

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-

havioral sciences (such as industrial-organizational psychology);

(C) to integrate into the activities of such Center consideration of the ethics of development, technology usage, and data collection, storage, and sharing (including training data sets) in connection with artificial intelligence;

(D) to support long-term and short-term workforce development in artificial intelligence, including broadening participation of underrepresented communities; and

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

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

(e) SELECTION AND DURATION.—

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

(2) EXTENSION.—Such a Center may apply for, and the Director may grant, an extension of a grant 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;

(ii) to conduct research to accelerate scientific breakthroughs in science and technology with respect to artificial intelligence;

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

(iv) to increase the distribution of research infrastructure and broaden the spectrum of students exposed to research in artificial intelligence at institutions of higher education (including emerging research institutions).

(4) COORDINATION.—The Secretary shall ensure the coordination of, and avoid unnecessary duplication of, the activities of each Center with the activities of—

(A) other research entities of the Department, including the Nanoscale Science Research Centers, the Energy Frontier Research Centers, and the Energy Innovation Hubs; and

(B) industry.

(5) DURATION.—

(A) IN GENERAL.—Any center selected and established under this section is authorized to 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.

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