - DTE:* these devices are either the source or destination

of the data being sent. Devices such as PCs, file servers, print servers and the like fall into this category.

Data Communications Equipment - DCE: *devices that fall into this category receive and forward the data frames across the network, and they may often be referred to as 'Intermediate Network Devices' or Intermediate Nodes.* They include items such as repeaters, routers, switches or even modems and other communications interface units.

Ethernet network topologies.

There are several network topologies that can be used for Ethernet communications. The actual form used will depend upon the requirements.

1) *Point to point*: this is the simplest configuration as only two network units are used. It may be a DTE to DTE, DTE to DCE, or even a DCE to DCE. In this simple structure the cable is known as the network link. Links of this nature are used to transport data from one place to another and where it is convenient to use Ethernet as the transport mechanism.

2) *Coaxial bus*: this type of Ethernet network is rarely used these days. The systems used a coaxial cable where the network units were located along the length of the cable. The segment lengths were limited to a maximum of 500 metres, and it was possible to place up to 1024 DTEs along its length. Although this form of network topology is not installed these days, a very few legacy systems might just still be in use.

3) *Star network*: this type of Ethernet network has been the dominant topology since the early 1990s. It consists of a central network unit, which may be what is termed a multi-port repeater or hub, or a network switch. All the connections to other nodes radiate out from this and are point to point links.

Despite the fact that Ethernet has been in use for many years, it is still a growing standard and it is likely to be used for many years to come. During its life, the speed of Ethernet systems has been increased, and now new optical fibre based Ethernet systems are being introduced. As the Ethernet standard is being kept up to date, the standard is likely to remain in use for many years to come.

- 2) Prepare the glossary (15 terms).
- 3) Write an abstract (see Unit 11).
- 4) Identify Tenses in highlighted sentences.

## Unit 11

Основные штампы (key-patterns) аннотаций на английском и русском языках

1. The article (paper, book, etc.) deals with... - Эта статья (работа, книга и т.д.) касается...
2. As the title implies the article describes... - Согласно названию, в статье описывается...

3. It is specially noted... - Особенно отмечается...
4. A mention should be made... - Упоминается...
5. It is spoken in detail... - Подробно описывается...
6. ...are noted - Упоминаются...
7. It is reported... - Сообщается...
8. The text gives valuable information on.... - Текст дает ценную информацию...
9. Much attention is given to... - Большое внимание уделяется...
10. The article is of great help to ... - Эта статья окажет большую помощь...
11. The article is of interest to... - Эта статья представляет интерес для...
12. It (the article) gives a detailed analysis of .... - Она (статья) дает детальный анализ...
13. It draws our attention to...- Она (статья, работа) привлекает наше внимание к...
14. The difference between the terms...and...should be stressed - Следует подчеркнуть различие между терминами ...и...
15. It should be stressed (emphasized) that... - Следует подчеркнуть, что...
16. ...is proposed - Предлагается...
17. ...are examined - Проверяются (рассматриваются)
18. ...are discussed - Обсуждаются...
19. An option permits... - Выбор позволяет...
20. The method proposed ... etc. - Предлагаемый метод... и т.д.
21. It is described in short ... - Кратко описывается ...
22. It is introduced .... - Вводится ...
23. It is shown that .... - Показано, что ...
24. It is given ... - Дается (предлагается) ...
25. It is dealt with .... - Рассматривается ...
26. It is provided for ... - Обеспечивается ...
27. It is designed for .... - Предназначен для ...
28. It is examined, investigated ... - Исследуется ...
29. It is analyzed ... - Анализируется ...
30. It is formulated .... - Формулируется ...
31. The need is stressed to employ... - Подчеркивается необходимость использования...
32. Attention is drawn to... - Обращается внимание на ...
33. Data are given about... - Приведены данные о ...
34. Attempts are made to analyze, formulate ... - Делаются попытки проанализировать, сформулировать ...
35. Conclusions are drawn.... - Делаются выводы ...
36. Recommendations are given ... - Даны рекомендации ...

## Summary and Annotation

The reading of original literature (texts, articles) is crucial to get the latest information. *Summary* (*abstract, précis*) and *annotation* have become important forms of such information providing. These forms can essentially reduce the specialists' time of information (data) processing.

*Summary* is a short written account of something, which gives the important points but not the details. It usually opens an article or a report. It can be considered as a shortened version of an original. The summary is expected to be about a sixth or a tenths of the original in length. It is usually far easier to write it after you have read the original. First go through it lifting out important information, findings, conclusions and recommendations. It is necessary to avoid including excessive background and detail. Sometimes the summary may take a spoken form. To prepare a summary you should:

- 1) Study the work carefully.
- 2) Make definite opinion of what has been read.
- 3) Develop the appropriate style of writing.
- 4) Communicate accurately the author's conclusions.
- 5) Write briefly and clearly.

*Annotation* is the extremely brief account of the main contents like the list of major problems. If the purpose of summary is to get the reader acquainted with the main contents of the original and the substitute it to some degree, the annotation considers only the article's or the book's topic and facilitates search of necessary information on the subject. To make annotation, you should do the following:

- 1) Write down the name of the original (article or book) in English:
- 2) Translate this into Russian.
- 3) Write down the publishing data of the article (book).
- 4) Resume briefly (in 3-4 sentences) the contents of the original.

The following phrases normally open summaries and annotations:

The article (text/story) is concerned with ...

This work deals with ...

This work is devoted to ...

Mention was made of the new achievements in the field of ...

Special emphasis is laid on ...

Particular attention is given to ...

Notice has been taken to ...

It is known (thought) that ...

A new method (approach) has been proposed ...

The author comes to the conclusions ...

The work is of primary interest (importance, value) for ...

One manager who had trouble summarizing a lengthy report discovered a helpful technique. He imagined that he and his boss got on the elevator on the

35<sup>th</sup> floor and rode down to the lobby. His boss remarked, “I just got your report on the new sales incentive plan. What’s it all about?” The manager would - in the time it takes an elevator to descend 35 floors – give his boss the rationale, findings, and recommendations of the report.

Depending on how tall your building is – or how fast or slow the elevators are – you may want to try this technique to help you frame your summary.

*Ответьте на вопросы.*

1. What is a definition of a summary?
2. Is it difficult to write summaries?
3. What phrases are typical for a summary or an annotation opening?
4. What technique can be proposed for making an annotation?
5. How long can it take you to write a summary?

*Запомните эти слова и составьте с ними предложения.*

Nouns	Существительные
Summary/abstract/precis	реферат
Annotation	аннотация
aim/purpose/object	цель
intention	намерение
action	действие
effect/function	роль, функция
approach	подход
method/technique	метод
manner/way	способ
suggestion	предположение
trend/tendency	тенденция
task	задача
verbs	глаголы
sum up/summarize	подвести итог, подытожить
assume	считать, допускать, полагать
consider	считать, рассматривать
expect	ожидать, предполагать
find/reveal	находить, обнаруживать
maintain	утверждать
intend	намереваться
show/demonstrate	показывать, демонстрировать
suppose/suggest	предполагать
report	сообщать
Interpret	объяснять, интерпретировать
think/reckon	считать
prove/give evidence	доказывать
expressions	выражения
call attention to	обращать ч-л внимание на

give/pay attention to	уделять внимание кому-то
do away with	покончить с, отказаться от
make attempt	делать попытку, пытаться
make mention of	упоминать о
make reference to	ссылаться
make use of	использовать, применять
take account of	принимать во внимание
take advantage of	воспользоваться
take care of	заботиться, учитывать
take notice of	замечать, обращать внимание на

*Приведите в соответствие слова и их перевод.*

assume	действие
approach	утверждать
suggestion	цель
task	задача
maintain	рассматривать
consider	допускать
purpose	предположение
action	подход

*Заполните толкование этих слов на английском языке.*

accurate (adj)	free from errors
adequate (adj)	enough; sufficient
analyze (v)	study in all parts
issue (n)	a matter of dispute or a difference
knowledge (n)	information that is capable of being learned
transition (n)	smooth connection of ideas
valid (adj)	truthful or supported by accurate facts and statistics
abstract (n)	a short piece of writing that summarizes the main point of it

*Приведите в соответствие выражения и их перевод.*

make mention of	принимать во внимание
take account of	воспользоваться
call attention to	обращать (ч-л) внимание на
make use of	использовать
take notice of	упоминать о
take advantage of	замечать

make attempt  
pay attention to

уделять внимание кому-то (чему-то)  
делать попытку

*Сопоставьте каждое слово из левой колонки с его синонимом из правой колонки.*

aim	technique
manner	sum up
method	objective
summarize	tendency
reveal	way
trend	show
demonstrate	find

*Переведите предложения на русский язык.*

1. This statement was followed by a long discussion concerning the meaning and application of the theory. 2. Mention was made of the new achievements in this field. 3. An attempt was made to review the vast amount of new facts obtained in this field. 4. This method allows the data to be easily obtained. 5. The method was proved to be of considerable commercial value. 6. Our conclusions were supported by new evidence furnished by other investigators. 7. The scheme insisted upon proved to be satisfactory. 8. Much attention was paid to the data reported. 9. The object of investigations is to understand the way these changes are brought about. 10. Mentioning some unsolved problems, a certain amount of work has to be done upon the development of the theory. 11. We should summarize the information available on this subject. 12. The solution to this problem might probably be found in this work. 13. Proof of the correctness of this interpretation would seem to call for some modification of our notions. 14. The suggestion does not seem to have satisfied itself in practice.

*Переведите предложения на английский язык.*

1. Чтение оригинальной литературы необходимо для получения новейшей информации. 2. Аннотация и реферат позволяют существенно сократить время специалистов. 3. Реферат – это краткое резюме каких-либо материалов в письменном виде. 4. Его можно рассматривать как сокращенную версию оригинала. 5. Объем реферата составляет от 1/6 до 1/10 объема оригинала. 6. Начинайте делать реферат, только прочитав оригинал. 7. Избегайте излишних рассуждений и деталей. 8. Аннотация еще короче, чем реферат. 9. Она знакомит читателя лишь с основным

содержанием книги или статьи. 10. Выучите на память типичные фразы, с которых начинается аннотация и реферат.

## REVIEWING A NEWSPAPER ARTICLE (TEXT/STORY)

*Describe the article (text/story) you are going to review by giving answers to the following questions:*

- 1) How is the article (text/story) entitled (headlined)?
- 2) What newspaper (magazine, book/textbook) is it published in?
- 3) What page is it on?
- 4) What is the date of the issue?
- 5) Who is the author (writer/journalist/correspondent/narrator)?
- 6) What problem is it devoted to?
- 7) What is your opinion on the problem spoken about in the article (text/story)?
- 8) What can you say in conclusion?

*I. Use the following expressions to answer the questions given above:*

The plan for reviewing the article (text/story)

1) The title of the article (text/story).

2) The author/ writer /narrator/correspondent of the article (text/story); where and when the article (text/story) was published (written).

3) The main idea of the article (text/story).

4) The contents of the article (text/story). Some facts, names, figures.

Some expressions to be used while reviewing the article (text/story)

The article (text/story) is entitled (headlined) ... . The title (headline/heading) of the article (text/story) I've read is ...

The author (writer/narrator/correspondent) of the article (text/story) is ... The article (text/story) is written by ... It is (was) published (written) in ... It is (was) printed in ... .

The main idea of the article (text/story) is ... . The article (text/story) is about/is devoted to/ deals with/ is concerned with/touches upon ... . The purpose (aim/goal/objective) of the article (text/story) is to give/provide the reader some information/material/data on ... .

a) The author (writer/narrator/correspondent) starts by telling the readers (about, that) ... . b) The author (writer/narrator/correspondent) writes (states/stresses/thinks/points out) that ... . The article (text/story) describes ... . c) According to the text (article/story) ... . Further the author reports (informs/says) that ... . The article (text/story) goes on to say that ... .

- 5) Your opinion of the article (text/story). From my viewpoint (in my opinion/to my mind/I think/believe/consider) I've found the article (text/story) interesting (important/dull/informative/knowledgeable/of practical use/of no value/too hard to understand ...)

*II. Complete your story with the help of the expressions given below:*

- 1) The article (text/story) ends with...
- 2) The author (writer/narrator/correspondent) comes to the conclusion...
- 3) In conclusion the author (writer/narrator/correspondent) ...
- 4) At the end of the article (text/story) the author (writer/ narrator/ correspondent) sums it up...

*III. The plan for reviewing a newspaper article (text/story):*

- 1) The title (headline/heading) of the article (text/story)
- 2) Where and when the article (text/story) was published (written)
- 3) The author (writer/narrator/correspondent) of the article (text/story) (if stated)
- 4) The main idea of the article (text/story) (some names, facts, figures)
- 5) The conclusion of the article (text/story)

*Фразы для аннотирования статьи на английском языке.*

Annotation plan	
1. The title of the article.	The article is headlined... The headline of the article I have read is... As the title implies the article describes ...
2. The author of the article, where and when the article was published.	The author of the article is... The author's name is ... Unfortunately the author's name is not mentioned ... The article is written by... It was published in ... ( <i>on the Internet</i> ). It is a newspaper (scientific) article (published on <i>March 10, 2012 / in 2010</i> ).
3. The main idea of the article.	The main idea of the article is... The article is about... The article is devoted to... The article deals ( <i>is concerned</i> ) with... The article touches upon the issue of... The purpose of the article is to give the reader some

	<p>information on...</p> <p>The aim of the article is to provide the reader with some material on...</p>
<p>4. The contents of the article. Some facts, names, figures.</p>	<p>The author starts by telling (the reader) that...</p> <p>The author (of the article) writes (<i>reports, states, stresses, thinks, notes, considers, believes, analyses, points out, says, describes</i>) that... / <i>draws reader's attention to...</i></p> <p>Much attention is given to...</p> <p>According to the article...</p> <p>The article goes on to say that...</p> <p>It is reported (<i>shown, stressed</i>) that ...</p> <p>It is spoken in detail about...</p> <p>From what the author says it becomes clear that...</p> <p>The fact that ... is stressed.</p> <p>The article gives a detailed analysis of...</p> <p>Further the author reports (<i>writes, states, stresses, thinks, notes, considers, believes, analyses, points out, says, describes</i>) that... / <i>draws reader's attention to...</i></p> <p>In conclusion the author writes (<i>reports, states, stresses, thinks, notes, considers, believes, analyses, points out, says, describes</i>) that... / <i>draws reader's attention to...</i></p> <p>The author comes to the conclusion that...</p> <p>The following conclusions are drawn: ...</p>
<p>5. Your opinion.</p>	<p>I found the article (rather) interesting (important, useful) <i>as / because...</i></p> <p><i>I think / In my opinion</i> the article is (rather) interesting (important, useful) <i>as / because...</i></p> <p>I found the article too hard to understand / rather boring <i>as / because...</i></p>

### *Annotation*

Annotation (from Latin *Annotatio* - note) is an argument of a book or other publication, such as manuscripts, articles and so on. Annotation gives a short descriptive characteristic of first primary source. It summarizes the disclosed subject-matter of publications without its content. Annotation gives an answer to the question about what says the primary source of information.

*Annotations depending on the content and purpose are divided into.*

1. Reference Annotation reveal subject documents and report some information about them, but do not give critical evaluation.
2. Annotation of Recommendation contain an assessment of document from the viewpoint of its suitability for a particular category of readers.

*According to the destination and scope of publication annotations are divided into.*

1. General. It characterizes document in general and it is intended for a wide range of readers.
2. Specialized. It opens only certain aspects of document for specialists. They may be quite brief, consisting of a few words or phrases and deployed by lines 20-30, but in this case, unlike the essay, it gives in summary form only the basic premises and conclusions of documents.

*Referencing.*

Let us start by considering the facts that if you are able to analyze the English texts it is really an enormous progress in your studying. If you see the main idea, specific signs of the story or article, in such way, of course you can understand it much better.

Let's imagine that you have a task to retail in writing a certain article for your boss.

The first thing that needs to be said is that you have to give your boss such kind of translated work called referencing.

Referencing is one of the most widespread forms of written information, which allows in a short time for modern huge flow of information to select the right information. If compare it with annotating one should accept that referencing is the most perfect method processing information. It can be explained, because annotation gives us only a short list of question taken place in text while referencing describes the essence of issues and presents important conclusions.

It is not so as the simple summary or retail, because first of all it is analysis.

If you want your referencing to be in correct form and successful you have to learn all introductory structures that are needed for your text.

So, where have you start and how have you finish? We will give you the example of a few sentences. And you choose the most liked.

Firstly, you have to get to know the title, the author and the manner of his writing.

If you already have done it, you can start your referencing *with such statements:*

*The article I'm going to give a review of is taken from... —Статья, которую я собираюсь анализировать, взята из...*

*The headline of the article is — Заголовок статьи...*

*The author of the article is... — Автор статьи...*

*It is written by — Она написана...*

*The article under discussion is ...* —Статья, которую мне хотелось бы обсудить...

*The headline foreshadows...* — Заголовок раскрывает...

Secondly, it will be correctly, to find out the topic, the key issue and the problem of article and to start to reference them with such words:

*The topic of the article is...* — Тема статьи...

*The key issue of the article is...* — Ключевой вопрос статьи заключается в ...

*The article under discussion is devoted to the problem...* - Обсуждаемая статья посвящена проблеме...

*The author in the article touches upon the problem of...* — автор статьи затрагивает проблему...

*I'd like to make some remarks concerning...* — Мне бы хотелось сделать заметки касательно...

*I'd like to mention briefly that...* - Хотелось бы кратко упомянуть, что...

*I'd like to comment on the problem of...* — Хотелось бы кратко прокомментировать проблему...

*The article under discussion may be divided into several logically connected parts which are...* —Статью можно поделить на несколько логически связанных частей, такие как...

Thirdly, it is time for summary. You can express your minds with such help: *At the beginning of the article, the author – вначале статьи автор...*

*describes — описывает; explains – поясняет; introduces – знакомит; mentions – упоминает*

*The story begins (opens) with a (the) – текст начинается с...description of —описания; statement – заявления; the analysis of a summary of — коротким анализом*

*In conclusion the author – в заключении автор points out – указывает на то, что*

In addition to this, you can also add personal attitude of author to a certain moment of his article or story. But it is up to you, but if you want, it is for you:

*The author starts with the statement of the problem and then logically passes over to its possible solutions. – Автор начинает с постановки проблемы, а затем логично переходит к ее возможному решению...*

*The author asserts that... - Автор утверждает, что...*

Besides you have try not to forget to present in your referencing the conclusion of author in way similar with such statements:

*In conclusion the author says / makes it clear that.../ gives a warning that... - В заключении автор говорит/проясняет, что/предупреждает, что...*

*At the end of the story the author sums it all up by saying ... - В конце автор подводит итог всему сказанному, говоря....*

Doubtless that now it is time for your own conclusion:

*Taking into consideration the fact that – Учитывая тот факт, что....*

*The message of the article is that /The main idea of the article is – Основная идея статьи....*

*In addition... / Furthermore... - Кроме того...*

*On the one hand..., but on the other hand... - С одной стороны...с другой стороны...*

*From my point of view... - С моей точки зрения...*

*My own attitude to this article is... — Мое отношение к статье..*

*I fully agree with / I don't agree with... - Я полностью согласен /Я не согласен...*

*I have found the article important / interesting /... - Я нахожу статью важной/ интересной...*

So let's sum up: for successful referencing you have to read the original text at least twice. First time will be for becoming familiar with it and another one will help you to come to know all important details. Than look through it one more time and try to find the message of author. And finally, give the readers of your referencing your own attitude and opinion.

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## Содержание

Unit 1. Intelligent UK launches flexible RF and microwave support service .....	3
Unit 2. EU's Tulipp project targets embedded systems for image processing .....	4
Unit 3. Cache-coherent network-on-chip IP supercharges heterogeneous SoC .....	5
design.....	6
Unit 4. Update offers faster, easier Simplicity Studio software .....	7
Unit 5. Millimeter wave with continuous-sweep signal analysis to 110 GHz.....	9
Unit 6. Anritsu expands CPRI test portfolio .....	10
Unit 7. Op Amp Output Impedance / Resistance.....	11
Unit 8. Transistor circuit design.....	13
Unit 9. Transistor Darlington Pair Tutorial.....	14
Unit 10. Ethernet IEEE 802.3 tutorial.....	17
Unit 11. Фразы для аннотирования статьи на английском языке.....	19
Список литературы .....	31

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