



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Sanath K. Devalapurkar	Project Number S1403
Project Title Preserving Algebraic Structures on Exact Quasicategories with the K-Theory Functor	
<div><div>Objectives/Goals The objective of this project is to establish the foundations for a new perspective on the algebraic K-theory of exact quasicategories, so as to allow for a simpler way to approach multiple problems involving the existence and preservation of algebraic structures.</div><div>Methods/Materials The theory of quasicategories and quasioperads was used extensively. The classical perspectives on K-theory was used as a motivation for laying the foundation for a new perspective on the algebraic K-theory of exact quasicategories. The methods of simplicial homotopy theory and category theory were instrumental in proving our main results.</div><div>Results The classical interpretation on the K-theory of an exact quasicategory is as a spectrum. My idea was to view these objects not as spectra, but rather as stable quasicategories. This shift in perspective allowed me to show that the K-theory functor respects module structures, and can be used to develop a homotopical derived Morita theory for algebras in quasioperads, which, in turn, allowed for the comparison of the K-theories of different exact quasicategories.</div><div>Conclusions/Discussion My interpretation of K-theory as a stable quasicategory allows for multiple problems to be simplified. The main calculation shows that K-theory is a very good "algebraic functor" because it preserves module structures, thus, giving rise to a new derived Morita theory. This main calculation also has applications to a theory of quasi-n-operads, which I plan to explore in the near future.</div></div>	
Summary Statement In this project, I describe, how viewing the K-theory of an exact quasicategory as a stable quasicategory (and not as a spectrum) can be beneficial to the study of homotopical algebra.	
Help Received	