



# Brianna Gopaul

[www.briannagopaul.com](http://www.briannagopaul.com)

@briannagopaul



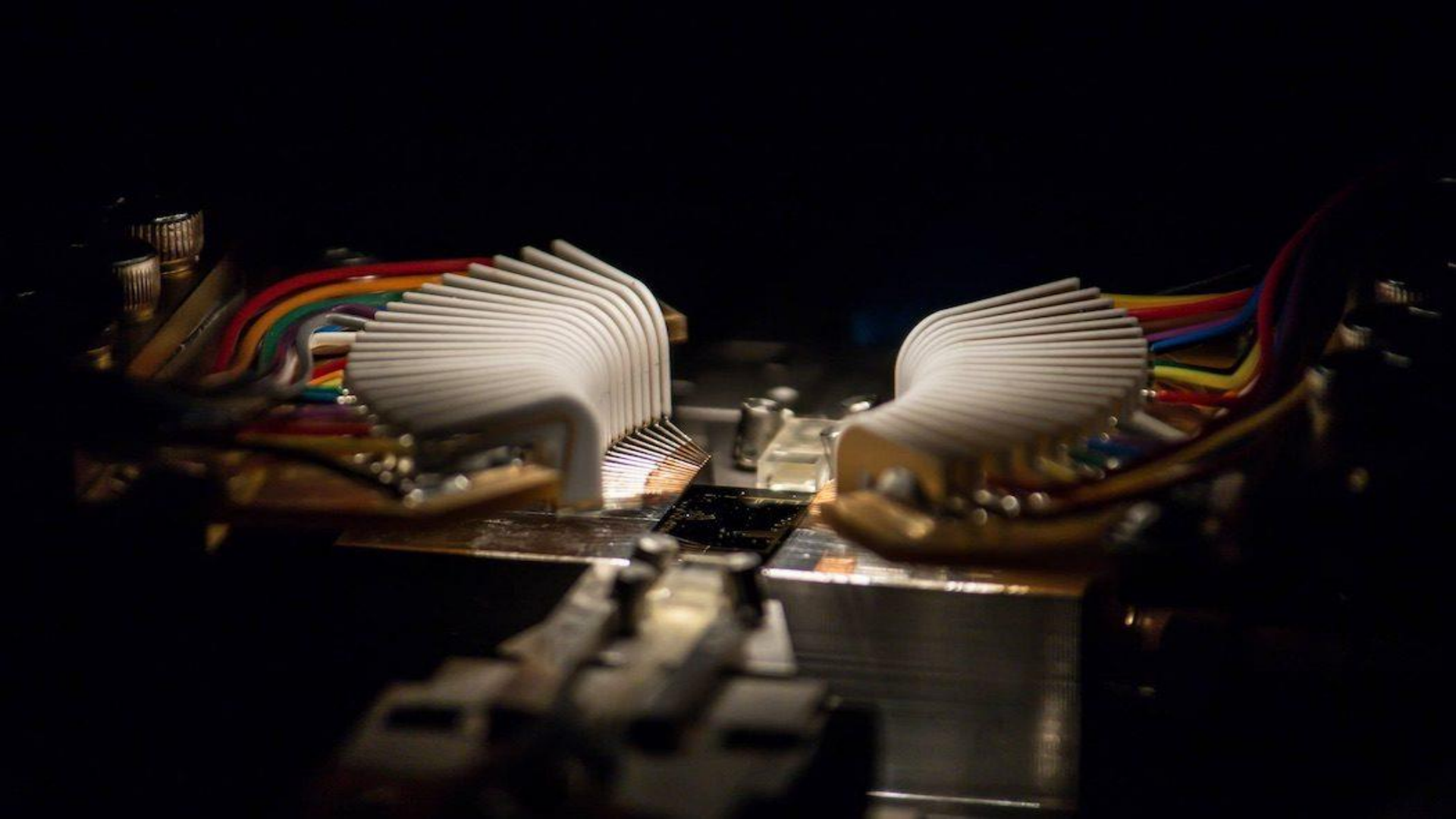
# QUANTUM COMPUTING



**theksociety.com**

rigetti





## GETTING STARTED

[Installation and downloads](#)[Gallery and links](#)[Notebook gallery](#)[Applications and plugins](#)[External resources](#)[Research papers](#)[Research and contribution](#)

## CONTINUOUS-VARIABLE QUANTUM COMPUTING

[Introduction](#)[Conventions and formulas](#)[Quantum algorithms](#)[Glossary](#)[References and further reading](#)

## STRAWBERRY FIELDS TUTORIALS

[Blackbird programming language](#)[Basic tutorial: teleportation](#)

# CV quantum gate visualizations

*Author: Brianna Gopaul*

In a conventional quantum circuit, qubits represented by wires are operated on by quantum gates which collectively perform computations. Similarly, continuous variable quantum computing uses qumodes that represent bundles of interacting photons. To perform computations on qumodes, we leverage Gaussian and non-Gaussian gates.

Gaussian and non-Gaussian gates can be described within the phase space. This space is shown by the position and momentum axes.

Gaussian gates such as the squeezing and rotation gate act linearly on modes. These gates can only reach positive quasi-probability distributions and can be classically simulated. On the other hand, non-Gaussian gates such as the Kerr gate and Cubic Phase gate act nonlinearly. This property allows them to be in negative quasi-probability distributions and not be classically simulated.

**In this notebook, we'll learn about various single mode Gaussian and non-Gaussian gates and apply them to a state using Strawberry Fields.**

```
[1]: import strawberryfields as sf
    from strawberryfields.ops import *

    import numpy as np
    import matplotlib.pyplot as plt
    from mpl_toolkits.mplot3d import Axes3D
```

## Vacuum State

The vacuum state is the lowest energy Gaussian state. It has no displacement or squeezing in phase space.

Here we learn how to create the vacuum state on a quantum circuit with one qumode.

We initialize the Strawberry Fields program. `q` represents a qumode and below we start with one qumode for our circuit.

```
[2]: prog = sf.Program(1)
```



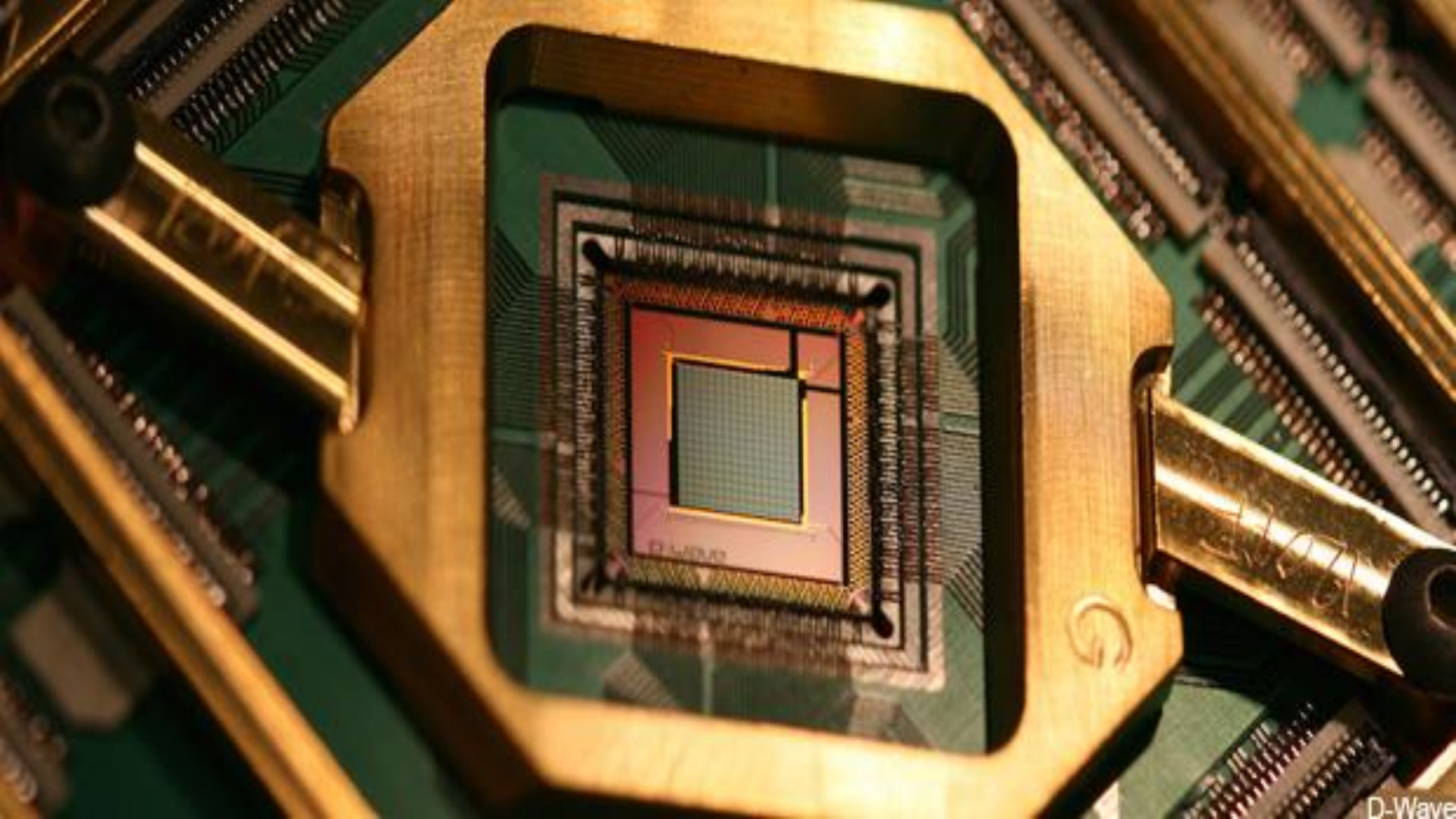


# ARTIFICIAL INTELLIGENCE



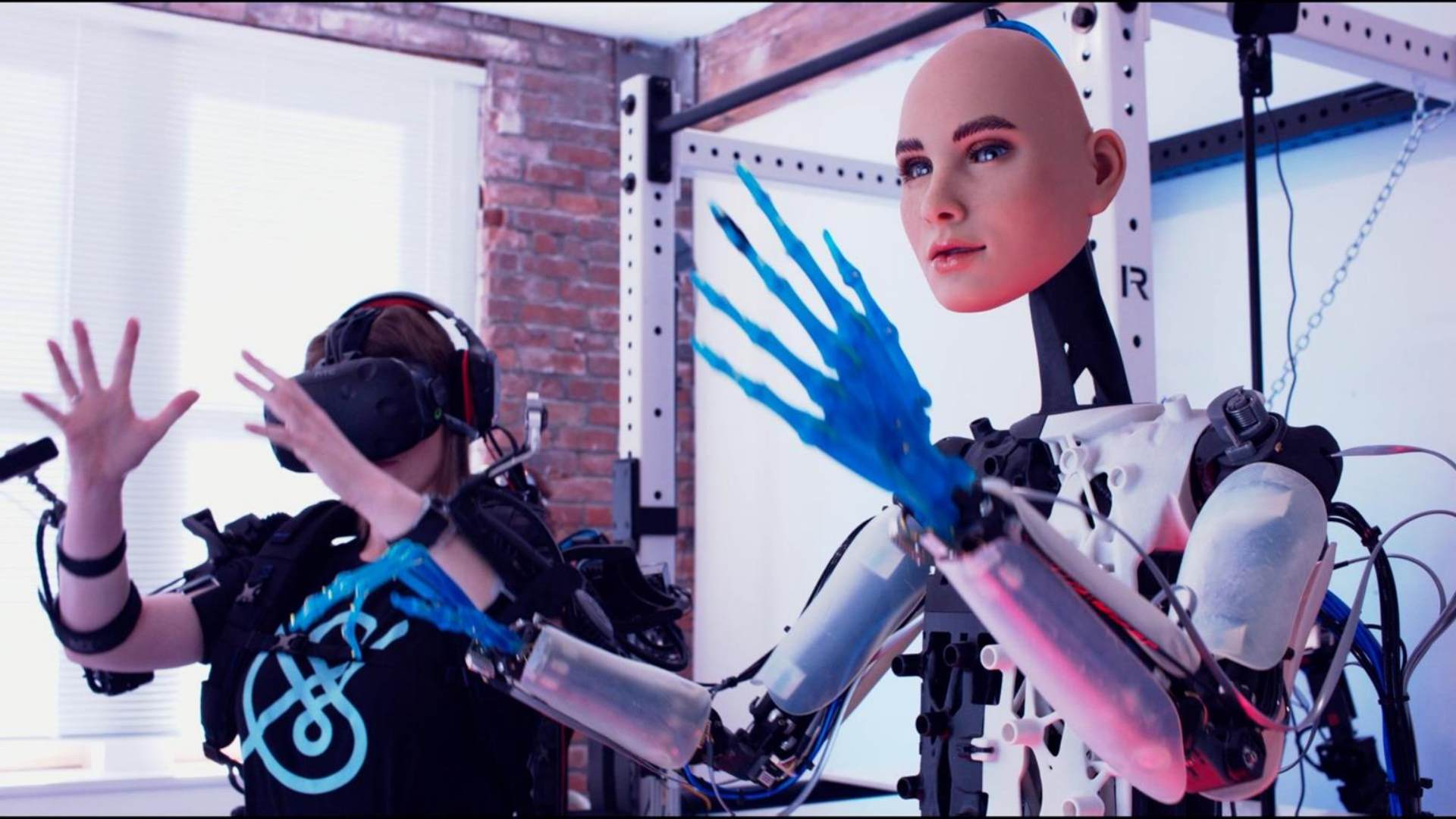
Geordie Rose

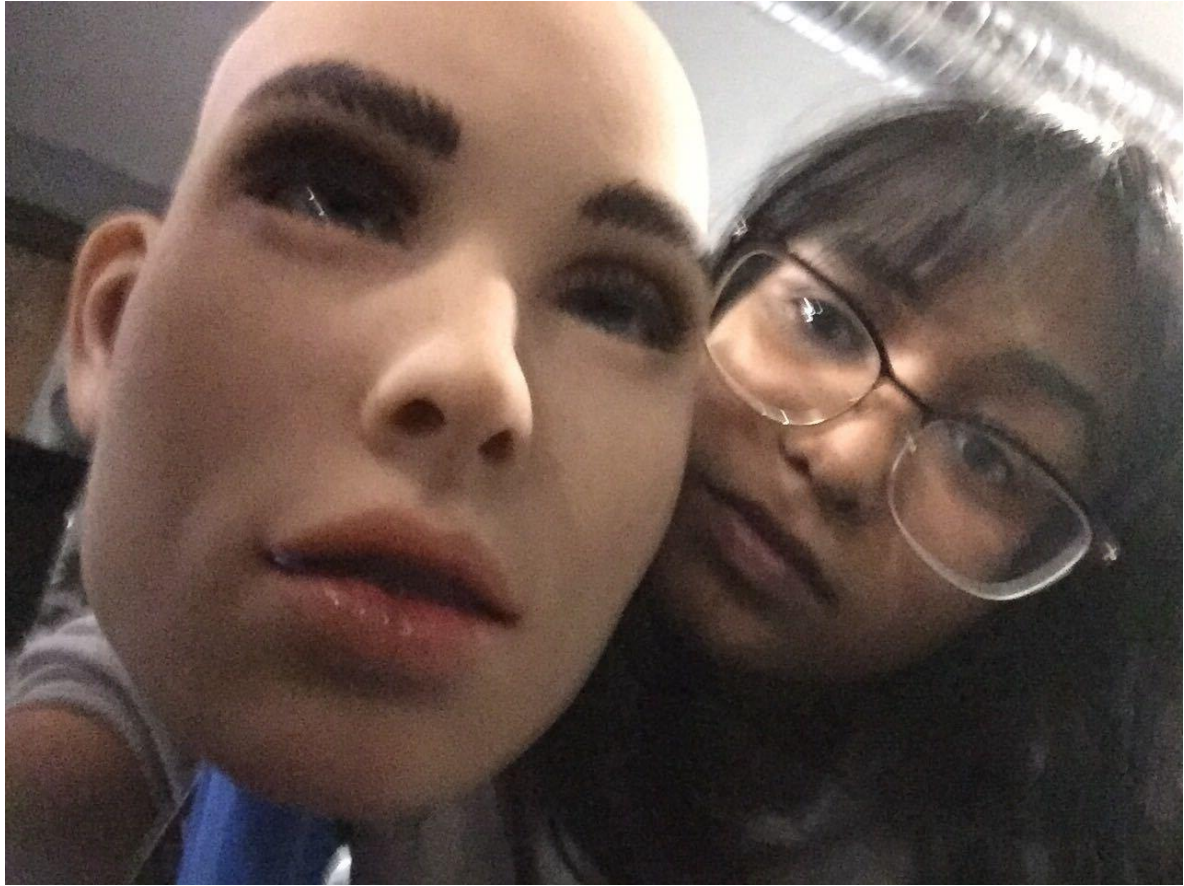














Self-imposed limits



A futuristic yellow and blue aircraft with a sleek, aerodynamic design is shown on a runway. The aircraft has a high-wing configuration and a large, dark cockpit. In the background, another smaller aircraft is visible on the tarmac.

## ADVANCED TRANSPORTATION

A conceptual illustration of nanotechnology. It features a glowing yellow DNA double helix structure on the left. To the right, a blue, chain-like structure with a bright white sphere at its end is shown, resembling a molecular probe or a nanorobot. The background is dark with faint blue particles.

## NANOTECHNOLOGY

A close-up, glowing blue DNA double helix structure. The helix is composed of two intertwined strands connected by horizontal rungs, all emitting a bright blue luminescence.

## GENETIC ENGINEERING

A complex network of interconnected nodes and lines, representing artificial intelligence or data networks. The nodes are small white dots, and the lines are thin, light blue or grey, creating a dense, web-like structure against a dark background.

## ARTIFICIAL INTELLIGENCE





1839



# Education 2.0

1. Shift in mentality – Think BIG.
2. Next generation knowledge and skills.
3. Training thinking as a skill.



# Brianna Gopaul

[www.briannagopaul.com](http://www.briannagopaul.com)

@briannagopaul