Comp 209 white literature research

1. The reflection and refraction of a beam of light is treated. Approximate solutions of Maxwell’s equations are used to describe the electromagnetic field of the beam being limited in the transverse direction. The point of departure is the classical paper by Schaefer and Pich. The laws of reflection and refraction are derived. Fresnel’s formulas and their corrections are presented for both polarizations. The case of total reflection is investigated for *E* polarization in greater detail. The electromagnetic fields and the time-average Poynting vectors are explicitly derived for both the optically dense and less-dense media. The flow of energy at total reflection is studied extensively. [1]
2. The crystalline lens makes a major contribution to intraocular light scatter, yet the responsible structural features have not been identified. A hypothesis is presented that implicates the fibre architecture of the ocular lens in small-angle scatter, this being the only part contributing to the associated reduction in vision. The main evidence supporting this hypothesis is a calculation of light scatter by a model lattice of fibres simulating the fibre lattice of the ocular lens. [2]
3. For many simple layouts, a mirror-based solution may save cost and reduce the weight of a given system (assuming that off-the-shelf mirrors can be used). A mirror system might also make sense when sys tem size is not a constraint, e.g. on a large bench. Mirrors are favorably used for wave length ranges that are strongly absorbed by most types of glass. High power laser applications where even partial absorp tion may be a concern could be another strong case for using mirrors rather than prisms. Any bubbles or inclusions in the glass of a prism could lead to preferential absorption and heat build-up, which could permanently damage or ultimately even crack the prism. Mirrors are also preferrable in applications where fl exibility and quick changes are more important than other system parameters. One major disadvan tage to a mirror-based layout, however, is the need for mounting fi xtures for each mirror. With multiple mirrors and mounts, positioning issues and alignment complex ity can quickly become worrisome. [3]
4. Ethics and robotics are two academic disciplines, one dealing with the moral norms and values underlying implicitly or explicitly human behavior and the other aiming at the production of artificial agents, mostly as physical devices, with some degree of autonomy based on rules and programmes set up by their creators. Robotics is also one of the research fields where the convergence of nanotechnology, biotechnology, information technology and cognitive science is currently taking place with large societal and legal implications beyond traditional industrial applications. Robots are and will remain -in the foreseeable future- dependent on human ethical scrutiny as well as on the moral and legal responsibility of humans. Human-robot interaction raises serious ethical questions right now that are theoretically less ambitious, but practically more important than the possibility of the creation of moral machines that would be more than machines with an ethical code. The ethical perspective addressed in this volume is therefore the one we humans have when interacting with robots. Topics include the ethical challenges of healthcare and warfare applications of robotics, as well as fundamental questions concerning the moral dimension of human-robot-interaction including epistomological, ontological and psychoanalytic issues. [4]
5. Light detection and ranging (LIDAR) sensors, employing direct time-of-flight (dToF) measurements, are crucial for precise surface localization and are increasingly integrated into compact chip designs. These sensors have extensive use in proximity sensing in various applications. This article presents the innovative use of LIDAR sensors for ranging within waveguides to accurately detect touch and pressure. In our OptoSkin sensors, light propagates via total internal reflection (TIR) within the waveguide. Then, it is reflected back to the sensor as a result of waveguide deformation and/or scattering in the contact area, a phenomenon attributed to frustrated total internal reflection (FTIR). We have designed, simulated, and implemented different OptoSkin sensors using waveguides constructed from a flexible rod, rigid-curved 3-D-printed resin, and planar soft silicone rubber, respectively. Each configuration is equipped with multiple LIDAR sensors, demonstrating effective localization of touch points. In addition, pressure sensing was performed on the elastic wave guides. These novel touch sensors show great potential for applications such as robotic sensor skins, which enhance tactile responsiveness and interaction. [5]

# Bibliography

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