

Production of Biodiesel and Ethanol from Algae
(Technical Report)

Competing Notions of Autonomous Vehicle Safety
(STS Research Paper)

An Undergraduate Thesis Portfolio
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by

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Preface

How can transportation be made safer and more sustainable, healthful, and equitable?

Biofuels may theoretically become a carbon-neutral alternative to fossil fuels, but current biofuels are uneconomical or compete with food crops for land. Algal biodiesel and ethanol are not cost competitive, but the research team hypothesized that coproduction of these fuels could prove profitable. We designed a biorefinery that would produce ethanol and biodiesel from *Chlorella vulgaris* grown in secondary wastewater ponds. The plant's theoretical cost was estimated at \$506,251,000 in capital and the plant would lose \$105,838,000 per year at current fuel prices. Ethanol production accounted for 53 percent of operating costs, suggesting coproduction of ethanol does not improve profitability. Faster-growing algae strains, more efficient water removal, and heterogeneous catalysts can improve return on investment.

In the U.S., developers test autonomous vehicles (AVs) and sell partially automated cars with little federal regulation. Proponents assert that AVs could someday prevent most of the 36,000 American roadway deaths each year, but many road users and researchers are skeptical. Many skeptics distrust developers and regulators. By holding AV developers to higher standards of test safety, to greater accountability for hazards, and to substantial data transparency, public policy can build greater public confidence in AV developers and in the future of automated driving.

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