

Analysis of Phasor Distortions by Fog in Time-of-Flight Measurement

Time-of-Flight 計測における霧による距離計測歪みの解析

Student No.: 201821638

Name: Keita Yamazaki

This thesis proposes a time-of-flight (ToF) measurement method that can estimate the depth in a foggy scene. It is known that depth measurement by ToF camera in a foggy scene cannot capture correct phase difference and amplitude. This is because the light emitted from the light source of the ToF camera is scattered by the fog, and the optical path length of the light returning from the target object is different from that without the fog. This study uses a ray-tracing simulation to reveal the change in ToF measurement value when light is scattered by fog and adversely affects the measurement. This thesis examines the following parameters: the distance between the object and the ToF camera, the modulation frequency of the illumination emitted from the light source of the ToF camera, and the scattering coefficient of the fog. Based on the results, this thesis creates a look-up table that estimates the depth from the ToF measurement value of the scene with fog. The effectiveness of the proposed method was evaluated for unknown scenes in the simulation.

Academic Advisors: Principal: Yoichi OCHIAI

Secondary: Norihiko UDA