

1. Indian Space Research Organization (ISRO), Bengaluru

Project title: *High bit rate X-band QPSK modulator realization and analysis*

Project guide: Mrs. Deepashree A P

Project team: Prajna P, Swasthishree B, Swathi P

Abstract: Communication is a process of exchanging information. Modulation in is the mixing of two signals. In the communication system modulation is the process of varying some characteristics of carrier wave (Amplitude, phase or frequency) with respect to the modulating wave (message signal). In other words modulation process is viewed as the frequency transformation of message signal from low frequency to high frequency band. The impression can be performed by varying the amplitude, frequency or phase of the carrier signal in Communication is a process of exchanging information. Modulation in is the mixing of two signals. In the communication system modulation is the process of varying some characteristics of carrier wave (Amplitude, phase or frequency) with respect to the modulating wave (message signal). In other words modulation process is viewed as the frequency transformation of message signal from low frequency to high frequency band. The impression can be performed by varying the amplitude, frequency or phase of the carrier signal in accordance with the rate of change of the low frequency signal. The low frequency signal, usually the information bearing signal is called modulating signal. Modulation allows us to send a signal over a bandpass frequency range. If every signal gets its own frequency range, then we can transmit multiple signals simultaneously over a single channel, all using different frequency ranges. Another reason to modulate a signal is to allow the use of a smaller antenna. A baseband (low frequency) signal would need a huge antenna because in order to be efficient, the antenna needs to be about 1/10th the length of the wavelength. Modulation shifts the baseband signal up to a much higher frequency, which has much smaller wavelengths and allows the use of a much smaller antenna. The most common technique of modulation implemented in satellite communication is QPSK modulation. For Low Earth Orbit Satellites, the frequency band allotted for payload data transmission lies in the X-band. Hence up-conversion of the QPSK modulated signal is required. The project is aimed at the realization of an X-band QPSK Modulator supporting bit-rates up to 500 Mbps using I-Q Modulator and I-Q up-converting mixer. It analyzes the effect of skew between I and Q data streams on the spectrum of the modulated signal. Asymmetry in the QPSK spectrum as a function of I-Q has been quantified. Concept of I-Q mixer for frequency up-conversion or down-conversion has been explained and implemented. Effect of phase error in quadrature splitter of I-Q mixer on the suppression of the unwanted frequency band has been studied.

2. BEML Limited, Bengaluru

Project title: *Study on electrical distribution board and validation through automatic continuity check*

Project guide: Mr. Vyasraj T

Project team: Aishwarya P, Deepika, Arsha H L, Megha S G

Abstract: The project is aimed at an overall study of modern electric metro and modification of door logic control system along with the validation through automatic electrical multi wire continuity checking system. The first part of our project is door logic control system. In this system we found that in DMRC firstly there were using one LED to indicate the opening and closing of all the doors and then we designed logic circuit with LED's on each door. Thus while opening and closing of the door each of the LED's will glow but the customer demand is that while opening and closing of the door the LED has to flash. To meet the customer requirements we have designed a logic circuit with diode which results in the LED to flash while opening and closing of the door. During the detailed study in metro car electrical wiring system, it was found that "bell check" method is used to check the continuity of the wire, which was done manually. This method results in a drawback of human error and also it takes lot of time to check. To overcome this, we have designed an automatic electrical multi wire continuity checking system. This method uses the IC 555 timer as astable and clock. Then IC 4017 as decade counter divider. And also IC 4050 is buffer IC which provides a sufficient current boost. This method checks the different types of fault in wiring system, accurately reducing the human error and time consumption.

3. KELTRON, Kozhikode, Kerala

Project title: *War field spying with night vision wireless camera with GPS and GSM using Arduino*

Project guide: Mr. Ramachandra V Ballary

Project team: Athira Vijaykumar, Parvathi Mohan, Anusha M N

Abstract: The intension of this project is to reduce human victims in terrorist attacks. So this problem can be overcome by designing the spy robot which involves wireless camera so that from this we can examine rivals when it is required. This robot can quietly enter into enemy area and sends us the information via wireless camera. It can act as a live telecast of audio and video information from the surroundings and can be sent to a remote station. It is also able to access information when surrounding have darkness. One of the major applications of this project can be analyzed using android based smart phone which can be used to control the movement of the robot. The robot sends the signal to the RF receiver mounted on the robot via RF transmitter at the base station. This spy robot can be used in star hotels, shopping malls, jewelry showrooms, etc. where there can be threat from intruders or terrorists since human life is always precious, and these robots are the replacement of fighters against terrorists in war areas.

4. VI Solutions, Bengaluru

Project title: *Design and implementation of real time video edge detection, motion tracking and compression using FPGA*

Project guide: Mrs. Rashmi A V

Project team: Aishwarya Radhakrishnan, Sruthi Vasudeven, Priyanka N H, Vanishree

Abstract: Video is the most useful and most appealing approach to represent some information. Today all the communication approaches are working with such kind of media. The only problem with such kind of media is its large size. Either we have to store the data in database or to transfer video over some communication medium, video size always effect the efficiency. Because of this video compression is required to save the storage space. In this approach we are using dwt compression techniques for compressing a real time video and the resultant video quality is measured by signal to noise ratio and the mean square error. The purpose of edge detection is to discover the information about the edge and hiding the background of the video. Applying an edge detection algorithm to an image may significantly reduce the amount of data to be processed and may therefore filter out information that may be regarded as less relevant, while preserving the important structural properties of an image. This paper presents the implementation of an real time video edge-detection, compression on an FPGA using a combination of hardware and software components. The FPGA provides the necessary performance for real-time image and video processing.