# Need and Constraints

Every year the average family can spend up to [] a year on energy costs in the form of air conditioning during the summer months, especially in areas where daily temperatures can reach up to 40 degrees Celsius. One of the most common methods in use today of combatting this energy consumption is to outfit buildings with fixed shades on the exterior of the building that block the majority of sunlight from entering the room. This solution creates the disadvantage of blocking light and obstructing sightlines permanently. With this project we aim to create a simple and elegant approach to blocking sunlight only when wanted through the use of autonomous actuating blinds. These blinds are expected to function in a hypothetical home in Austin, Texas during the months when air conditioning systems would be required. The blinds will block sunlight only when the sun is at a certain brightness while automatically retracting when the day cools down. That is to say, the blinds must autonomously open and close at suitable times during the day; responding to the changing levels of solar radiation reaching the windows.

In order to create a design that fits the client’s specification we have compiled a list of hard and soft constraints for our window covering unit. Hard constraints are those specified by the client that cannot be altered. The hard constraints include the following.

* Blinds must work autonomously
* Folding unit must be square or "equiaxed"
* Must be able to close all the way and cover entire window and open all the way to allow line of sight and let light enter
* Must be able to lift its own weight as well as the weight of other attached panels
* Must operate for a long time without needing maintenance or hinge replacement
* Must be robust enough to withstand elements such as rain and wind without damage
* Must not be a fire hazard
* Must be able to fully open and close within the maximum temperature range

Soft constraints are those we would like to be true but can be modified to fit the design if required from a technical or aesthetic standpoint. The following are soft constraints for the design.

* Blinds are installed on the outward face of the window
* Unit box should be close to 6"
* System should reduce cooling costs noticeably
* Should be visually appealing
* Covering should not require much force to deform or close
* Hinges must not exceed 90 degrees to close
* Should be safe for people outside ie. Should not create hotspots or reflect harmful amounts of light
* Shouldn't harm environment or wildlife
* Should withstand elements or wildlife
* Should be UV resistant