

A scatter plot showing the relationship between Design Variable  $x_1$  (X-axis) and Design Variable  $x_2$  (Y-axis). The plot displays numerous blue circular markers representing 'Samples'. The data points are distributed across the plot area, with a higher density in the upper-left quadrant and a more sparse distribution in the lower-right quadrant. A legend in the top right corner identifies the blue dots as 'Samples'.

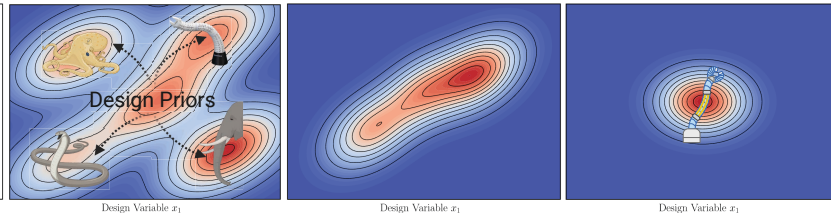
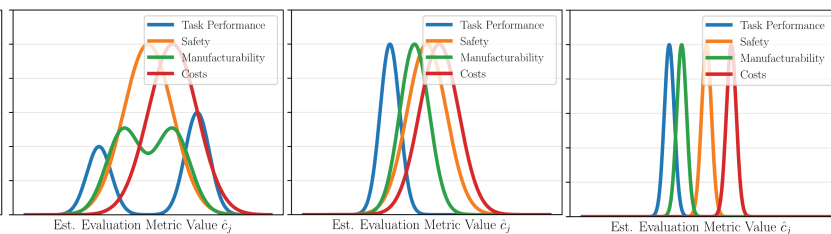


Figure 1 is a bar chart illustrating the estimated evaluation metric values for four metrics: Task Performance, Safety, Manufacturability, and Costs. The x-axis is labeled 'Est. Evaluation Metric Value  $\hat{c}_j$ ' and the y-axis is labeled 'Est. Evaluation Metric Value  $\hat{c}_j$ '. The bars are ordered from highest to lowest value: Task Performance (blue), Safety (orange), Manufacturability (green), and Costs (red). The legend indicates the color coding for each metric.



The figure is a graph titled "Realization Ratio  $\text{RealR} := \frac{\# \text{ Realization It.}}{\# \text{ Refinement It.} + \# \text{ Realization It.}}$ ".

- Axes:**
  - Y-axis:** Labeled "Costs  $c_j$ " and "Optimal Refinement vs. Realization Tradeoff  $\text{RealR}^*$ ". It has a tick mark for "0".
  - X-axis:** Labeled "Sim-to-Real Error  $\|c_j - \mathbb{E}[\hat{c}_j]\|_1$ ". It has a tick mark for "0".
- Curves and Regions:**
  - A green curve labeled  $\text{RealR}^*$  starts from the "Optimum" (marked with a green star) and trends upwards.
  - A brown curve starts from the top right and trends downwards towards the left.
  - A red dashed line starts from the bottom left and trends upwards to the right, defining the boundary of the "Infeasible Design Space" (the area below it).
- Annotations and Labels:**
  - "Initialization" is labeled at the top right corner.
  - "# It." (number of iterations) is written multiple times along various curves.
  - "Period of Realization" and "Period of Refinement" are indicated by arrows pointing to specific segments of the curves.
  - "Current Co-Design Approaches: Only Refinement  $\lim_{\text{RealR} \rightarrow 0}$ " points to the brown curve.
  - "Lower Bound for Computational Optimization  $c_j(\argmin_x \mathbb{E}[\hat{c}_j(x)]) = c_j^* + \|c_j^* - \mathbb{E}[\hat{c}_j(x)]\|_1$ " points to the red dashed line.
  - "Min. Feasible Cost  $c_j^* = \min_x c_j(x)$ " points to the start of the red dashed line.
  - "Infeasible Design Space" is labeled in the shaded area below the red dashed line.
  - "Optimum" is labeled near the origin.