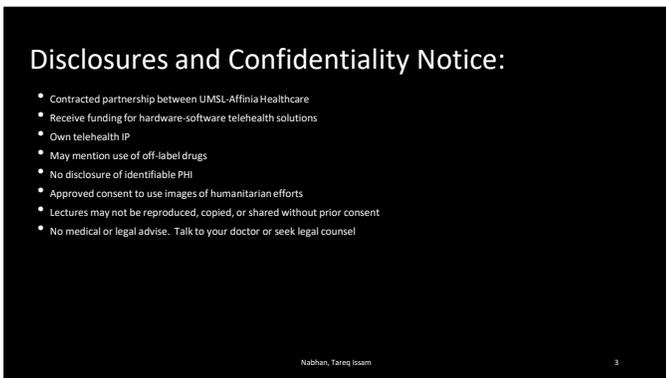


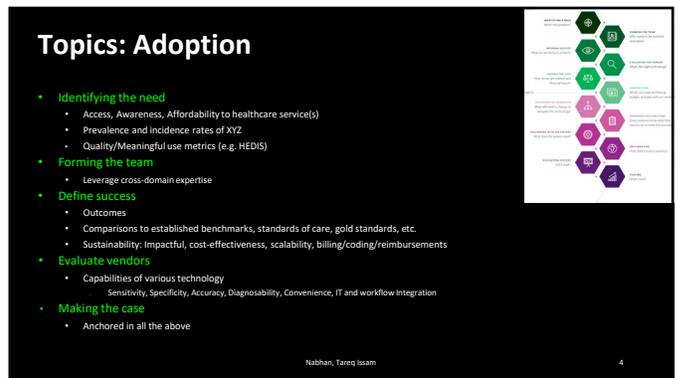
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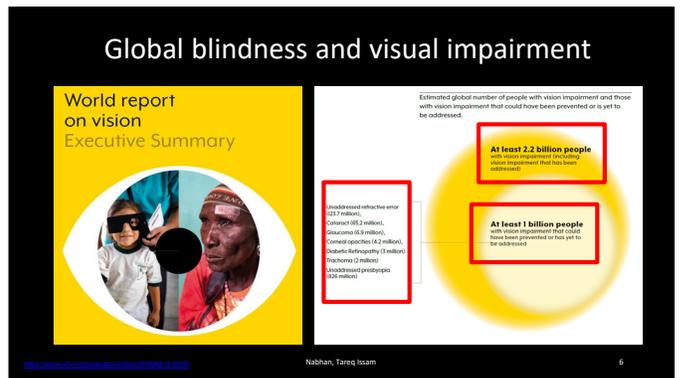
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**World Health Organization**

Global magnitude: eye conditions and vision

"Eye conditions are remarkably common. Those who live long enough will experience at least one eye condition during their lifetime. Globally, at least 2.2 billion people have a vision impairment or blindness, of whom at least 1 billion have a vision impairment that could have been prevented or has yet to be addressed. More reliable data on the met and unmet eye care needs, however, are required for planning. Also, the burden of eye conditions and vision impairment is not borne equally. The burden tends to be greater in low- and middle-income countries and underserved populations, such as women, migrants, indigenous peoples, persons with certain kinds of disability, and in rural communities. Population growth and ageing, along with behavioural and lifestyle changes, and urbanization, will dramatically increase the number of people with eye conditions, vision impairment and blindness in the coming decades."

<https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment>

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**Diabetes by the #s:**



- Prevalence of diabetes mellitus (DM) (2019):
  - Global estimate ~ 463 million
    - ~50% are unaware of their condition
    - Projected to be 700 million by 2045<sup>2</sup>
  - United States ~37 million
    - Ranked 4<sup>th</sup> for number of people with diabetes (20-79 years)
    - Estimated 98 million adults 18+ have prediabetes (2018)
      - ~1 in 3 Americans have diabetes or prediabetes<sup>3</sup>
- Prevalence of diabetic retinopathy (DR):
  - Leading cause of blindness among working adults
  - Global estimate ~103 million; 22.27% (2020)<sup>2</sup>
  - United States ~ 7.7 million; ~25%<sup>3</sup>
  - ~1/5 adults with type 2 diabetes will have some eye involvement when diagnosed<sup>4</sup>

<https://www.who.int/news-room/fact-sheets/detail/diabetes>

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**Prevalence of DR in DM:**

**Table 1** Prevalence of diabetic retinopathy among diabetic subjects

Author (Year)	Type of study	Location	Sample Size, Age in years	Diabetes type	Prevalence of DR (%)	Prevalence of VEDR (%)
Yau (2012) [3]	Meta-analysis	Global	12,620 Mean 58.1 Range 3-97	Overall Type 1 Type 2	35.36 77.31 25.16	11.72 (PDR and/or DME) 38.48 (PDR and/or DME) 6.92 (PDR and/or DME)
North America						
Zhang (2010) [18]	Population	United States of America	1006 Range 2-40	Unspecified	28.5	4.4
Kempson (2006) [7]	Fooled population from 8 studies	United States of America	4440 Range 2-40	Type 2	40.3	8.2
Roy (2004) [14]	Fooled population from 2 studies	United States of America	1,384 Range 2-18	Type 1	79.1	31.2
Nathoo (2010) [6]	Population	Canada	394 Mean 58.8 Range 10-100	Unspecified	27.2	2.3 (PDR) 2.0 (CSME)

*Note: A red circle highlights the 'Prevalence of DR (%)' column in the original image.*

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2827700/>

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**Workforce burden: Eyes by the #s**



- 37 million Americans with DM
- 74 million eyes (+/-; (-) more likely)
- 202,740 eyes/day (101,370 patients/day)
- 8447 eyes/hour
- 141 eyes/minute
- 2.4 eyes/second, 24-hours/day, 7-days/week, for a year... at least every year

Remember:

- ~50% don't know they have DM
  - Diabetes-related blindness cost ~\$500 million/yr
- This number continues to climb
- Another ~100 million with pre-diabetics
  - Observational Danish Study of 112,000 non-diabetic patients = 13.9% had evidence of DR lesions
  - "Pre-diabetic retinopathy"<sup>7</sup>
- Managing many other conditions (HTN-ret, HCL, Glaucoma, Cataracts, Ametropias, Strabismus, etc.)

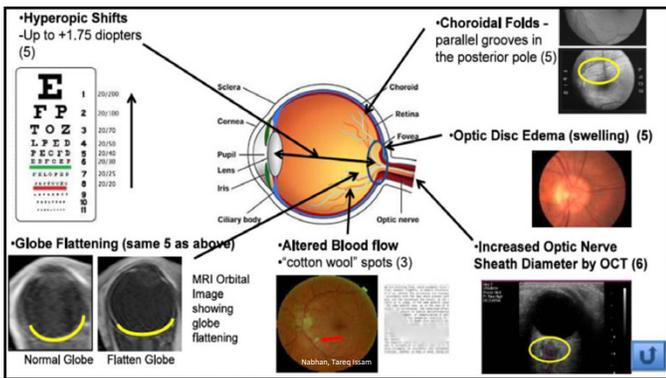
**98 Million** 98 million American adults—more than 1 in 3—have prediabetes

**More than 8 in 10** adults with prediabetes don't know they have it

<https://www.who.int/news-room/fact-sheets/detail/diabetes>

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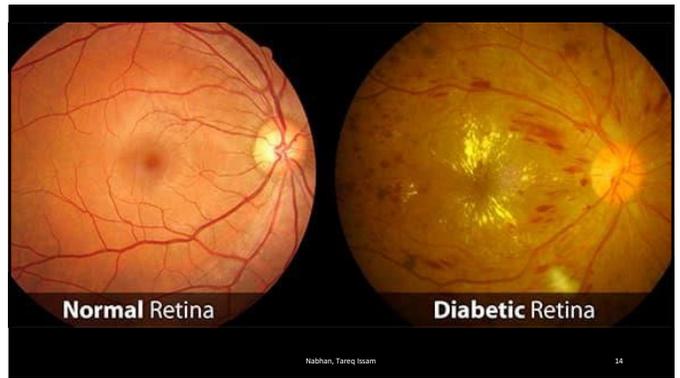
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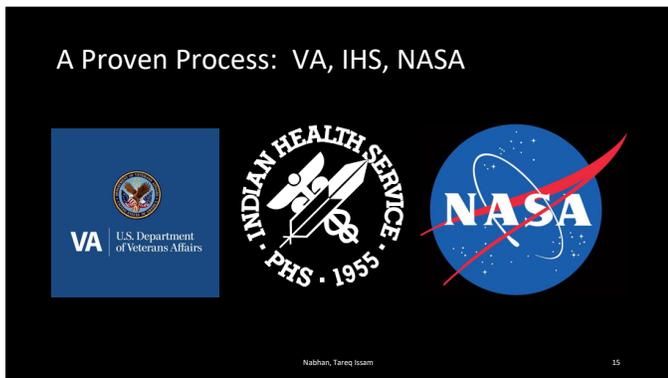
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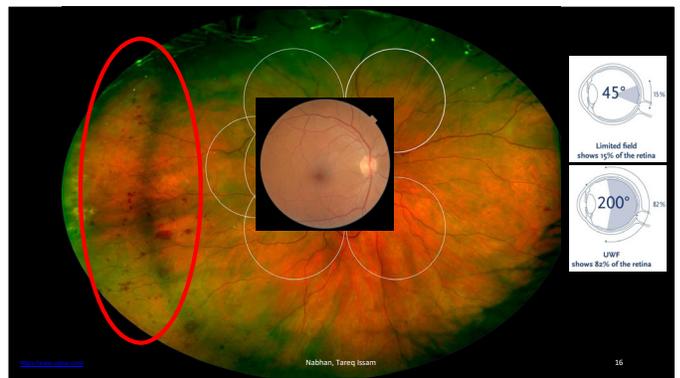
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**Billing and Coding: Remote Imaging of the Retina to Screen for Retinal Diseases**

Article Type: Billing and Coding  
 Original Effective Date: 09/30/2021  
 Revision Effective Date: 01/21/2022  
 Revision Ending Date: N/A  
 Retirement Date: N/A

92227: IMAGING OF RETINA FOR DETECTION OR MONITORING OF DISEASE; WITH REMOTE CLINICAL STAFF REVIEW AND REPORT, UNILATERAL OR BILATERAL

92228: IMAGING OF RETINA FOR DETECTION OR MONITORING OF DISEASE; WITH REMOTE PHYSICIAN OR OTHER QUALIFIED HEALTH CARE PROFESSIONAL INTERPRETATION AND REPORT, UNILATERAL OR BILATERAL. ~\$30.00

92229: IMAGING OF RETINA FOR DETECTION OR MONITORING OF DISEASE; POINT-OF-CARE AUTOMATED ANALYSIS AND REPORT, UNILATERAL OR BILAT. ~\$50.00

<https://www.cms.gov/medicare/coverage/determination-process/determination-2021>  
<https://www.cms.gov/medicare/coverage/determination-process/determination-2022>

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The underlying purpose of AI is to allow wealth to access skill while removing from the skilled the ability to access wealth.  
#ai #generativeAI



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AMERICAN OPTOMETRIC ASSOCIATION

2026 COMMITTEE DESCRIPTIONS

Innovations in Care	Comprised for the former New Technology Committee and Quality Improvement and Data Committee, this committee identifies, engages and evaluates companies bringing innovative solutions to the eye care market. The committee helps ensure the success of the ADA Innovation Hub, a key program at Optometry's Meeting aimed driving connections between doctors of optometry and innovators in eye care. The committee is the go to resource for information on new and evolving technologies.	Quarterly meetings.
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Christopher Wroten, O.D., Co-Chair Zachary McCarthy, O.D., Co-Chair Alan Glazier, O.D. Carey Patrick, O.D. Dena Weitzman, O.D. Helene Clayton-Jeter, O.D. Kenneth Daniels, O.D. Lauren White, O.D. Mark Colp, O.D. Megan Moore, O.D. Mile Brujic, O.D. Nathan Kuykendall, O.D. Prati Lal, O.D., Edstrom Sandra Fortenberry, O.D. Scot Morris, O.D. Tareq Nabhan, O.D. Karoline Marson, O.D., ADA Board Liaison Teri Coeard, O.D., ADA Board Liaison Kara Webb, ADA Staff Michelle Dorsett, ADA Staff

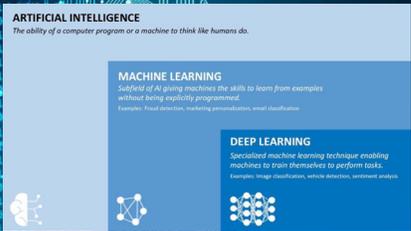
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**ARTIFICIAL INTELLIGENCE**  
The ability of a computer program or a machine to think like humans do.

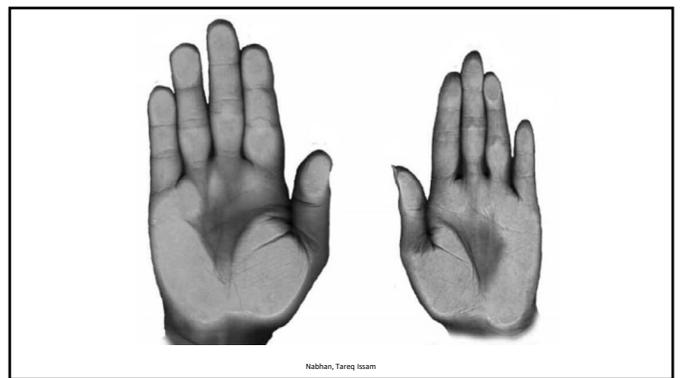
**MACHINE LEARNING**  
Subfield of AI giving machines the skills to learn from examples without being explicitly programmed.  
Examples: Fraud detection, marketing personalization, visual classification

**DEEP LEARNING**  
Specialized machine learning technique enabling machines to train themselves to perform tasks.  
Examples: Image classification, vehicle detection, sentiment analysis



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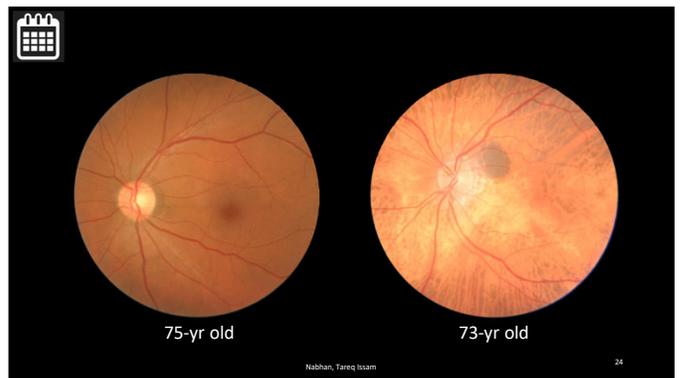
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Different measurements can be used to estimate BA, including clinical biomarkers - **total cholesterol, blood pressure**, or combination of several clinical biomarkers, such as 'PhenoAge', **telomere length, DNA methylation**, etc.

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Accurate estimation of biological age and its application in disease prediction using a multimodal image Transformer system

BA prediction ~2.5 years versus CA

"It is superior to established BA prediction models such as DNA methylation clocks, transcriptome aging clocks, and blood profiles. Our AI model also shows statistically significant differences in BA between healthy and diseased subjects, indicating that the impact of diseases in BA and the potential of BA-based AgeDiff as an effective biomarker of aging and age-related disease research. Our study showed a link between accelerated BA and risk of chronic diseases such as CHD, CVD, CKD, stroke, hypertension, and diabetes."

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RESEARCH PAPER

### Retinal photograph-based deep learning predicts biological age, and stratifies morbidity and mortality risk

SIMON NUSINOVIC<sup>1,2,†</sup>, TYLER HYUNGTAEK RIM<sup>1,2,†</sup>, MARCO YU<sup>1</sup>, GEUNJUNG LEE<sup>3</sup>, YIH-CHUNG THAM<sup>1,2,4</sup>, NING CHEUNG<sup>1,2</sup>, CRYSTAL CHEN YUEN CHONG<sup>1</sup>, ZHI DA SOH<sup>1</sup>, SAHIL THAKUR<sup>1</sup>, CHAN JOO LEE<sup>1</sup>, CHARUPATHI SABANAYAGAM<sup>1,2</sup>, BHDUNG KWON LEE<sup>1</sup>, SUNGHA PARK<sup>1</sup>, SUNG SOO KIM<sup>1</sup>, HYEON CHANG KIM<sup>1</sup>, TIEN-YIN WANG<sup>1,2</sup>, CHANG-YU CHENG<sup>1,2,5,†</sup>

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<p>Chronological age: 63 years RetiAGE: 0.0005 (lowest quartile) Interpretation: macula Outcome: Alive at end of follow-up, age 73</p>	<p>Chronological age: 63 years RetiAGE: 0.867 (highest quartile) Interpretation: macula Outcome: Died at age 68</p>
<p>Chronological age: 67 years RetiAGE: 0.0295 (lowest quartile) Interpretation: macula, optic disc margin, and arcade vessels Outcome: Alive at end of follow-up, age 77</p>	<p>Chronological age: 65 years RetiAGE: 0.964 (highest quartile) Interpretation: macula, optic disc margin, and arcade vessels Outcome: Died at age 71</p>

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AOA FIRST LOOK

AMERICAN OPTOMETRIC ASSOCIATION

### Panel Says More Studies Needed To Investigate Differences Between Male, Female Eyes

Heallo (3/18, Kimberle) reports a panel of ophthalmologists at an eye surgery meeting "measured the eyes in a large population of all ages and found differences in axial length, lens thickness and shape, anterior chamber volume and other parameters between male and female eyes." Marie-José Tassignon, MD, the moderator of the panel, said, "There is a difference between female eyes and male eyes in babies, and it continues in adults. Now whether that is important, I don't know because nobody has ever studied that." Because of the "significant differences" between the sexes, the panelists said "more studies are needed to assess how these distinctions should be addressed in eye care."

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XRAI Saliency Map

Ground Truth	Male	Female, Ungradable	Male	Female	Male	Female
Prediction	Male	Female, Ungradable	Male	Female	Male	Female
Confidence Score (Softmax: Sex)	0.728	0.862	0.955	0.661	0.892	0.950

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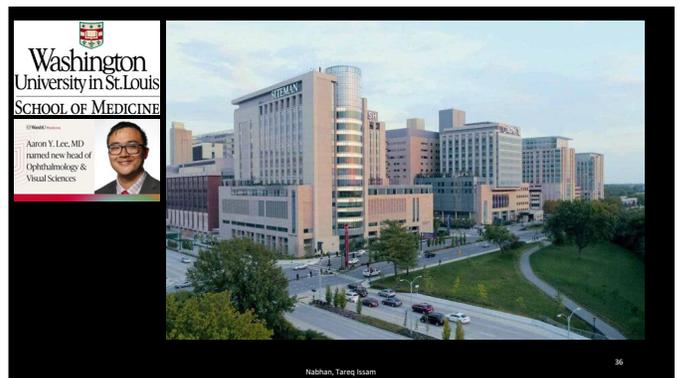
According to the DD, their solution is used in over 1000 sites nationwide.

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### What is AI bias?

An **underlying prejudice in data** that's used to create AI algorithms

Can ultimately **result in discrimination** and other social consequences.

Example: An algorithm is designed to decide whether an applicant gets accepted into a university or not and one of the input conditions is geographic location. If the location of an individual was highly correlated with ethnicity, then the algorithm would indirectly favor certain ethnicities over others.

Let's look at some real-life examples of when AI algorithms have demonstrated prejudice and discrimination towards others.

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**OPTUM:**  
 In October 2019, researchers found that an algorithm used on more than 200 million people in US hospitals to predict which patients would likely need extra medical care heavily favored white patients over black patients. While race itself wasn't a variable used in this algorithm, healthcare cost history was. For various reasons, black patients incurred lower healthcare costs than white patients with the same conditions on average. Researchers worked with Optum to reduce the level of bias by 80%.

**COMPAS:**  
 The Correctional Offender Management Profiling for Alternative Sanctions (COMPAS) algorithm was used in US court systems to predict the likelihood of recidivism. Due to the data used, the model chosen, and the process of creating the algorithm, the model predicted twice as many false positives for recidivism for black offenders than white offenders.

**Amazon:**  
 Amazon relies heavily on ML and AI. In 2015, Amazon realized that their algorithm used for hiring employees was found to be biased against women. The algorithm was based on the number of resumes submitted over the past ten years, and since most of the applicants were men, it was trained to favor men over women.

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**unesco** United Nations Educational, Scientific and Cultural Organization

**Four core values:**  
 Central to the Recommendation are four core values which lay the foundations for AI systems that work for the good of humanity, individuals, societies, and the environment:

- 1** Human rights and human dignity  
 Respect, protection and promotion of human rights and fundamental freedoms and human dignity
- 2** Living in peaceful, just, and interconnected societies
- 3** Ensuring diversity and inclusiveness
- 4** Environment and ecosystem flourishing

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**AI-Human Romances Are Flourishing—And This Is Just the Beginning**  
 The women in love with AI companions: 'I vowed to my chatbot that I wouldn't leave him'

**China's AI Boyfriend Business Is Taking On a Life of Its Own**  
 Get 2 women in China and all you might see is a man, but they're not. They're with real-world versions of their AI boyfriends.

**MIT Study Finds Chatbot Love Is Real—and It's Often Unintentional**  
 The growing community is building a life with large language models.

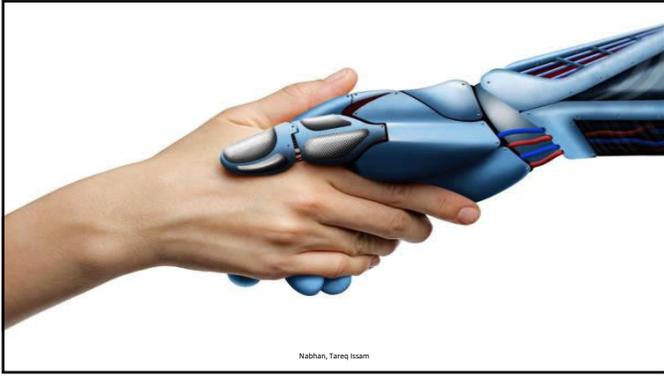
**Esther Perel on the Falsehoods of a Frictionless Relationship**  
 Perel, a renowned psychotherapist, doesn't really think society can—or should—fall in love with a machine.

**THE PEOPLE WHO MARRY CHATBOTS**  
 A growing community is building a life with large language models.

**PLAYING THE FIELD WITH MY A.I. BOYFRIENDS**  
 AI companions—without gender fluidity and AI control.

**THE NEW YORK TIMES MAGAZINE**  
 The Way We Live Now  
 They Fell in Love With A.I. Chatbots — and Found Something Real

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