

Even as access to high school computer science courses increases, female participation remains low. At high schools offering advanced placement courses in computer science, only 23 percent of the students taking the exam are girls.

Research shows us that interventions at the high school level may come too late. Girls as young as 6 years old are internalizing gender-based stereotypes that discourage them from engaging in STEM activities, including computer science.

The Building Blocks of STEM Act directs the National Science Foundation to support research into factors that contribute to the early adoption of these stereotypes. The bill also directs the National Science Foundation to support the development of models for intervention to prevent or reverse the effects of these negative and false stereotypes.

I thank my colleagues Representatives STEVENS and BAIRD and Senators ROSEN and CAPITO for their leadership on this legislation, and I urge my colleagues to support this bill.

Mr. Speaker, I reserve the balance of my time.

Mr. LUCAS. Mr. Speaker, I yield myself such time as I may consume.

How appropriate that today the House is taking up S. 737, the Building Blocks of STEM Act, just as the Nation kicks off a celebration of Computer Science Education Week.

S. 737, the Building Blocks of STEM Act, is important, bipartisan legislation to improve science, technology, engineering, mathematics, and computer science, or STEM, education. It directs the National Science Foundation to support STEM research focused on early childhood education and to award grants to encourage young girls to pursue computer science learning. Studies have found that children who engage in scientific activities from an early age develop positive attitudes toward science and are more likely to pursue STEM expertise and careers.

Across the country, the share of STEM jobs has expanded significantly, with STEM employment nearly doubling over the last 30 years. Currently, there are over half a million open computing jobs in the United States, in every industry and in every State. This demand is projected to grow at twice the rate of any other field, and America is failing to meet it.

We can succeed, though, and we can do it by encouraging children, particularly young girls, in STEM in early childhood and sustaining that interest as they grow.

More students with STEM degrees means more advanced American technologies and a more robust economy. But it is not just about the economy. STEM graduates have the potential to develop technologies that can save thousands of lives, jump-start a new industry, or even discover new worlds.

It has been shown that female students who learn computer science be-

fore college are 10 times more likely to major in it. By supporting more hands-on STEM engagement at younger ages, we are supporting and investing in America's future.

I thank Representative BAIRD and Representative STEVENS for their leadership on this bill. The House previously passed this legislation in July and sent it to the Senate for consideration. We are considering it again today with some minor changes from our Senate colleagues.

I encourage my colleagues to again support this legislation and send it to the President's desk for his signature.

Mr. Speaker, the love of learning starts young, and the Building Blocks of STEM bill promotes this by prioritizing a focus on early childhood STEM education. It gives us the opportunity to encourage girls to get involved and stay engaged in STEM, helping us improve our educational programs and diversify the STEM workforce.

Again, I thank Representative BAIRD and Representative STEVENS for leading this bipartisan bill. As the House did in July, I encourage this body to again support and unanimously pass this legislation and send it to the President's desk for his signature.

Mr. Speaker, I yield back the balance of my time.

Ms. JOHNSON of Texas. Mr. Speaker, I would like to express my appreciation for the leadership of Representatives STEVENS and BAIRD; Senators ROSEN and CAPITO; and the ranking member, Mr. LUCAS. I urge that we pass this important piece of legislation.

Mr. Speaker, I yield back the balance of my time.

Mr. BAIRD. Mr. Speaker, I rise in support of S. 737, the Building Blocks of STEM Act.

I was proud to join my colleague, the Chair of the Research and Technology Subcommittee, Representative Haley Stevens in introducing the House version of this legislation, which unanimously passed this Chamber in July, and am pleased to be speaking today on the nearly identical Senate version of the bill.

As one of only two members of Congress with a PhD in science, I understand the importance of teaching STEM concepts and principles at an early age.

Fostering the natural curiosity that children possess is critical to expanding their interests in science, technology, engineering, and math. Research confirms that kids as young as one, two, or three are capable of absorbing STEM concepts.

Equally important is ensuring that we get more girls involved in the STEM fields, so that we have as many people as possible contributing to the knowledge base of our society.

Like the House version, S. 737 directs NSF to fund research and grants that focus on early childhood and young women in STEM at the K through 12 level.

This bill helps ensure we are preparing our future workforce to fill the jobs of the future.

By passing this important legislation we will continue America's global leadership in science and technology.

I ask my colleagues to support the bill and send it to the President's desk for his signature.

The SPEAKER pro tempore. The question is on the motion offered by the gentlewoman from Texas (Ms. JOHNSON) that the House suspend the rules and pass the bill, S. 737.

The question was taken; and (two-thirds being in the affirmative) the rules were suspended and the bill was passed.

A motion to reconsider was laid on the table.

#### IDENTIFYING OUTPUTS OF GENERATIVE ADVERSARIAL NETWORKS ACT

Ms. JOHNSON of Texas. Mr. Speaker, I move to suspend the rules and pass the bill (H.R. 4355) to direct the Director of the National Science Foundation to support research on the outputs that may be generated by generative adversarial networks, otherwise known as deepfakes, and other comparable techniques that may be developed in the future, and for other purposes, as amended.

The Clerk read the title of the bill.

The text of the bill is as follows:

H.R. 4355

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

#### SECTION 1. SHORT TITLE.

*This Act may be cited as the "Identifying Outputs of Generative Adversarial Networks Act" or the "IOGAN Act".*

#### SEC. 2. FINDINGS.

*Congress finds the following:*

(1) *Research gaps currently exist on the underlying technology needed to develop tools to identify authentic videos, voice reproduction, or photos from manipulated or synthesized content, including those generated by generative adversarial networks.*

(2) *The National Science Foundation's focus to support research in artificial intelligence through computer and information science and engineering, cognitive science and psychology, economics and game theory, control theory, linguistics, mathematics, and philosophy, is building a better understanding of how new technologies are shaping the society and economy of the United States.*

(3) *The National Science Foundation has identified the "10 Big Ideas for NSF Future Investment" including "Harnessing the Data Revolution" and the "Future of Work at the Human-Technology Frontier", in with artificial intelligence is a critical component.*

(4) *The outputs generated by generative adversarial networks should be included under the umbrella of research described in paragraph (3) given the grave national security and societal impact potential of such networks.*

(5) *Generative adversarial networks are not likely to be utilized as the sole technique of artificial intelligence or machine learning capable of creating credible deepfakes and other comparable techniques may be developed in the future to produce similar outputs.*

#### SEC. 3. NSF SUPPORT OF RESEARCH ON MANIPULATED OR SYNTHESIZED CONTENT AND INFORMATION SECURITY.

*The Director of the National Science Foundation, in consultation with other relevant Federal agencies, shall support merit-reviewed and competitively awarded research on manipulated or synthesized content and information authenticity, which may include—*

(1) fundamental research on digital forensic tools or other technologies for verifying the authenticity of information and detection of manipulated or synthesized content, including content generated by generative adversarial networks;

(2) fundamental research on technical tools for identifying manipulated or synthesized content, such as watermarking systems for generated media;

(3) social and behavioral research related to manipulated or synthesized content, including the ethics of the technology and human engagement with the content;

(4) research on public understanding and awareness of manipulated and synthesized content, including research on best practices for educating the public to discern authenticity of digital content; and

(5) research awards coordinated with other federal agencies and programs including the Networking and Information Technology Research and Development Program, the Defense Advanced Research Projects Agency and the Intelligence Advanced Research Projects Agency.

**SEC. 4. NIST SUPPORT FOR RESEARCH AND STANDARDS ON GENERATIVE ADVERSARIAL NETWORKS.**

(a) *IN GENERAL.*—The Director of the National Institute of Standards and Technology shall support research for the development of measurements and standards necessary to accelerate the development of the technological tools to examine the function and outputs of generative adversarial networks or other technologies that synthesize or manipulate content.

(b) *OUTREACH.*—The Director of the National Institute of Standards and Technology shall conduct outreach—

(1) to receive input from private, public, and academic stakeholders on fundamental measurements and standards research necessary to examine the function and outputs of generative adversarial networks; and

(2) to consider the feasibility of an ongoing public and private sector engagement to develop voluntary standards for the function and outputs of generative adversarial networks or other technologies that synthesize or manipulate content.

**SEC. 5. REPORT ON FEASIBILITY OF PUBLIC-PRIVATE PARTNERSHIP TO DETECT MANIPULATED OR SYNTHESIZED CONTENT.**

Not later than one year after the date of the enactment of this Act, the Director of the National Science Foundation and the Director of the National Institute of Standards and Technology shall jointly submit to the Committee on Space, Science, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation a report containing—

(1) the Directors' findings with respect to the feasibility for research opportunities with the private sector, including digital media companies to detect the function and outputs of generative adversarial networks or other technologies that synthesize or manipulate content; and

(2) any policy recommendations of the Directors that could facilitate and improve communication and coordination between the private sector, the National Science Foundation, and relevant Federal agencies through the implementation of innovative approaches to detect digital content produced by generative adversarial networks or other technologies that synthesize or manipulate content.

**SEC. 6. GENERATIVE ADVERSARIAL NETWORK DEFINED.**

In this Act, the term “generative adversarial network” means, with respect to artificial intelligence, the machine learning process of attempting to cause a generator artificial neural network (referred to in this paragraph as the “generator”) and a discriminator artificial neural network (referred to in this paragraph as a

“discriminator”) to compete against each other to become more accurate in their function and outputs, through which the generator and discriminator create a feedback loop, causing the generator to produce increasingly higher-quality artificial outputs and the discriminator to increasingly improve in detecting such artificial outputs.

The SPEAKER pro tempore. Pursuant to the rule, the gentlewoman from Texas (Ms. JOHNSON) and the gentleman from Oklahoma (Mr. LUCAS) each will control 20 minutes.

The Chair recognizes the gentlewoman from Texas.

**GENERAL LEAVE**

Ms. JOHNSON of Texas. Mr. Speaker, I ask unanimous consent that all Members may have 5 legislative days within which to revise and extend their remarks and include extraneous material on H.R. 4355, the bill under consideration.

The SPEAKER pro tempore. Is there objection to the request of the gentlewoman from Texas?

There was no objection.

Ms. JOHNSON of Texas. Mr. Speaker, I yield myself such time as I may consume.

Mr. Speaker, I rise today in support of H.R. 4355, the Identifying Outputs of Generative Adversarial Networks Act.

Deepfake technology, which manipulates photos, videos, or audio clips to produce content that seems real but is not, has become increasingly commonplace in recent years. This increase in prevalence has been spurred, in part, by increases in computing power, widespread availability of images and other data, and the use of artificial intelligence.

In many cases, the applications of this technology may be benign, but bad actors can also use this technology to spread disinformation and cause great harm to individuals, organizations, and society as a whole.

During the Science, Space, and Technology Committee hearing on online imposters and disinformation earlier this year, one of the witnesses showed us a demonstration of a deepfake video in which he swapped the likenesses of two Members of Congress at the hearing.

Despite the spread and potential harm of deepfake technology, there are currently no sure-fire methods of identifying and distinguishing manipulated content from authentic content. The ability to differentiate between manipulated and authentic content is essential to maintaining our national and economic security and protecting against malicious use of these technologies.

H.R. 4355 leverages the strengths of the National Science Foundation and the National Institute of Standards and Technology by directing these agencies to support research on manipulated or synthesized content in order to help develop the standards and other tools necessary to detect this content.

I commend my colleagues Representatives GONZALEZ, STEVENS, and BAIRD

for their excellent leadership on this bipartisan legislation. I urge all of my colleagues to join in passing this bill.

Mr. Speaker, I reserve the balance of my time.

Mr. LUCAS. Mr. Speaker, I yield myself such time as I may consume.

Mr. Speaker, I rise in support of H.R. 4355, the Identifying Outputs of Generative Adversarial Networks Act introduced by Representative ANTHONY GONZALEZ. This bill addresses the underlying technologies for digital content commonly referred to as “deepfakes.” This technology uses machine learning to manipulate videos and other digital content to produce misleading and false products.

These technologies are becoming more sophisticated and, in the wrong hands, present a serious security threat. As we know, bad actors are already using disinformation to disrupt civil society and try to sow divisions among Americans.

H.R. 4355 supports the fundamental research necessary to better understand the underlying technology, to develop tools to identify manipulated content, and to better understand how humans interact with this generated content.

The bill also tasks the National Institute of Standards and Technology with bringing together the private sector and government agencies to discuss how to advance innovation in this area responsibly.

I applaud Mr. GONZALEZ' bipartisan work on this bill and his leadership on the issue of technology and security.

I thank the chairwoman and her staff for moving H.R. 4355 forward. There is a lot of fundamental research that needs to be done to better understand the technologies driving deepfakes and their impact on society. H.R. 4355 will help support that research.

Mr. Speaker, I urge my colleagues to support the bill, and I yield back the balance of my time.

Ms. JOHNSON of Texas. Mr. Speaker, I would like to express my appreciation for all the Members who have been working on this very important bipartisan legislation. I urge its passage, and I yield back the balance of my time.

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The SPEAKER pro tempore. The question is on the motion offered by the gentlewoman from Texas (Ms. JOHNSON) that the House suspend the rules and pass the bill, H.R. 4355, as amended.

The question was taken; and (two-thirds being in the affirmative) the rules were suspended and the bill, as amended, was passed.

A motion to reconsider was laid on the table.

**VIRGINIA BEACH STRONG ACT**

Ms. SEWELL of Alabama. Mr. Speaker, I move to suspend the rules and pass the bill (H.R. 4566) to accelerate