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Classical coding theory and its links to quantum codes

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Error-correcting codes act on transmitted data, detecting and correcting any errors that may have occurred due to 'noise' within the communication channel. The concept of coding theory is to make messages easier and safe to read. We will discuss different methods of code techniques that can be used to communicate data safely from one place to another. The transmission channel is presented through Shannon's 'model of communication' which depicts the journey of data from source to the receiving location. Linear codes, which work with linear combinations of code words, correct errors through the construction of generator matrices and parity check matrices. We will consider the type of code called Reed-Solomon codes, which frequently occur in technologies such as CDs and DVDs. Further to this, we will discuss a new branch of coding called quantum error correcting codes and we will focus on the family called on stabiliser codes that work on a subspace of a finite dimensional Hilbert space.

Biography

Selina Patel is a final year undergraduate mathematics student at Nottingham Trent University. Her interests extend to mathematical aspects of quantum mechanics and biological modelling.

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