MISSOURI S&T	Initial Proposal	
	n-Dimensional Graphing Calculator	CS 4091
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1 Problem

Consider a real valued function of one variable $f : \mathbb{R} \to \mathbb{R}$. By a graph G of the function f, we mean a subset of $\mathbb{R}^2$,

$$G = \{(x, y) \in \mathbb{R} \times \mathbb{R} : y = f(x)\}.$$

There exist many applications for visualizing the graph of single variable functions. Several hand held calculators can graph single variable functions. For example, Texas Instruments has a lineup of graphing calculators including the leading TI-Inspire. There are also online applications such as Desmos and GeoGebra with similar capabilities.

Now consider a real valued function of n variables $f : \mathbb{R}^n \to \mathbb{R}$. The graph G of f is defined similarly to that of single variable functions,

$$G = \{(\mathbf{x}, y) \in \mathbb{R}^n \times \mathbb{R} : y = f(\mathbf{x})\}.$$

However, this graph is a subset of $\mathbb{R}^{n+1}$. It is not obvious how one should visualize this graph. A 3 dimensional world offers efficient visualization of two-variable functions at best. There are no well known calculators capable of visualizing a real function of n variables.

The problem is that functions of n variables are common in nature. It is hard to find a system where values are only dependent on one variable. We seek an application capable of visualzing the graph of functions of n variables. Such an application will offer details on functions where previously calculations had to be carried out by hand.

2 Solution

3 Milestones & Tasking

4 MOSCOW

MUST:	Method for displaying graphs of single variable real valued functions on screen
	Method for storing real valued functions of n variables
	Method for displaying projections n variable functions
	Method for user to input n variable functions
	Run at stable 60fps with no warnings/errors
SHOULD:	Parser to allow function input as text
	Run on both Windows and Linux
COULD:	Parser to allow function input as LaTeX
WOULD:	