U.S. DEPARTMENT OF ENERGY
AlgaePrize
NextGen Algal Innovators

**Team Name:**

The Algenius Thinkers

**Team School/Organization:**

University of Texas at Austin, Austin, TX

**Abstract:**

Algae are attractive species for manufacturing lipid-based biofuels since they are ecologically cleaner than fossil fuels. Algal biofuel production has a lower atmospheric carbon footprint than fossil fuels because photosynthetic algae consume atmospheric carbon dioxide to produce biofuel lipids; biofuels are biodegradable and generate fewer greenhouse gases when burned. Due to fossil fuel sources depleting and their environmental impact, large-scale biofuel production is desirable. Lipid algae production faces obstacles such as high-cost production maintenance and long-chain fatty acid production. This study effort can address the main difficulty of algal production of long-chain fatty acids instead of short-chain, which lowers production costs. This study recommends overexpressing diacylglycerol acyltransferase (DGAT) to produce lipid components and acyl-ACP thioesterases to hydrolyze long-chain fatty acids into short-chain ones for biofuel generation. Due to increased synthesis and quick hydrolysis of long-chain fatty acids, dual overexpression of DGAT and thioesterases will maximize short-chain fatty acid production. For greener energy, a dynamic collaboration is created.