# Capstone Proposal: Baja SAE Rolling Chassis Design and Build Project

Baja SAE is a design competition held by the Society of Automotive Engineers (SAE) with the intent to have college students display their engineering skills by building a small off-road vehicle, similar to a modern side-by-side. Universities worldwide will compete in a variety of events to prove the effectiveness of their designs. Events will range from pitching your vehicle as a marketable product to racing side-by-side with other colleges on very technical terrain that will test any off-road vehicle’s capabilities. The objective of this project is to design, fabricate, and assemble a rolling chassis capable of handling the extreme terrain it will encounter at competition.

There are two types of events that the vehicle can compete in: static and dynamic events. Static events consist of meeting technical inspections, cost reviews, design judgement, and sales presentations. These types of events are designed to evaluate ergonomics, functionality, manufacturability and other important aspects of a mass produced off-road vehicle from a design aspect. Dynamic events consist of acceleration tests, traction tests, specialty events, and an endurance race. Traction tests can consist of hill climbs, towing, and tight maneuverability courses. Specialty events can consist of rock crawling, mud bogging, and terrain that will test suspension. These events will test the true functionality and robustness of the vehicle. All these events can change from year to year and location of competition, so the vehicle must be designed with the intent of flexibility of its use.

This project will be a collaboration between the Bobcat Motorsport Club and the Capstone Group. The Capstone Group will focus solely on design of the rolling chassis, which will consist of a full body roll-cage, front suspension geometry, rear suspension geometry, and steering geometry. Put simply the rolling chassis should be everything necessary to allow the vehicle to sit on its own 4 wheels. All other subsystems such as the pedal box, drivetrain, brake systems, seats, and driver controls will be handled by the Motorsport Club. Both the Capstone and club will need to work closely together to integrate all the components of the vehicle for a completed design. The vehicles design must meet all Baja SAE rules and consider the drivers and others safety as the highest priority. Any vehicle that does not meet these expectation cannot be raced until it is deemed otherwise.

Between 6 and 7 people will be needed for the Capstone Team. This allows 2 people to be in charge of the front suspension and steering geometry, 2 on the rear, and 2 to 3 for the roll cage. The roll cage must just adhere to more strict rules and hence will likely need more resources than the front and rear suspension. Those already on the Bobcat Motorsport Club are preferred, but any experience working on cars, custom fabrication, FEA/CAD, racing, and ORV driving experience are preferable as well. All participants must join the Bobcat Motorsport Club and the SAE International professional organization. Club dues are $30/year. Sponsor: MSU Bobcat Motorsports Club and the Department of Mechanical and Industrial Engineering