



$$\cos(\theta) = \cos(\vec{u}, \vec{x}) = \frac{\vec{u}^T \vec{x}}{\|\vec{u}\| \|\vec{x}\|} \Rightarrow$$

$$\cos(\theta) = \frac{x_1'}{\|\vec{x}\|}$$

$$\Rightarrow x_1' = \|\vec{x}\| \cdot \cos(\theta) = \left(\frac{\vec{u}}{\|\vec{u}\|} \right)^T \cdot \vec{x}$$

$$= \underbrace{\vec{u}^T}_{\text{unit norm}} \vec{x}$$