

ABSTRACT

The need for positioning technology is currently in high demand due to its various applications, however the existing technology widely used by people, namely GPS, cannot accurately detect positions in indoor environment. Therefore, a specialized indoor positioning system is required to get a more accurate position. The technology under recent development is the Indoor Positioning System (IPS), which has been widely studied by various groups of scientific researchers. IPS can be classified based on the type of signal used, i.e., radio frequency, light, acoustic, and magnetic field.

In this research, the IPS utilized can be classified as light-based through an invisible light medium. The system is designed using an infrared LED that is mounted on a microcontroller. The microcontroller represents a static beacon that functions as a transmitter. The receiver on the other hand, employs the infrastructure that is widely available, namely CCTV cameras. The experiment in this final project used two CCTV cameras. CCTV will be set to work on night mode so that the captured image is monochromatic without IR filter. The main image processing functions are performed i.e., detection using blob feature extraction to detect beacons and ambient light reduction. The ambient light disturbance can be reduced by shortening the exposure period. Additional image processing function is the mixing of the RGB channel to increase the brightness level of the image for surveillance since the image was darken by the shorter exposure period. Observing the test results, the system can detect more than one beacon and can determine the position of each beacon with centimeter accuracy with a maximum average position error of 3 cm and a maximum positioning error of 10 cm from the actual position. It is worth noting that the system can still be used for surveillance needs.

Keywords : *indoor positioning system, invisible light , blob detection*