Designing a solar car is a complex task, any changes in design parameters can affect the overall efficiency of the car. The weight of the body and its design is one of the most common problems encountered in solar cars, which affects the car's efficiency. Therefore, this report will focus on optimizing the design of the solar car chassis to address this issue [14]. The car chassis plays a crucial role in ensuring the safety of occupants, especially during collisions, and the selected chassis material and structure significantly affect the behavior of the overall car structure. To achieve a lightweight yet rigid chassis, high carbon steel or aluminum is preferred, and the frame structure will be a hollow tubular space frame and I beam shape. In addition to addressing the weight and structural considerations, the aerodynamics of the solar car will also be considered [2]. A streamlined body design, with smooth and curved surfaces, will help reduce drag and improve the car's overall efficiency. The placement of the solar panels and battery will also be optimized to maximize the car's energy conversion and performance [2]. 2.1Chassis The challenging that may occurs for the design of a solar car chassis is to design a lightweight, strong, and durable structure that can support the weight of the solar panels, batteries, motor, and other components of the car, while also protecting the occupants in the event of a collision [4]. Here are some of the key challenges that must be addressed in the design of a solar car chassis: ● Weight: The chassis must be as lightweight as possible, in order to minimize the overall weight of the car and improve its efficiency. ● Strength: The chassis must be strong enough to withstand the various loads that will be placed on it, such as the weight of the car, the forces of acceleration and braking, and the impact of a collision. ● Durability: The chassis must be durable enough to withstand the elements and the rigors of everyday use. ● Safety: The chassis must be designed to protect the occupants in the event of a collision. In addition to these challenges, the solar car chassis must also be designed to be compatible with the other components of the car, such as the solar panels, batteries, and motor. Here are some of the key factors that must be considered in the design of a solar car chassis: ● Material selection: The chassis should be constructed from a lightweight and strong material, such as carbon fiber, aluminum, or titanium. ● Structural design: The chassis should be designed to distribute loads evenly and minimize stress concentrations. ● Manufacturing process: The chassis should be manufactured using a process that ensures high quality and consistency [16][17]. 2.2 Shell The shell of a solar car is an essential component that affects the car's performance, safety, and efficiency. The primary challenge in designing the shell of a solar car is to create a lightweight, aerodynamic, and durable structure that can accommodate the solar panels and other components while minimizing energy loss due to friction and wind resistance. The shell must also be designed to provide adequate protection to the occupants in the event of a collision [3]. To address these challenges, the selection of materials and safety factor calculations are crucial in the design of the top shell of a solar-powered vehicle body. The material chosen should have high strength-to-weight ratio and impact resistance to withstand the forces experienced during a collision [3]. The shell's structural design should be optimized to distribute impact forces and minimize deformation, reducing the risk of injury to the occupants. In addition to addressing the weight and structural considerations, the aerodynamics of the solar car shell will also be considered. A streamlined body design, with smooth and curved surfaces, will help reduce drag and improve the car's overall efficiency. The placement of the solar panels and battery will also be optimized

to maximize the car's energy conversion and performance [10][14]. 2.3 Roll Cage The roll cage of a solar car is a critical safety element that protects the occupants in the event of a rollover or collision. The primary challenge in designing the roll cage of a one cab solar car is to create a strong and durable structure that can withstand the forces experienced during a rollover or collision while minimizing weight and space requirements [1][5][12]. To address these challenges, the roll cage should be designed to provide maximum protection to the occupants. The arch of the roll cage should be strong and designed to absorb the kinetic energy during impacts, reducing the risk of injuries for drivers and passengers. The material chosen for the roll cage should have high strength-to-weight ratio and impact resistance to withstand the forces experienced during a collision [1][5][12]. In addition to addressing the safety considerations, the roll cage should also be designed to minimize weight and space requirements. This is particularly important in a solar car, where weight reduction is crucial for maximizing energy efficiency and performance [12].