Aufgabenbeschreibung

Bachelorarbeit/Studienarbeit N.N.

Development of a low-cost LED vein detection sensor

Drawing of blood is one of the most common invasive procedures in health care. However, complications such as increased pain, bruising, hematoma or collapsing veins still arise as a successful venipuncture is dependent on clinician skills and patient physiology. The Institute of Medical Device Technology (IMT) is investigating devices to improve blood draw efficiency in the clinical setting. To use robotically-assisted needle insertion techniques, a suitable vein has to be first identified and located accurately. A cheap potential method of vein detection may be the use of LEDs to detect reflected light. The use of LEDs as light detectors has been studied and proven in the literature. However, to our knowledge no device exists that uses this property of LEDs for vein detection. Therefore, this project is focused on investigating the possibilities for a low-cost LED-based vein detection sensor. For this purpose, the required light characteristics for detection of surface veins will be investigated. In addition, experiments will be performed investigating methods to improve reliability of detection.

The main points to be addressed are:

- Literature search on typical vein depth and behaviour of light within human tissue.
- Literature search of different LED light sensing concepts and the used parameters.
- Develop an experimental setup for investigation and evaluation of different light sensing concepts using an Arduino and standard LEDs.
- Build, test and evaluate different LED setups for the detection of veins.
- Based on previous results, create a single LED light detector sensor module.

Supervision will be provided in English by a native English speaker (From New Zealand). As a result, the thesis should also be written in English. This thesis will be co-supervised by two members of IMT.

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