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Senior

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Summary:

Light propagates through a diffuse medium like wax by a process called photon diffusion. The goal of this project is twofold; first, to model this phenomenon as the random walk of particles of light, the (in) famous photons of quantum theory, through a medium with randomly situated scattering sites. Second, to get high-resolution data to test the model. We currently use a tored-down inkjet printer, an Arduino and a high power LED to collect the high-resolution data. As we progress through the development of the setup, our goal is to make it from scratch using 3-d printed parts for the placement of the LED, photodiode, and wax sample. We will also use motors with precise movement to allow fine movement to improve data collection.

For modelling, we will be using the programming language Python to show random movement of particles in an enclosed space synonymous to a gas diffusing through a room. The boundary conditions will be created by making “walls” off which the photons will bounce back and continue diffusing through the medium. The wax sample, which serves as the medium, is covered in aluminum foil to create similar boundary conditions. The collected data will then be analyzed and used to test the proposed model.