The main purpose of the project is to reduce the high lighting power consumption caused by the usage of conventional lighting systems. An electrowetting-driven indoor solar lighting system was developed which contain four different components. They are: multiple voltage sources, a liquid prism, a white light source, and a programmed controller.

The fabrication process utilize the use of a NanoFabrication Lab. The process of fabricating an electrode sidewall starts with covering a small area of the glass with the kapton tape after cleaning it and placing it on the spin coating machine. Second, dispense the Ion Gel (dielectric material) and start spin coating at 2000-3000 rpms. Third, the glass shall be left on a hot plate under 75°C for 24 h to dry. Fourth, spin coat the Fluoropel at 1000-1500 rpm and leave it for 12 h to dry under 65-75°C. The same process shall be done for the glass sidewalls and the base but without the Fluoropel 800 coating. Fifth, the walls shall be attached together using adhesive to form the cubic shape of the prism. Lastly, the prism shall be filled with two immiscible liquids, water and silicon oil.

The working principle of the liquid prism is based on the electrowetting phenomenon, which is well described by the Young–Lippmann theory to control the left angle $\theta_L$ and right angle $\theta_R$ of the prism. The following graphs present the theoretical results which conclude relationship between the prism (apex) angle $\phi$ and $\theta_L$ and $\theta_R$ of the prism.

Moreover, The liquid prism main purpose is to transmit light for indoor lighting. The equations governing transmittance of power are Snell’s law and Fresnel equations. With a fixed incident angle, a theoretical study was made to understand the performance of prism in transmitting light with the change of the prism angle $\phi$ and the results were shown in the graph below. The graph demonstrate how the change in the prism angle $\phi$ can affect the intensity of the light passing through the prism.