



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

<b>Name(s)</b> <b>Sanath K. Devalapurkar</b>	<b>Project Number</b> <b>S1403</b>
<b>Project Title</b> <b>Preserving Algebraic Structures on Exact Quasicategories with the K-Theory Functor</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> 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.</p> <p><b>Methods/Materials</b> 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.</p> <p><b>Results</b> 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.</p> <p><b>Conclusions/Discussion</b> 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.</p>	
<b>Summary Statement</b> 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.	
<b>Help Received</b>	