Lab 2

- **Background:**

  Signal is propagated from transmitter to receiver through the air and, as discussed in Chapte r 3, there are many factors that affect the quality of received signal. Therefore, it can be easi ly generalized that the wireless medium is relatively difficult to predict as compared to wire d communication. This unpredictability basically introduces random errors into the signals b eing received. Any scheme that could enable recovery from these errors is of prime importa nce in making the communication reliable. A simple technique is to do channel coding. The basic idea is to introduce some degree of redundancy in the information before it is transmit ted such that even if some fraction of the signal gets corrupted, the receiver should be able t o recover it correctly.

- **Experimental Objective:**

  As mentioned earlier, wireless media is inherently unpredictable, and it is not possible to en sure that the signal received is the exact signal that was transmitted. Therefore, the focus shi fts to assuming that if the errors are present, then every attempt must be made to recover fro m these errors. There are many different schemes for such recovery, which vary in their lev el of sophistication and computing power requirements. The objective of this experiment is to help students appreciate this tradeoff. As new communication technologies are being dev eloped, existing channel coding techniques ought to be improved so as to suit new requirem ents. This experiment will serve as a basis for training students for the same.

- **Experimental Environment:**

  PCs with simulation software such as Python/C/C++.

- **Experimental Steps:**

1. The students are required to implement a channel coding program. In this program, one can in put arbitrary original signal code at the receiver, and one of the channel coding schemes will b e carried out (e.g., CRC). Compare the result with the theoretical value and do the decoding at the receiver.
2. The laboratory will have a wireless environment that automatically introduces errors in the sig nal being sent from a transmitter to a receiver. Students can use many different channel coding techniques to recover from these errors. This experiment will provide a good exposure to the tr ade-off between the complexity of different coding techniques and their error recovery capabil ities. They will gain a perspective on the suitability of alternate coding techniques for different error severities.
3. If there is adequate hardware, like a PC with wireless card or an access point, and another wire less receiver, the experiment, to some extent, can also be performed on the hardware.