Robotic vehicle for automated illuminance measurement

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In lighting engineering practice illuminance measurements in indoor spaces are carried out manually by using portable illuminance meter. Measuring illuminance at the grid points defined by the lighting standards [1] is a lengthy and tedious task. To automate the illuminance measurement, we have developed a robotic vehicle equipped with an illuminance sensor (Fig 1). The illuminance sensor was calibrated to a professional illuminance meter (Fig 2).

MATLAB-SIMULINK simulation software [2] was used to control the robotic vehicle and accomplish the automated measurement. The self-driving robot scans illuminance in a predefined area and saves data to an SD card for further analysis. We have also developed a mobile application to control the motion of the measurement robot via Bluetooth communication. The measurement data can also be displayed on the smart phone's screen in real time (Fig 3).

The robotic measurement allows the user to collect much more data compared to manual measurements providing detailed information on the uniformity of illuminance distribution.
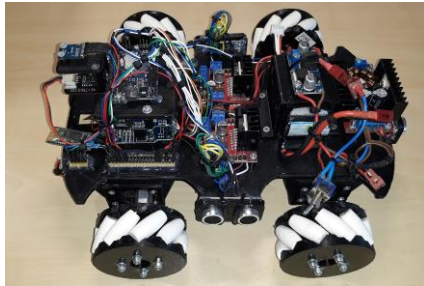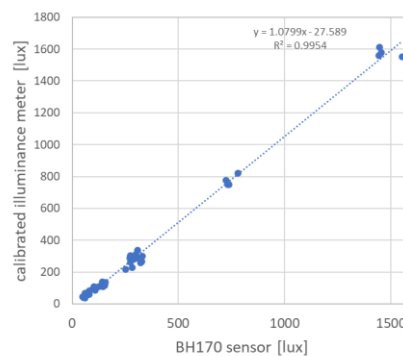

Fig.1 – The robotic vehicle

Fig.2 – Calibration curve of the BH170 illuminance sensor

Fig.3 – Screen shot of the mobile phone controlling the robotic vehicle

References
[1] MSZ EN12464-1:2011 "Light and lighting - Lighting of work places - Part 1: Indoor work places"
[2] Matlab-Simulink (Mathworks) www.mathworks.com