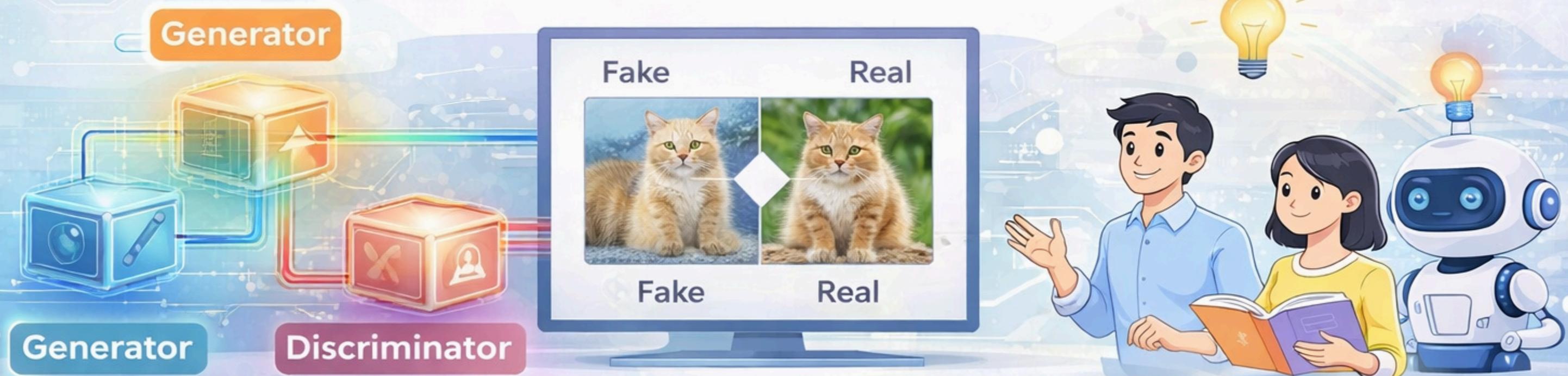


Generative Adversarial Networks (GANs)

A Design Thinking Approach

23ECE604-GENAI AND AGENTIC AI SYSTEMS FOR ELECTRONICS ENGINEER



EMPATHIZE



DEFINE



IDEATE



PROTOTYPE



TEST



TEST

♥ EMPATHIZE – Stage 1

Empathize – Generative Adversarial Networks (Real-World Problems)



Define – Generative Adversarial Networks (Key Problems)

-  Traditional models cannot generate new data
-  Need to create realistic synthetic data
-  Require models that learn data distribution

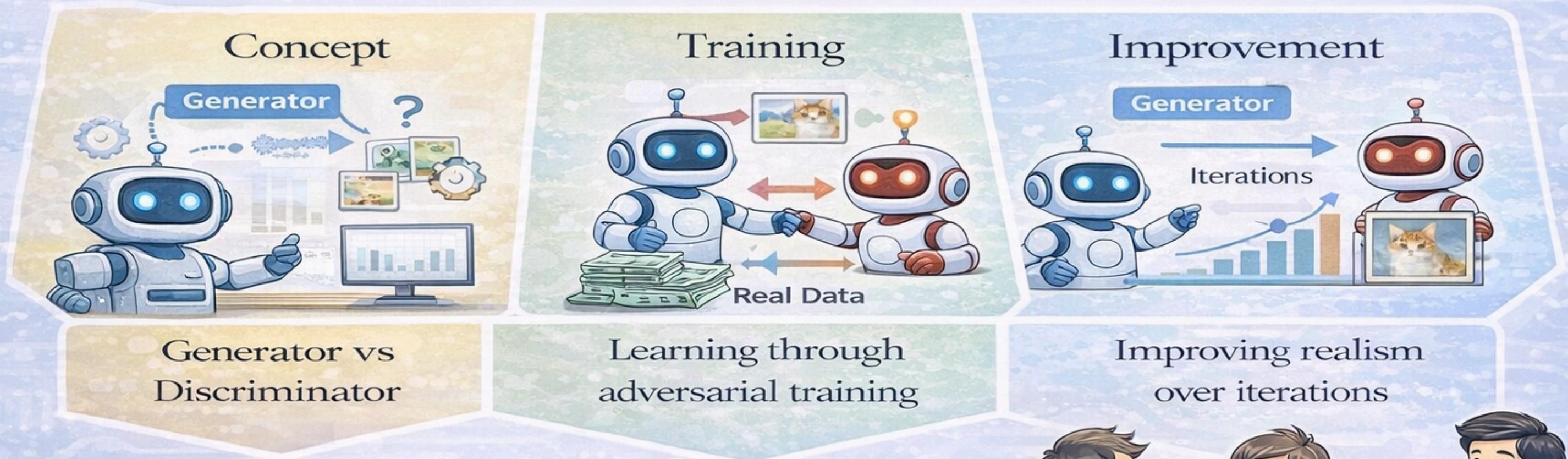


 How can we create realistic data that machines can learn from?

Ideate – Stage 3

Ideate – Solutions Using Generative Adversarial Networks

How can we generate new, realistic data like humans?



Generator vs
Discriminator

Learning through
adversarial training

Improving realism
over iterations

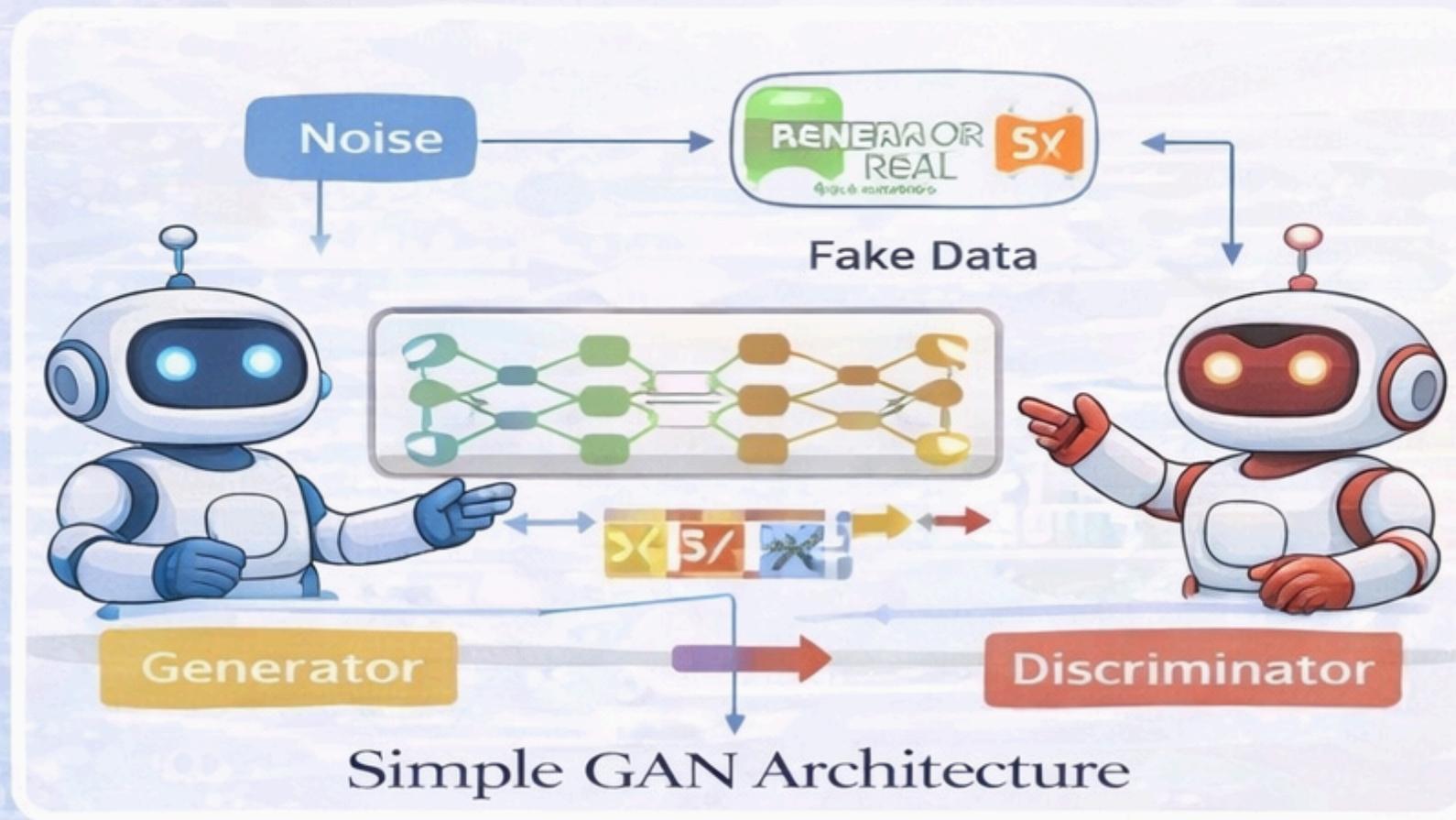
 Many ideas – no judging



🔧 PROTOTYPE – Stage 4

Prototype – Build Generative Adversarial Networks

How do we construct and train GANs?



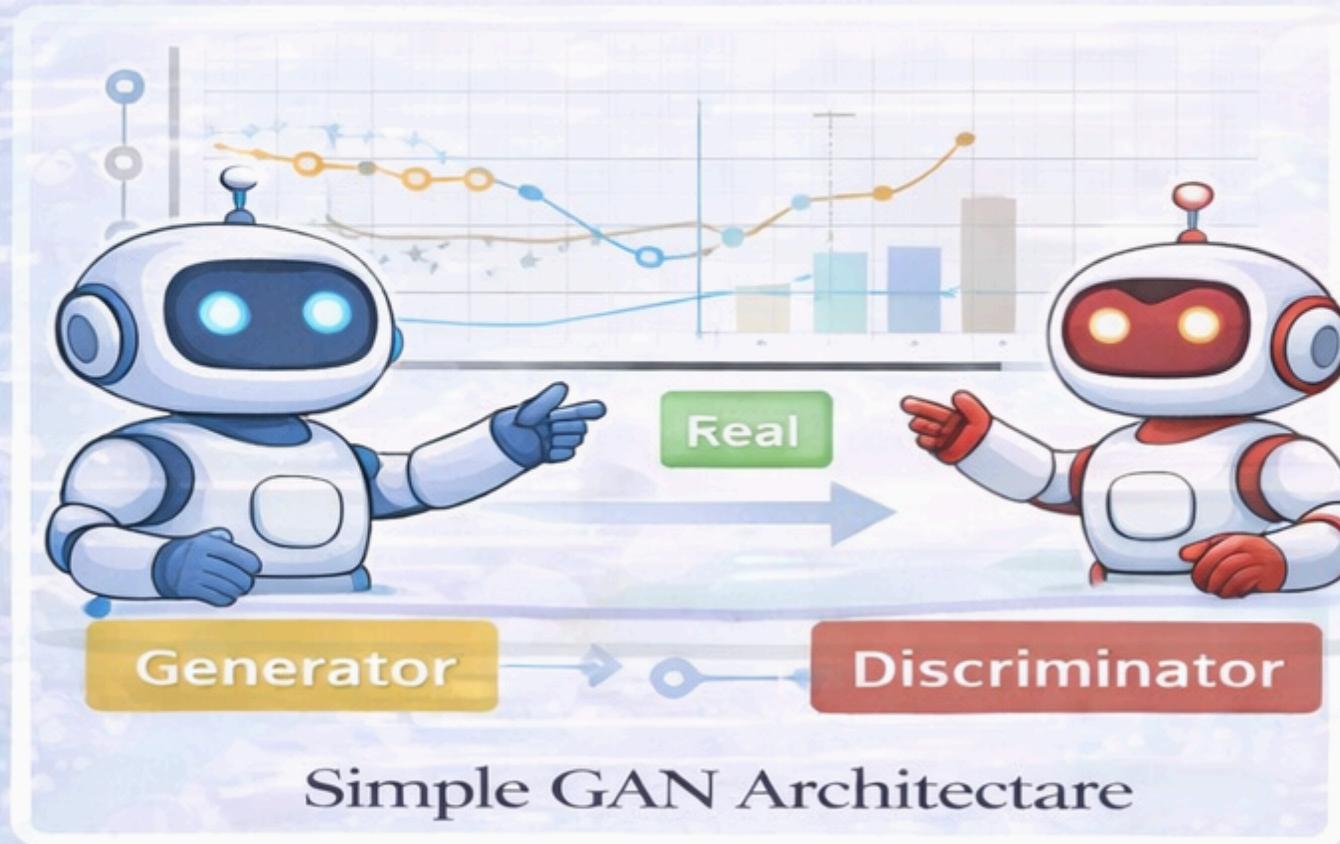
💡 Prototyping tools to experiment?



♥ TEST – Stage 5

Test – Evaluate and Improve Generative Adversarial Networks

How do we assess and refine GANs?



💡 How do we validate and improve GAN outputs?

Advantages & Limitations

✓ Advantages

- ✓ Realistic data generation
- ✓ Data augmentation
- ✓ Creative applications



- ✓ Realistic data generation
- ✓ Data augmentation
- ✓ Creative applications

⚠ Limitations

- ⚠ Mode collapse
- ⚠ Training instability
- ⚠ High computation cost



Applications of GANs



Image Generation



Data Augmentation

Applications of GANs



Super Resolution



Drug Discovery

Conclusion

Generative Adversarial Networks transform how we generate data, offering powerful solutions and opportunities across various domains.



How will GANs shape the future of data generation?

References

Generative Adversarial Networks (GANs)

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