

116TH CONGRESS  
1ST SESSION

# S. 1558

To establish a coordinated Federal initiative to accelerate research and development on artificial intelligence for the economic and national security of the United States, and for other purposes.

---

## IN THE SENATE OF THE UNITED STATES

MAY 21, 2019

Mr. HEINRICH (for himself, Mr. PORTMAN, and Mr. SCHATZ) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

---

## A BILL

To establish a coordinated Federal initiative to accelerate research and development on artificial intelligence for the economic and national security of the United States, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*  
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

4 (a) SHORT TITLE.—This Act may be cited as the  
5 “Artificial Intelligence Initiative Act” or “AI-IA”.

6 (b) TABLE OF CONTENTS.—The table of contents for  
7 this Act is as follows:

Sec. 1. Short title; table of contents.

Sec. 2. Sense of Congress.

Sec. 3. Definitions.

TITLE I—NATIONAL ARTIFICIAL INTELLIGENCE RESEARCH AND  
DEVELOPMENT INITIATIVE

Sec. 101. National Artificial Intelligence Research and Development Initiative.

Sec. 102. National Artificial Intelligence Coordination Office.

Sec. 103. Interagency Committee on Artificial Intelligence.

Sec. 104. National Artificial Intelligence Advisory Committee.

Sec. 105. Study on the artificial intelligence workforce.

TITLE II—NATIONAL INSTITUTE OF STANDARDS AND  
TECHNOLOGY ARTIFICIAL INTELLIGENCE ACTIVITIES

Sec. 201. National Institute of Standards and Technology activities on artificial intelligence.

TITLE III—NATIONAL SCIENCE FOUNDATION AND MULTIDISCIPLINARY  
CENTERS FOR ARTIFICIAL INTELLIGENCE RESEARCH  
AND EDUCATION

Sec. 301. Research and education program on artificial intelligence and artificial intelligence engineering.

Sec. 302. Multidisciplinary Centers for Artificial Intelligence Research and Education.

TITLE IV—DEPARTMENT OF ENERGY ARTIFICIAL INTELLIGENCE  
RESEARCH AND DEVELOPMENT PROGRAM

Sec. 401. Research and development program on artificial intelligence.

**1 SEC. 2. SENSE OF CONGRESS.**

2 It is the sense of Congress that—

3 (1) there is a need for a National Artificial In-  
4 telligence Initiative, including a comprehensive strat-  
5 egy for and coordination across agencies on research  
6 and development on artificial intelligence;

7 (2) there are currently several interagency com-  
8 mittees working on related tasks with respect to ar-  
9 tificial intelligence; and

10 (3) the reporting structure of such committees  
11 could be simplified to address efficiently the goals of  
12 an initiative described in paragraph (1).

1 **SEC. 3. DEFINITIONS.**

2 In this Act:

3 (1) **ARTIFICIAL INTELLIGENCE.**—The term “ar-  
4 tificial intelligence” includes the following:

5 (A) Any artificial system that performs  
6 tasks under varying and unpredictable cir-  
7 cumstances without significant human over-  
8 sight, or that can learn from experience and im-  
9 prove performance when exposed to data sets.

10 (B) An artificial system developed in com-  
11 puter software, physical hardware, or other con-  
12 text that solves tasks requiring human-like per-  
13 ception, cognition, planning, learning, commu-  
14 nication, or physical action.

15 (C) An artificial system designed to think  
16 or act like a human, including cognitive archi-  
17 tectures and neural networks.

18 (D) A set of techniques, including machine  
19 learning, that is designed to approximate a cog-  
20 nitive task.

21 (E) An artificial system designed to act ra-  
22 tionally, including an intelligent software agent  
23 or embodied robot that achieves goals using  
24 perception, planning, reasoning, learning, com-  
25 municating, decision making, and acting.

1           (2) ADVISORY COMMITTEE.—The term “Advi-  
2           sory Committee” means the advisory committee es-  
3           tablished or designated under section 104.

4           (3) EMERGING RESEARCH INSTITUTION.—The  
5           term “emerging research institution” means an in-  
6           stitution of higher education that—

7                   (A) receives less than \$20,000,000 in Fed-  
8                   eral research funding annually; and

9                   (B) may grant a doctoral degree.

10          (4) INDUSTRY.—The term “industry” means  
11          entities in industries relevant to artificial intel-  
12          ligence.

13          (5) INITIATIVE.—The term “Initiative” means  
14          the National Artificial Intelligence Research and De-  
15          velopment Initiative established under section 101.

16          (6) INSTITUTIONS OF HIGHER EDUCATION.—  
17          The term “institutions of higher education” has the  
18          meaning given the term in section 101 of the Higher  
19          Education Act of 1965 (20 U.S.C. 1001).

20          (7) INTERAGENCY COMMITTEE.—The term  
21          “Interagency Committee” means the interagency  
22          committee established or designated under section  
23          103.

24          (8) K–12 EDUCATION.—The term “K–12 edu-  
25          cation” means elementary school and secondary edu-

1 cation, as such terms are defined in section 8101 of  
2 the Elementary and Secondary Education Act of  
3 1965 (20 U.S.C. 7801).

4 (9) MACHINE LEARNING.—The term “machine  
5 learning” means a subfield of artificial intelligence  
6 that is characterized by giving computers the auton-  
7 omous ability to progressively optimize performance  
8 of a specific task based on data without being explic-  
9 itly programmed.

10 (10) MINORITY-SERVING INSTITUTION.—The  
11 term “minority-serving institution” means any of  
12 the following:

13 (A) A Hispanic-serving institution (as de-  
14 fined in section 502(a) of the Higher Education  
15 Act of 1965 (20 U.S.C. 1101a(a))).

16 (B) A Tribal College or University (as de-  
17 fined in section 316(b) of the Higher Education  
18 Act of 1965 (20 U.S.C. 1059c(b))).

19 (C) An Alaska Native-serving institution  
20 (as defined in section 317(b) of the Higher  
21 Education Act of 1965 (20 U.S.C. 1059d(b))).

22 (D) A Native Hawaiian-serving institution  
23 (as defined in section 317(b) of the Higher  
24 Education Act of 1965 (20 U.S.C. 1059d(b))).

1 (E) A Predominantly Black Institution (as  
 2 defined in section 318(b) of the Higher Edu-  
 3 cation Act of 1965 (20 U.S.C. 1059e(b))).

4 (F) A Native American-serving nontribal  
 5 institution (as defined in section 319(b) of the  
 6 Higher Education Act of 1965 (20 U.S.C.  
 7 1059f(b))).

8 (G) An Asian American and Native Amer-  
 9 ican Pacific Islander-serving institution (as de-  
 10 fined in section 320(b) of the Higher Education  
 11 Act of 1965 (20 U.S.C. 1059g(b))).

12 **TITLE I—NATIONAL ARTIFICIAL**  
 13 **INTELLIGENCE RESEARCH**  
 14 **AND DEVELOPMENT INITIA-**  
 15 **TIVE**

16 **SEC. 101. NATIONAL ARTIFICIAL INTELLIGENCE RESEARCH**  
 17 **AND DEVELOPMENT INITIATIVE.**

18 The President shall establish and implement an ini-  
 19 tiative with respect to artificial intelligence to be known  
 20 as the “National Artificial Intelligence Research and De-  
 21 velopment Initiative”. In carrying out the Initiative, the  
 22 President shall, acting through appropriate Federal enti-  
 23 ties, including the Networking and Information Tech-  
 24 nology Research and Development Program—

1           (1) establish objectives, priorities, and metrics  
2           for strategic plans under section 103(d) to accelerate  
3           development of science and technology applications  
4           for artificial intelligence in the United States;

5           (2) invest in research, development, demonstra-  
6           tion, application to analysis and modeling, and other  
7           activities with respect to science and technology in  
8           artificial intelligence;

9           (3) support the development of a workforce  
10          pipeline for science and technology with respect to  
11          artificial intelligence by making strategic invest-  
12          ments to—

13                (A) expand the number of researchers,  
14                educators, and students with training in science  
15                and technology in artificial intelligence;

16                (B) increase the number of skilled and  
17                trained workers from underrepresented commu-  
18                nities who can contribute to the development of  
19                artificial intelligence and artificial intelligence  
20                technology, diversify the artificial intelligence  
21                workforce, and expand the artificial intelligence  
22                workforce pipeline;

23                (C) promote the development and inclusion  
24                of multidisciplinary curricula and research op-  
25                portunities for science and engineering with re-

1           spect to artificial intelligence, including ad-  
2           vanced technological education, during the pri-  
3           mary, secondary, undergraduate, graduate,  
4           postdoctoral, adult learning, and career retrain-  
5           ing stages of education; and

6                   (D) equip workers with the knowledge and  
7           skill sets required to operate effectively in occu-  
8           pations and workplaces that will be increasingly  
9           influenced by artificial intelligence;

10           (4) facilitate coordination of efforts and collabo-  
11          ration with respect to research and development of  
12          artificial intelligence among government agencies,  
13          Federal and national laboratories, nonprofit organi-  
14          zations, institutions of higher education, and indus-  
15          try;

16           (5) leverage existing Federal research invest-  
17          ments, and partner with industry and institutions of  
18          higher education to leverage knowledge and re-  
19          sources, to advance objectives and priorities of the  
20          Initiative;

21           (6) strengthen research, development, dem-  
22          onstration, and applications in science and tech-  
23          nology with respect to artificial intelligence by—



1 (A) addressing gaps in basic research  
2 knowledge with respect to artificial intelligence  
3 through research;

4 (B) promoting the further development of  
5 facilities and centers available for research,  
6 testing, and education in science and technology  
7 with respect to artificial intelligence;

8 (C) stimulating research on, and pro-  
9 moting more rapid development and commer-  
10 cialization of, artificial intelligence-based tech-  
11 nologies;

12 (D) promoting research into the effects of  
13 artificial intelligence and applications of artifi-  
14 cial intelligence on society, the workforce and  
15 workplace, and individuals, including those from  
16 underrepresented communities;

17 (E) promoting data and model sharing  
18 among the Federal government, academic re-  
19 searchers, the private sector, and other practi-  
20 tioners of artificial intelligence;

21 (F) identifying and minimizing inappro-  
22 priate bias in data sets, algorithms, and other  
23 aspects of artificial intelligence; and

24 (G) supporting efforts to create metrics to  
25 assess safety, security, and reliability of applica-

1           tions of science and technology with respect to  
2           artificial intelligence; and

3           (7) ensure that research, development, dem-  
4           onstration, and applications efforts with respect to  
5           artificial intelligence create measurable benefits for  
6           all individuals in the United States, including mem-  
7           bers of disadvantaged and underrepresented groups.

8   **SEC. 102. NATIONAL ARTIFICIAL INTELLIGENCE COORDI-**  
9                           **NATION OFFICE.**

10          (a) IN GENERAL.—The Director of the Office of  
11 Science and Technology Policy, in consultation with the  
12 Director of the National Science Foundation, the Sec-  
13 retary of Energy, and the Secretary of Commerce, shall  
14 establish or designate, and appoint a director of, an office  
15 to be known as the “National Artificial Intelligence Co-  
16 ordination Office” (in this section referred to as the “Of-  
17 fice”).

18          (b) DUTIES.—The Office shall—

19               (1) provide technical and administrative support  
20               to the Advisory Committee;

21               (2) serve as the point of contact on Federal ar-  
22               tificial intelligence activities for government organi-  
23               zations, academia, industry, professional societies,  
24               State artificial intelligence programs, interested cit-

1       izen groups, and others to exchange technical and  
2       programmatic information;

3               (3) conduct public outreach, including dissemi-  
4       nation of findings and recommendations of the Advi-  
5       sory Committee (as appropriate); and

6               (4) promote access to and development of early  
7       applications of the technologies, innovations, and ex-  
8       pertise that benefit the public derived from Initiative  
9       activities to agency missions and systems across the  
10      Federal Government, and to United States industry,  
11      including startup companies.

12      (c) FUNDING.—The Office shall be funded through  
13      interagency funding.

14      (d) REPORT.—Not later than 90 days after the date  
15      of the enactment of this Act, the Director of the Office  
16      of Science and Technology Policy shall submit to the Com-  
17      mittee on Commerce, Science, and Transportation of the  
18      Senate and the Committee on Science, Space, and Tech-  
19      nology of the House of Representatives a report on fund-  
20      ing for the National Artificial Intelligence Coordination  
21      Office. The report shall include—

22               (1) the amount of funding required to ade-  
23      quately fund the Office;

24               (2) the adequacy of existing mechanisms to  
25      fund the Office; and

1           (3) the actions taken by the director of the Of-  
2           fice to ensure stable funding for the Office.

3 **SEC. 103. INTERAGENCY COMMITTEE ON ARTIFICIAL IN-**  
4 **TELLIGENCE.**

5           (a) IN GENERAL.—The Director of the Office of  
6 Science and Technology Policy shall establish or designate  
7 an interagency committee to be known as the “Inter-  
8 agency Committee on Artificial Intelligence”.

9           (b) COMPOSITION; CHAIRS.—

10           (1) COMPOSITION.—The Interagency Com-  
11 mittee shall be comprised of representatives from the  
12 following, as detailed to the Interagency Committee  
13 by the head of the agency concerned:

14                   (A) The National Institute of Standards  
15                   and Technology.

16                   (B) The National Science Foundation.

17                   (C) The Department of Energy.

18                   (D) The National Aeronautics and Space  
19                   Administration.

20                   (E) The Department of Defense.

21                   (F) The Office of the Director of National  
22                   Intelligence.

23                   (G) The Office of Management and Budg-  
24                   et.

1 (H) The Office of Science and Technology  
2 Policy.

3 (I) The National Institutes of Health.

4 (J) Any other Federal agency the Director  
5 of the Office of Science and Technology Policy  
6 considers appropriate.

7 (2) CO-CHAIRS.—The Interagency Committee  
8 shall be co-chaired by the following:

9 (A) The Secretary of Energy.

10 (B) The Director of the Office of Science  
11 and Technology Policy.

12 (C) The Director of the National Institute  
13 of Standards and Technology.

14 (D) The Director of the National Science  
15 Foundation.

16 (c) DUTIES.—The Interagency Committee shall—

17 (1) coordinate, and make recommendations for,  
18 activities and programs of Federal agencies on re-  
19 search and education with respect to artificial intel-  
20 ligence and artificial intelligence technology;

21 (2) establish objectives and priorities for the  
22 Initiative, consistent with the objectives and pur-  
23 poses specified in section 101, based on identified  
24 knowledge and workforce gaps and other national  
25 needs;

1           (3) assess and recommend Federal infrastruc-  
2           ture needs to support the Initiative; and

3           (4) evaluate opportunities for international co-  
4           operation with strategic allies on research and devel-  
5           opment with respect to artificial intelligence and ar-  
6           tificial intelligence technology.

7           (d) STRATEGIC PLAN.—Not later than 1 year after  
8           the date of the enactment of this Act, the Interagency  
9           Committee shall develop a 5-year strategic plan, and 6  
10          years after enactment of this Act develop an additional  
11          5-year strategic plan, with periodic updates (as appro-  
12          priate), to guide the activities of the Initiative, meet Initia-  
13          tive goals and priorities, and anticipate outcomes at par-  
14          ticipating agencies. In carrying out this subsection, the  
15          Interagency Committee should take into consideration re-  
16          ports from the Advisory Committee.

17       **SEC. 104. NATIONAL ARTIFICIAL INTELLIGENCE ADVISORY**  
18                                               **COMMITTEE.**

19          (a) IN GENERAL.—The Director of the National  
20          Science Foundation (in this section referred to as the “Di-  
21          rector”) shall establish or designate an advisory committee  
22          to be known as the “National Artificial Intelligence Advi-  
23          sory Committee”.

24          (b) QUALIFICATION OF MEMBERS.—

1           (1) IN GENERAL.—The Director of the National  
2           Science Foundation, in consultation with the Direc-  
3           tor of the Office of Science and Technology Policy,  
4           shall appoint as members of the Advisory Committee  
5           individual who are qualified to provide advice and in-  
6           formation on research, development, demonstrations,  
7           education, infrastructure, technology transfer, com-  
8           mercial applications, and concerns of a national se-  
9           curity, social, or economic nature with respect to ar-  
10          tificial intelligence and artificial intelligence tech-  
11          nology. The Director shall seek public input, and in-  
12          dividuals so appointed shall collectively have exper-  
13          tise on a wide range of defense and non-defense arti-  
14          ficial intelligence matters.

15          (2) LIMITATION.—Not more than half of the  
16          members of the Advisory Committee may be rep-  
17          resentatives of the artificial intelligence industry.

18          (c) DUTIES.—The Advisory Committee shall advise  
19          the Director of the Office of Science and Technology Pol-  
20          icy and the Interagency Committee on Artificial Intel-  
21          ligence under section 103 on matters relating to the Initia-  
22          tive, including assessing—

23                 (1) trends and developments in artificial intel-  
24                 ligence, including the current and near future state  
25                 of artificial intelligence systems and forecasting;

1           (2) progress made in implementing the Initia-  
2     tive;

3           (3) the need to revise the Initiative;

4           (4) balance among the components of the Ini-  
5     tiative, including funding levels for component areas  
6     of the Initiative;

7           (5) whether the component areas, priorities,  
8     and technical goals of the Initiative are helping to  
9     maintain United States leadership in artificial intel-  
10    ligence and artificial intelligence technology;

11          (6) the management, coordination, implementa-  
12    tion, and activities of the Initiative; and

13          (7) whether societal, ethical, legal, environ-  
14    mental, and workforce concerns with respect to arti-  
15    ficial intelligence and artificial intelligence tech-  
16    nology are adequately addressed by the Initiative.

17    (d) REPORTS.—Not later than 4 years after the date  
18    of the most recent assessment under subsection (c), and  
19    quadrennially thereafter, the Advisory Committee shall  
20    submit to the Director of the National Science Founda-  
21    tion, the Committee on Commerce, Science, and Transpor-  
22    tation of the Senate, and the Committee on Science,  
23    Space, and Technology of the House of Representatives  
24    a report on its assessments under subsection (c) and its  
25    recommendations for ways to improve the Initiative.



1           (e) TRAVEL EXPENSES OF NON-FEDERAL MEM-  
2 BERS.—Non-Federal members of the Advisory Committee,  
3 while attending meetings of the Advisory Committee or  
4 while otherwise serving at the request of the head of the  
5 Advisory Committee away from their homes or regular  
6 places of business, may be allowed travel expenses, includ-  
7 ing per diem in lieu of subsistence, as authorized by sec-  
8 tion 5703 of title 5, United States Code, for individuals  
9 in the government serving without pay. Nothing in this  
10 subsection shall be construed to prohibit members of the  
11 Advisory Committee who are officers or employees of the  
12 United States from being allowed travel expenses, includ-  
13 ing per diem in lieu of subsistence, in accordance with ex-  
14 isting law.

15           (f) EXEMPTION FROM SUNSET.—Section 14 of the  
16 Federal Advisory Committee Act (5 U.S.C. App.) shall not  
17 apply to the Advisory Committee.

18 **SEC. 105. STUDY ON THE ARTIFICIAL INTELLIGENCE WORK-**  
19 **FORCE.**

20           (a) IN GENERAL.—Not later than 60 days after the  
21 date of the enactment of this Act, the National Artificial  
22 Intelligence Coordination Office shall seek to enter into  
23 a contract with a federally funded research and develop-  
24 ment center for a study on the mechanisms that produce  
25 or contribute to the workforce in artificial intelligence (in-

1 cluding researchers and specialists in artificial intelligence  
2 and users of artificial intelligence) in order to identify and  
3 develop actions to ensure an appropriate increase in the  
4 size, quality, and diversity of the workforce.

5 (b) COLLABORATION IN STUDY.—The contract re-  
6 ferred to in subsection (a) shall require the federally fund-  
7 ed research and development center entering into the con-  
8 tract to do the following:

9 (1) Collaborate with the Secretary of Com-  
10 merce, the Commissioner of Labor Statistics, and  
11 the Director of the Census in developing a com-  
12 prehensive and detailed understanding of the work-  
13 force needs of and employment opportunities in the  
14 artificial intelligence field, by State and by region.

15 (2) Collaborate in carrying out the study with  
16 educational institutions, State and local workforce  
17 development boards, nonprofit organizations, labor  
18 organizations, apprenticeship programs, industry,  
19 and other entities in the artificial intelligence field.

20 (3) Collaborate with minority-serving institu-  
21 tions in order to facilitate the sharing of best prac-  
22 tices and approaches for increasing and retaining  
23 underrepresented populations in the artificial intel-  
24 ligence field.

1           (4) Facilitate the sharing of best practices and  
2 approaches for the development and sustainment of  
3 the workforce in artificial intelligence that are iden-  
4 tified or developed through the study among—

5           (A) entities in the artificial intelligence  
6 field, State and local workforce development  
7 boards, nonprofit organizations, labor organiza-  
8 tions, and apprenticeship programs that provide  
9 training programs for employment in the artifi-  
10 cial intelligence field; and

11           (B) educational institutions that seek to  
12 establish such training programs.

13           (c) DEPARTMENT OF LABOR ANNUAL REPORT ON  
14 JOB CREATION.—Ech year while the contract referred to  
15 in subsection (a) is in force, the Secretary of Labor shall,  
16 using information derived from the study described in that  
17 subsection and other appropriate information, issue to the  
18 public a report on job creation in the artificial intelligence  
19 field during the preceding year.

1 **TITLE II—NATIONAL INSTITUTE**  
2 **OF STANDARDS AND TECH-**  
3 **NOLOGY ARTIFICIAL INTEL-**  
4 **LIGENCE ACTIVITIES**

5 **SEC. 201. NATIONAL INSTITUTE OF STANDARDS AND TECH-**  
6 **NOLOGY ACTIVITIES ON ARTIFICIAL INTEL-**  
7 **LIGENCE.**

8 (a) IN GENERAL.—As part of the Initiative, the Di-  
9 rector of the National Institute of Standards and Tech-  
10 nology (in this section referred to as the “Director”)  
11 shall—

12 (1) support the development of measurements  
13 and standards necessary to advance commercial de-  
14 velopment of artificial intelligence applications, in-  
15 cluding by—

16 (A) developing measurements and stand-  
17 ards;

18 (B) supporting efforts to develop measure-  
19 ments and consensus standards by standards  
20 development organizations; and

21 (C) modernizing the infrastructure used  
22 for benchmarking artificial intelligence tech-  
23 nologies;

24 (2) establishing and supporting collaborative  
25 ventures or consortia with public or private sector

1 entities, including institutions of higher education,  
2 National Laboratories, and industry for the purpose  
3 of advancing fundamental and applied research and  
4 development on artificial intelligence; and

5 (3) use existing authorities to award contracts  
6 as necessary to carry out the Initiative, including co-  
7 operative agreements and other similar transactions.

8 (b) ARTIFICIAL INTELLIGENCE OUTREACH.—

9 (1) IN GENERAL.—The Director shall conduct  
10 outreach—

11 (A) to receive input from stakeholders on  
12 the development of a plan to address future  
13 measurements and standards related to artifi-  
14 cial intelligence; and

15 (B) to provide an opportunity for public  
16 comment on any such measurements or stand-  
17 ards.

18 (2) MEETINGS.—

19 (A) IN GENERAL.—Not later than 1 year  
20 after the date of the enactment of this Act, and  
21 a periodic basis thereafter, as the Director de-  
22 termines appropriate, the Director shall convene  
23 1 or more meetings of stakeholders, including  
24 technical expert representatives from govern-  
25 ment organizations, industry, and institutions

1 of higher education, to discuss topics described  
2 in subparagraph (B).

3 (B) TOPICS.—Meetings under subpara-  
4 graph (A) may cover topics that the Director  
5 determines to be important to the development  
6 of standards and measurements with respect to  
7 artificial intelligence, including—

- 8 (i) cybersecurity;
- 9 (ii) algorithm accountability;
- 10 (iii) algorithm explainability;
- 11 (iv) algorithm trustworthiness;
- 12 (v) establishment of a common lexicon  
13 for artificial intelligence; and
- 14 (vi) resources and methods for  
15 benchmarking artificial intelligence tech-  
16 nologies.

17 (C) PURPOSES.—The purposes of meetings  
18 under this paragraph shall be—

- 19 (i) to assess contemporary research on  
20 the topics determined by the Director  
21 under subparagraph (B);
- 22 (ii) to evaluate research gaps relating  
23 to such topics;
- 24 (iii) to provide an opportunity for  
25 stakeholders to provide recommendations

1 on the research to be addressed by the Na-  
2 tional Institute of Standards and Tech-  
3 nology and the Initiative; and

4 (iv) to coordinate engagement with  
5 international standards bodies in order to  
6 ensure United States leadership in the de-  
7 velopment of global technical standards, in-  
8 cluding with respect to artificial intel-  
9 ligence and cybersecurity.

10 (3) REPORT TO CONGRESS.—Not later than 2  
11 years after the date of the enactment of this Act, the  
12 Director shall transmit to the Committee on Com-  
13 merce, Science, and Transportation of the Senate  
14 and the Committee on Science, Space, and Tech-  
15 nology of the House of Representatives a report  
16 summarizing the results of outreach and meetings  
17 conducted under this subsection.

18 (c) AUTHORIZATION OF APPROPRIATIONS.—There  
19 are authorized to be appropriated for each of fiscal years  
20 2020 through 2024, \$40,000,000 to carry out this section.

1 **TITLE III—NATIONAL SCIENCE**  
2 **FOUNDATION AND MULTI-**  
3 **DISCIPLINARY CENTERS FOR**  
4 **ARTIFICIAL INTELLIGENCE**  
5 **RESEARCH AND EDUCATION**

6 **SEC. 301. RESEARCH AND EDUCATION PROGRAM ON ARTI-**  
7 **FICIAL INTELLIGENCE AND ARTIFICIAL IN-**  
8 **TELLIGENCE ENGINEERING.**

9 (a) IN GENERAL.—As part of the Initiative, the Di-  
10 rector of the National Science Foundation (in this section  
11 referred to as the “Director”) shall establish and imple-  
12 ment a research and education program on artificial intel-  
13 ligence and artificial intelligence engineering.

14 (b) PROGRAM COMPONENTS.—In carrying out the  
15 program required under subsection (a), the Director  
16 shall—

17 (1) continue to support interdisciplinary re-  
18 search on, and human resources development in, all  
19 aspects of science and engineering with respect to  
20 artificial intelligence, including—

21 (A) algorithm accountability;

22 (B) minimization of inappropriate bias in  
23 training data sets or algorithmic feature selec-  
24 tion;



1 (C) qualitative and quantitative forecasting  
2 of future capabilities and applications; and

3 (D) societal and ethical implications of ar-  
4 tificial intelligence;

5 (2) use existing authorities and programs and  
6 collaborate with other Federal agencies—

7 (A) to improve teaching and learning in  
8 science and engineering with respect to artificial  
9 intelligence during the primary, secondary, un-  
10 dergraduate, graduate, postgraduate, adult  
11 learning, and career retraining stages of edu-  
12 cation;

13 (B) to increase participation in artificial  
14 intelligence fields, including by individuals iden-  
15 tified in sections 33 and 34 of the Science and  
16 Engineering Equal Opportunities Act (42  
17 U.S.C. 1885a, 1885b);

18 (C) to formulate goals for education activi-  
19 ties in engineering and research with respect to  
20 artificial intelligence to be supported by the Na-  
21 tional Science Foundation related to topics im-  
22 portant to the Initiative, including—

23 (i) algorithm accountability;

24 (ii) algorithm explainability;

25 (iii) consumer data privacy;

1 (iv) assessment and minimization of  
2 inappropriate bias in training data and  
3 output;

4 (v) societal and ethical implications of  
5 the use of artificial intelligence;

6 (vi) algorithm trustworthiness; and

7 (vii) algorithmic forecasting;

8 (D) to engage with institutions of higher  
9 education, research communities, potential  
10 users of information produced under this sec-  
11 tion, entities in the private sector, and non-Fed-  
12 eral entities—

13 (i) to leverage the collective body of  
14 knowledge from existing research and edu-  
15 cation activities with respect to artificial  
16 intelligence and artificial intelligence engi-  
17 neering; and

18 (ii) to support partnerships among in-  
19 stitutions of higher education and industry  
20 that facilitate collaborative research, per-  
21 sonnel exchanges, and workforce develop-  
22 ment with respect to artificial intelligence  
23 and artificial intelligence engineering;

24 (E) to coordinate research efforts with re-  
25 spect to artificial intelligence and artificial intel-

1           ligence engineering funded through existing  
2           programs across the directorates of the Na-  
3           tional Science Foundation;

4           (F) to ensure adequate access to research  
5           and education infrastructure with respect to ar-  
6           tificial intelligence and artificial intelligence en-  
7           gineering, including through development of  
8           hardware and facilitation of the use of com-  
9           puting resources, including cloud-based com-  
10          puting services; and

11          (G) to increase participation rates in re-  
12          search and education on artificial intelligence  
13          among underrepresented communities by engag-  
14          ing with minority-serving institutions.

15          (c) GRADUATE TRAINEESHIPS.—In carrying out the  
16          program required under subsection (a), the Director may  
17          provide traineeships to graduate students at institutions  
18          of higher education who—

19               (1) are United States nationals or aliens law-  
20               fully admitted for permanent residence in the United  
21               States; and

22               (2) who choose to pursue masters or doctoral  
23               degrees in artificial intelligence or artificial intel-  
24               ligence engineering.

1 **SEC. 302. MULTIDISCIPLINARY CENTERS FOR ARTIFICIAL**  
2 **INTELLIGENCE RESEARCH AND EDUCATION.**

3 (a) IN GENERAL.—The Director of the National  
4 Science Foundation (in this section referred to as the “Di-  
5 rector”), in consultation with other appropriate Federal  
6 agencies, shall award grants to eligible entities to establish  
7 up to 5 research and education centers (in this section  
8 referred to as “Centers”) to conduct research and edu-  
9 cation activities in support of the Initiative. Each Center  
10 established pursuant to such a grant shall be known as  
11 a “Multidisciplinary Center for Artificial Intelligence Re-  
12 search and Education”.

13 (b) ELIGIBLE ENTITIES.—For purposes of this sec-  
14 tion, an eligible entity is any entity as follows:

- 15 (1) An institution of higher education.  
16 (2) A relevant nonprofit organization.  
17 (3) A State or local government.  
18 (4) A consortium of entities that consists of—  
19 (A) two or more entities specified in para-  
20 graphs (1) through (3); or  
21 (B) at least one entity specified in such  
22 paragraphs and a relevant private sector orga-  
23 nization that is not a nonprofit organization.

24 (c) MINIMUM NUMBER OF GRANTS FOR CERTAIN  
25 PURPOSES.—

1           (1) K–12 EDUCATION.—Not less than 1 grant  
2           under this section must be for a Center with the pri-  
3           mary purpose of integrating artificial intelligence  
4           into K–12 education.

5           (2) MINORITY-SERVING INSTITUTION.—Not less  
6           than 1 grant under this section must be for a Center  
7           located at a minority-serving institution.

8           (d) APPLICATION.—An eligible entity seeking funding  
9           under this section shall submit an application to the Direc-  
10          tor at such time, in such manner, and containing such  
11          information as the Director may require. The application  
12          shall include—

13           (1) a plan for the proposed Center—

14           (A) to work with other research institu-  
15           tions, emerging research institutions, and in-  
16           dustry to leverage expertise in artificial intel-  
17           ligence, education and curricula development,  
18           and technology transfer;

19           (B) to promote active collaboration among  
20           researchers in multiple disciplines and across  
21           multiple institutions involved in artificial intel-  
22           ligence research including physics, engineering,  
23           mathematical sciences, computer and informa-  
24           tion science, biological and cognitive sciences,  
25           material science, education, and social and be-

1           havioral sciences (such as industrial-organiza-  
2           tional psychology);

3           (C) to integrate into the activities of such  
4           Center consideration of the ethics of develop-  
5           ment, technology usage, and data collection,  
6           storage, and sharing (including training data  
7           sets) in connection with artificial intelligence;

8           (D) to support long-term and short-term  
9           workforce development in artificial intelligence,  
10          including broadening participation of underrep-  
11          resented communities; and

12          (E) to support an innovation ecosystem to  
13          work with industry to translate Center research  
14          into applications and products; and

15          (2) a description of the anticipated long-term  
16          impact of such Center beyond the termination of  
17          support under this section.

18          (e) SELECTION AND DURATION.—

19           (1) IN GENERAL.—A Center established using a  
20           grant under this section may receive funding under  
21           this section for a period of 5 years.

22           (2) EXTENSION.—Such a Center may apply for,  
23           and the Director may grant, an extension of a grant  
24           under this section for an additional 5-year period.

1           (3) TERMINATION.—The Director may termi-  
 2           nate for cause funding under this section for a Cen-  
 3           ter that underperforms.

4           (f) FUNDING.—During each of fiscal years 2020  
 5 through 2024, the amount provided each fiscal year for  
 6 a Center established pursuant to this section through a  
 7 grant under this section shall be \$20,000,000.

8           **TITLE IV—DEPARTMENT OF EN-**  
 9           **ERGY       ARTIFICIAL       INTEL-**  
 10           **LIGENCE RESEARCH AND DE-**  
 11           **VELOPMENT PROGRAM**

12           **SEC. 401. RESEARCH AND DEVELOPMENT PROGRAM ON AR-**  
 13           **TIFICIAL INTELLIGENCE.**

14           (a) PROGRAM REQUIRED.—As a part of the Initia-  
 15 tive, the Secretary of Energy (in this section referred to  
 16 as the “Secretary”) shall carry out a research and develop-  
 17 ment program on artificial intelligence.

18           (b) COMPONENTS.—In carrying out the program re-  
 19 quired under subsection (a), the Secretary shall—

20           (1) formulate objectives for research on artifi-  
 21 cial intelligence to be supported by the Department  
 22 of Energy that are consistent with the Initiative;

23           (2) leverage the collective body of knowledge  
 24 from existing research on artificial intelligence;

1           (3) coordinate research efforts on artificial in-  
2           telligence that are funded through existing programs  
3           across the Department;

4           (4) engage with other Federal agencies, re-  
5           search communities, and potential users of informa-  
6           tion produced under this section;

7           (5) build, maintain, and, to the extent prac-  
8           ticable, make available for use by academic, govern-  
9           ment, and private sector researchers the computing  
10          hardware and software necessary to carry out the  
11          program; and

12          (6) establish and maintain on an Internet  
13          website of the Department available to the public a  
14          resource center that—

15                (A) provides current information and re-  
16                sources on training programs for employment in  
17                artificial intelligence; and

18                (B) otherwise serves as a resource for edu-  
19                cational institutions, State and local workforce  
20                development boards, nonprofit organizations,  
21                and apprenticeship programs seeking to develop  
22                and implement training programs for employ-  
23                ment in artificial intelligence.

24          (c) RESEARCH CENTERS.—



1           (1) GRANTS.—In carrying out this section, the  
2           Secretary may award grants to eligible entities to es-  
3           tablish and operate up to 5 artificial intelligence re-  
4           search centers (in this subsection referred to as  
5           “Centers”) for the purposes described in paragraph  
6           (3).

7           (2) SELECTION.—

8                   (A) IN GENERAL.—Except as provided in  
9                   subparagraph (C), grants under this subsection  
10                  shall be awarded through a competitive, merit-  
11                  reviewed process.

12                  (B) ELIGIBLE ENTITIES.—For purposes of  
13                  this subsection, an eligible entity is any entity  
14                  as follows:

15                           (i) An institution of higher education.

16                           (ii) A relevant nonprofit organization.

17                           (iii) A State or local government.

18                           (iv) A National Laboratory or a feder-  
19                           ally funded research and development cen-  
20                           ter.

21                           (v) A consortium of entities that con-  
22                           sists of—

23                                   (I) two or more entities specified  
24                                   in clauses (i) through (iv); or

1 (II) at least one entity specified  
2 in such clauses and a relevant private  
3 sector organization that is not a non-  
4 profit organization.

5 (C) NATIONAL SECURITY LABORATORY.—  
6 At least 1 of the grants under this subsection  
7 shall be awarded to a national security labora-  
8 tory of the National Nuclear Security Adminis-  
9 tration.

10 (3) PURPOSES.—The purposes of the Centers  
11 established under this subsection are—

12 (A) to serve the needs of the Department  
13 and such academic, educational, and private  
14 sector entities as the Secretary considers appro-  
15 priate;

16 (B) to advance research and education in  
17 artificial intelligence and facilitate improvement  
18 in the competitiveness of the United States; and

19 (C) to provide access to computing re-  
20 sources to promote scientific progress and en-  
21 able users from institutions of higher education,  
22 educational institutions, the National Labora-  
23 tories, and industry—

24 (i) to make scientific discoveries rel-  
25 evant to research in artificial intelligence;

1 (ii) to conduct research to accelerate  
2 scientific breakthroughs in science and  
3 technology with respect to artificial intel-  
4 ligence;

5 (iii) to support research conducted  
6 under this section; and

7 (iv) to increase the distribution of re-  
8 search infrastructure and broaden the  
9 spectrum of students exposed to research  
10 in artificial intelligence at institutions of  
11 higher education (including emerging re-  
12 search institutions).

13 (4) COORDINATION.—The Secretary shall en-  
14 sure the coordination of, and avoid unnecessary du-  
15 plication of, the activities of each Center with the ac-  
16 tivities of—

17 (A) other research entities of the Depart-  
18 ment, including the Nanoscale Science Research  
19 Centers, the Energy Frontier Research Centers,  
20 and the Energy Innovation Hubs; and

21 (B) industry.

22 (5) DURATION.—

23 (A) IN GENERAL.—Any center selected and  
24 established under this section is authorized to  
25 carry out activities for a period of 5 years.

1           (B) EXTENSION.—Such a Center may  
2           apply for, and the Director may grant, an ex-  
3           tension of a grant under this section for an ad-  
4           ditional 5-year period.

5           (C) TERMINATION.—Consistent with exist-  
6           ing authorities of the Department, the Sec-  
7           retary may terminate for cause a Center that  
8           underperforms during the performance period.

9           (d) AUTHORIZATION OF APPROPRIATIONS.—There  
10          are authorized to be appropriated for each of fiscal years  
11          2020 through 2024 for the Department of Energy,  
12          \$300,000,000 to be available for the Department to carry  
13          out this section.

○