Visible Light Communication System (MWH1b-14)

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Introduction
Visible light communication (VLC) is considered as a promising future wireless communications technology. Meanwhile, progress in light emitting diode (LED) technology brought this into wireless data transmission. One of the current technologies for VLC is illumination of LED. Computers can get information from the light source.

Motivation
Nowadays, many shopping malls and public transport will utilize LED matrix for advertising. However, the tiny drawback of the current LED display is only to display the message without any interaction with the audience. This rises up our passion to develop a model with the combination of VLC technique and LED matrix.

Aim and objective
The aim of this project is to develop a model for the transmission of data from an LED matrix to a smartphone via visible light communication (VLC) technique. The LED matrix will generate the signal and the camera of the smartphone is used as a sensor to capture the continuous changes in state (on-off) of the light, which is invisible to the human eye. The information captured in the camera is decoded as barcode and the designed message is displayed via our App.

Methodology

![Diagram of the system block diagram](image1)

Image Processing in Matlab
Converting the photo captured by smartphone into decodable barcode image.

Result

![Image of LED matrix](image2)

Limitation
1. Because of the inadequate light intensity and the small size of the LED matrix, the detecting distance between the smartphone and the LED matrix should be within 5 cm.
2. In order to wait for capturing a complete barcode-shaped image, the user will spend more time to capture the image.
3. The higher frequency of the light flashing will raise the difficulty of capturing and lengthen the time of scanning the barcode-shaped image.

Conclusion
This FYP is mainly focused on encoding and decoding the data information in barcode format through VLC technique. The user can get access to their website. There are still many limitations of development. Hence, further work could be focused on designing or making a much larger LED matrix for the simulation, and also the larger LED matrix will bring the stronger light intensity of LED and in turn the user can put the smartphone far away from the LED matrix.