

AMENDMENT NO. \_\_\_\_\_ Calendar No. \_\_\_\_\_

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

**IN THE SENATE OF THE UNITED STATES—116th Cong., 1st Sess.**

**S.** \_\_\_\_\_

To authorize appropriations for fiscal year 2020 for military activities of the Department of Defense, for military construction, and for defense activities of the Department of Energy, to prescribe military personnel strengths for such fiscal year, and for other purposes.

Referred to the Committee on \_\_\_\_\_ and  
ordered to be printed

Ordered to lie on the table and to be printed

AMENDMENT intended to be proposed by Mr. HEINRICH

Viz:

1 At the end of division A, add the following:

2 **TITLE XVII—ARTIFICIAL**  
3 **INTELLIGENCE**

4 **SEC. 1701. SHORT TITLE.**

5 This title may be cited as the “Artificial Intelligence  
6 Initiative Act” or “AI-IA”.

7 **SEC. 1702. SENSE OF CONGRESS.**

8 It is the sense of Congress that—

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

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

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

11 **SEC. 1703. DEFINITIONS.**

12          In this title:

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

15           (A) Any artificial system that performs  
16          tasks under varying and unpredictable cir-  
17          cumstances without significant human over-  
18          sight, or that can learn from experience and im-  
19          prove performance when exposed to data sets.

20           (B) An artificial system developed in com-  
21          puter software, physical hardware, or other con-  
22          text that solves tasks requiring human-like per-  
23          ception, cognition, planning, learning, commu-  
24          nication, or physical action.

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

4 (D) A set of techniques, including machine  
5 learning, that is designed to approximate a cog-  
6 nitive task.

7 (E) An artificial system designed to act ra-  
8 tionally, including an intelligent software agent  
9 or embodied robot that achieves goals using  
10 perception, planning, reasoning, learning, com-  
11 municating, decision making, and acting.

12 (2) ADVISORY COMMITTEE.—The term “Advi-  
13 sory Committee” means the advisory committee es-  
14 tablished or designated under section 1714.

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

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

20 (B) may grant a doctoral degree.

21 (4) INDUSTRY.—The term “industry” means  
22 entities in industries relevant to artificial intel-  
23 ligence.

1           (5) INITIATIVE.—The term “Initiative” means  
2           the National Artificial Intelligence Research and De-  
3           velopment Initiative established under section 1711.

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

8           (7) INTERAGENCY COMMITTEE.—The term  
9           “Interagency Committee” means the interagency  
10          committee established or designated under section  
11          1713.

12          (8) K–12 EDUCATION.—The term “K–12 edu-  
13          cation” means elementary school and secondary edu-  
14          cation, as such terms are defined in section 8101 of  
15          the Elementary and Secondary Education Act of  
16          1965 (20 U.S.C. 7801).

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

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

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

4 (B) A Tribal College or University (as de-  
5 fined in section 316(b) of the Higher Education  
6 Act of 1965 (20 U.S.C. 1059e(b))).

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

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

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

16 (F) A Native American-serving nontribal  
17 institution (as defined in section 319(b) of the  
18 Higher Education Act of 1965 (20 U.S.C.  
19 1059f(b))).

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

1 **Subtitle A—National Artificial In-**  
2 **telligence Research and Devel-**  
3 **opment Initiative**

4 **SEC. 1711. NATIONAL ARTIFICIAL INTELLIGENCE RE-**  
5 **SEARCH AND DEVELOPMENT INITIATIVE.**

6 The President shall establish and implement an ini-  
7 tiative with respect to artificial intelligence to be known  
8 as the “National Artificial Intelligence Research and De-  
9 velopment Initiative”. In carrying out the Initiative, the  
10 President shall, acting through appropriate Federal enti-  
11 ties, including the Networking and Information Tech-  
12 nology Research and Development Program—

13 (1) establish objectives, priorities, and metrics  
14 for strategic plans under section 1713(d) to accel-  
15 erate development of science and technology applica-  
16 tions for artificial intelligence in the United States;

17 (2) invest in research, development, demonstra-  
18 tion, application to analysis and modeling, and other  
19 activities with respect to science and technology in  
20 artificial intelligence;

21 (3) support the development of a workforce  
22 pipeline for science and technology with respect to  
23 artificial intelligence by making strategic invest-  
24 ments to—

1 (A) expand the number of researchers,  
2 educators, and students with training in science  
3 and technology in artificial intelligence;

4 (B) increase the number of skilled and  
5 trained workers from underrepresented commu-  
6 nities who can contribute to the development of  
7 artificial intelligence and artificial intelligence  
8 technology, diversify the artificial intelligence  
9 workforce, and expand the artificial intelligence  
10 workforce pipeline;

11 (C) promote the development and inclusion  
12 of multidisciplinary curricula and research op-  
13 portunities for science and engineering with re-  
14 spect to artificial intelligence, including ad-  
15 vanced technological education, during the pri-  
16 mary, secondary, undergraduate, graduate,  
17 postdoctoral, adult learning, and career retrain-  
18 ing stages of education; and

19 (D) equip workers with the knowledge and  
20 skill sets required to operate effectively in occu-  
21 pations and workplaces that will be increasingly  
22 influenced by artificial intelligence;

23 (4) facilitate coordination of efforts and collabo-  
24 ration with respect to research and development of  
25 artificial intelligence among government agencies,

1 Federal and national laboratories, nonprofit organi-  
2 zations, institutions of higher education, and indus-  
3 try;

4 (5) leverage existing Federal research invest-  
5 ments, and partner with industry and institutions of  
6 higher education to leverage knowledge and re-  
7 sources, to advance objectives and priorities of the  
8 Initiative;

9 (6) strengthen research, development, dem-  
10 onstration, and applications in science and tech-  
11 nology with respect to artificial intelligence by—

12 (A) addressing gaps in basic research  
13 knowledge with respect to artificial intelligence  
14 through research;

15 (B) promoting the further development of  
16 facilities and centers available for research,  
17 testing, and education in science and technology  
18 with respect to artificial intelligence;

19 (C) stimulating research on, and pro-  
20 moting more rapid development and commer-  
21 cialization of, artificial intelligence-based tech-  
22 nologies;

23 (D) promoting research into the effects of  
24 artificial intelligence and applications of artifi-  
25 cial intelligence on society, the workforce and



1 workplace, and individuals, including those from  
2 underrepresented communities;

3 (E) promoting data and model sharing  
4 among the Federal government, academic re-  
5 searchers, the private sector, and other practi-  
6 tioners of artificial intelligence;

7 (F) identifying and minimizing inappro-  
8 priate bias in data sets, algorithms, and other  
9 aspects of artificial intelligence; and

10 (G) supporting efforts to create metrics to  
11 assess safety, security, and reliability of applica-  
12 tions of science and technology with respect to  
13 artificial intelligence; and

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

19 **SEC. 1712. NATIONAL ARTIFICIAL INTELLIGENCE COORDI-**  
20 **NATION OFFICE.**

21 (a) IN GENERAL.—The Director of the Office of  
22 Science and Technology Policy, in consultation with the  
23 Director of the National Science Foundation, the Sec-  
24 retary of Energy, and the Secretary of Commerce, shall  
25 establish or designate, and appoint a director of, an office

1 to be known as the “National Artificial Intelligence Co-  
2 ordination Office” (in this section referred to as the “Of-  
3 fice”).

4 (b) DUTIES.—The Office shall—

5 (1) provide technical and administrative support  
6 to the Advisory Committee;

7 (2) serve as the point of contact on Federal ar-  
8 tificial intelligence activities for government organi-  
9 zations, academia, industry, professional societies,  
10 State artificial intelligence programs, interested cit-  
11 izen groups, and others to exchange technical and  
12 programmatic information;

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

16 (4) promote access to and development of early  
17 applications of the technologies, innovations, and ex-  
18 pertise that benefit the public derived from Initiative  
19 activities to agency missions and systems across the  
20 Federal Government, and to United States industry,  
21 including startup companies.

22 (c) FUNDING.—The Office shall be funded through  
23 interagency funding.

24 (d) REPORT.—Not later than 90 days after the date  
25 of the enactment of this Act, the Director of the Office

1 of Science and Technology Policy shall submit to the Com-  
2 mittee on Commerce, Science, and Transportation of the  
3 Senate and the Committee on Science, Space, and Tech-  
4 nology of the House of Representatives a report on fund-  
5 ing for the National Artificial Intelligence Coordination  
6 Office. The report shall include—

7 (1) the amount of funding required to ade-  
8 quately fund the Office;

9 (2) the adequacy of existing mechanisms to  
10 fund the Office; and

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

13 **SEC. 1713. INTERAGENCY COMMITTEE ON ARTIFICIAL IN-**  
14 **TELLIGENCE.**

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

19 (b) COMPOSITION; CHAIRS.—

20 (1) COMPOSITION.—The Interagency Com-  
21 mittee shall be comprised of representatives from the  
22 following, as detailed to the Interagency Committee  
23 by the head of the agency concerned:

24 (A) The National Institute of Standards  
25 and Technology.

1 (B) The National Science Foundation.

2 (C) The Department of Energy.

3 (D) The National Aeronautics and Space  
4 Administration.

5 (E) The Department of Defense.

6 (F) The Office of the Director of National  
7 Intelligence.

8 (G) The Office of Management and Budg-  
9 et.

10 (H) The Office of Science and Technology  
11 Policy.

12 (I) The National Institutes of Health.

13 (J) Any other Federal agency the Director  
14 of the Office of Science and Technology Policy  
15 considers appropriate.

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

18 (A) The Secretary of Energy.

19 (B) The Director of the Office of Science  
20 and Technology Policy.

21 (C) The Director of the National Institute  
22 of Standards and Technology.

23 (D) The Director of the National Science  
24 Foundation.

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

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

5           (2) establish objectives and priorities for the  
6           Initiative, consistent with the objectives and pur-  
7           poses specified in section 1711, based on identified  
8           knowledge and workforce gaps and other national  
9           needs;

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

12          (4) evaluate opportunities for international co-  
13          operation with strategic allies on research and devel-  
14          opment with respect to artificial intelligence and ar-  
15          tificial intelligence technology.

16          (d) STRATEGIC PLAN.—Not later than 1 year after  
17          the date of the enactment of this Act, the Interagency  
18          Committee shall develop a 5-year strategic plan, and 6  
19          years after enactment of this Act develop an additional  
20          5-year strategic plan, with periodic updates (as appro-  
21          priate), to guide the activities of the Initiative, meet Initia-  
22          tive goals and priorities, and anticipate outcomes at par-  
23          ticipating agencies. In carrying out this subsection, the  
24          Interagency Committee should take into consideration re-  
25          ports from the Advisory Committee.

1 **SEC. 1714. NATIONAL ARTIFICIAL INTELLIGENCE ADVI-**  
2 **SORY COMMITTEE.**

3 (a) IN GENERAL.—The Director of the National  
4 Science Foundation (in this section referred to as the “Di-  
5 rector”) shall establish or designate an advisory committee  
6 to be known as the “National Artificial Intelligence Advi-  
7 sory Committee”.

8 (b) QUALIFICATION OF MEMBERS.—

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

23 (2) LIMITATION.—Not more than half of the  
24 members of the Advisory Committee may be rep-  
25 resentatives of the artificial intelligence industry.

1 (c) DUTIES.—The Advisory Committee shall advise  
2 the Director of the Office of Science and Technology Pol-  
3 icy and the Interagency Committee on Artificial Intel-  
4 ligence under section 1713 on matters relating to the Ini-  
5 tiative, including assessing—

6 (1) trends and developments in artificial intel-  
7 ligence, including the current and near future state  
8 of artificial intelligence systems and forecasting;

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

11 (3) the need to revise the Initiative;

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

15 (5) whether the component areas, priorities,  
16 and technical goals of the Initiative are helping to  
17 maintain United States leadership in artificial intel-  
18 ligence and artificial intelligence technology;

19 (6) the management, coordination, implementa-  
20 tion, and activities of the Initiative; and

21 (7) whether societal, ethical, legal, environ-  
22 mental, and workforce concerns with respect to arti-  
23 ficial intelligence and artificial intelligence tech-  
24 nology are adequately addressed by the Initiative.

1 (d) REPORTS.—Not later than 4 years after the date  
2 of the most recent assessment under subsection (c), and  
3 quadrennially thereafter, the Advisory Committee shall  
4 submit to the Director of the National Science Founda-  
5 tion, the Committee on Commerce, Science, and Transpor-  
6 tation of the Senate, and the Committee on Science,  
7 Space, and Technology of the House of Representatives  
8 a report on its assessments under subsection (c) and its  
9 recommendations for ways to improve the Initiative.

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



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

4 **SEC. 1715. STUDY ON THE ARTIFICIAL INTELLIGENCE**  
5 **WORKFORCE.**

6 (a) IN GENERAL.—Not later than 60 days after the  
7 date of the enactment of this Act, the National Artificial  
8 Intelligence Coordination Office shall seek to enter into  
9 a contract with a federally funded research and develop-  
10 ment center for a study on the mechanisms that produce  
11 or contribute to the workforce in artificial intelligence (in-  
12 cluding researchers and specialists in artificial intelligence  
13 and users of artificial intelligence) in order to identify and  
14 develop actions to ensure an appropriate increase in the  
15 size, quality, and diversity of the workforce.

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

20 (1) Collaborate with the Secretary of Com-  
21 merce, the Commissioner of Labor Statistics, and  
22 the Director of the Census in developing a com-  
23 prehensive and detailed understanding of the work-  
24 force needs of and employment opportunities in the  
25 artificial intelligence field, by State and by region.

1           (2) Collaborate in carrying out the study with  
2 educational institutions, State and local workforce  
3 development boards, nonprofit organizations, labor  
4 organizations, apprenticeship programs, industry,  
5 and other entities in the artificial intelligence field.

6           (3) Collaborate with minority-serving institu-  
7 tions in order to facilitate the sharing of best prac-  
8 tices and approaches for increasing and retaining  
9 underrepresented populations in the artificial intel-  
10 ligence field.

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

15           (A) entities in the artificial intelligence  
16 field, State and local workforce development  
17 boards, nonprofit organizations, labor organiza-  
18 tions, and apprenticeship programs that provide  
19 training programs for employment in the artifi-  
20 cial intelligence field; and

21           (B) educational institutions that seek to  
22 establish such training programs.

23           (c) DEPARTMENT OF LABOR ANNUAL REPORT ON  
24 JOB CREATION.—Each year while the contract referred to  
25 in subsection (a) is in force, the Secretary of Labor shall,

1 using information derived from the study described in that  
2 subsection and other appropriate information, issue to the  
3 public a report on job creation in the artificial intelligence  
4 field during the preceding year.

5 **Subtitle B—National Institute of**  
6 **Standards and Technology Arti-**  
7 **ficial Intelligence Activities**

8 **SEC. 1721. NATIONAL INSTITUTE OF STANDARDS AND**  
9 **TECHNOLOGY ACTIVITIES ON ARTIFICIAL IN-**  
10 **TELLIGENCE.**

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

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

19 (A) developing measurements and stand-  
20 ards;

21 (B) supporting efforts to develop measure-  
22 ments and consensus standards by standards  
23 development organizations; and

1 (C) modernizing the infrastructure used  
2 for benchmarking artificial intelligence tech-  
3 nologies;

4 (2) establishing and supporting collaborative  
5 ventures or consortia with public or private sector  
6 entities, including institutions of higher education,  
7 National Laboratories, and industry for the purpose  
8 of advancing fundamental and applied research and  
9 development on artificial intelligence; and

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

13 (b) ARTIFICIAL INTELLIGENCE OUTREACH.—

14 (1) IN GENERAL.—The Director shall conduct  
15 outreach—

16 (A) to receive input from stakeholders on  
17 the development of a plan to address future  
18 measurements and standards related to artifi-  
19 cial intelligence; and

20 (B) to provide an opportunity for public  
21 comment on any such measurements or stand-  
22 ards.

23 (2) MEETINGS.—

24 (A) IN GENERAL.—Not later than 1 year  
25 after the date of the enactment of this Act, and

1 a periodic basis thereafter, as the Director de-  
2 termines appropriate, the Director shall convene  
3 1 or more meetings of stakeholders, including  
4 technical expert representatives from govern-  
5 ment organizations, industry, and institutions  
6 of higher education, to discuss topics described  
7 in subparagraph (B).

8 (B) TOPICS.—Meetings under subpara-  
9 graph (A) may cover topics that the Director  
10 determines to be important to the development  
11 of standards and measurements with respect to  
12 artificial intelligence, including—

- 13 (i) cybersecurity;
- 14 (ii) algorithm accountability;
- 15 (iii) algorithm explainability;
- 16 (iv) algorithm trustworthiness;
- 17 (v) establishment of a common lexicon  
18 for artificial intelligence; and
- 19 (vi) resources and methods for  
20 benchmarking artificial intelligence tech-  
21 nologies.

22 (C) PURPOSES.—The purposes of meetings  
23 under this paragraph shall be—

1 (i) to assess contemporary research on  
2 the topics determined by the Director  
3 under subparagraph (B);

4 (ii) to evaluate research gaps relating  
5 to such topics;

6 (iii) to provide an opportunity for  
7 stakeholders to provide recommendations  
8 on the research to be addressed by the Na-  
9 tional Institute of Standards and Tech-  
10 nology and the Initiative; and

11 (iv) to coordinate engagement with  
12 international standards bodies in order to  
13 ensure United States leadership in the de-  
14 velopment of global technical standards, in-  
15 cluding with respect to artificial intel-  
16 ligence and cybersecurity.

17 (3) REPORT TO CONGRESS.—Not later than 2  
18 years after the date of the enactment of this Act, the  
19 Director shall transmit to the Committee on Com-  
20 merce, Science, and Transportation of the Senate  
21 and the Committee on Science, Space, and Tech-  
22 nology of the House of Representatives a report  
23 summarizing the results of outreach and meetings  
24 conducted under this subsection.

1 (c) AUTHORIZATION OF APPROPRIATIONS.—There  
2 are authorized to be appropriated for each of fiscal years  
3 2020 through 2024, \$40,000,000 to carry out this section.

4 **Subtitle C—National Science Foun-**  
5 **dation and Multidisciplinary**  
6 **Centers for Artificial Intel-**  
7 **ligence Research and Education**

8 **SEC. 1731. RESEARCH AND EDUCATION PROGRAM ON ARTI-**  
9 **FICIAL INTELLIGENCE AND ARTIFICIAL IN-**  
10 **TELLIGENCE ENGINEERING.**

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

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

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

23 (A) algorithm accountability;

1 (B) minimization of inappropriate bias in  
2 training data sets or algorithmic feature selec-  
3 tion;

4 (C) qualitative and quantitative forecasting  
5 of future capabilities and applications; and

6 (D) societal and ethical implications of ar-  
7 tificial intelligence;

8 (2) use existing authorities and programs and  
9 collaborate with other Federal agencies—

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

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

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



- 1 (i) algorithm accountability;
- 2 (ii) algorithm explainability;
- 3 (iii) consumer data privacy;
- 4 (iv) assessment and minimization of
- 5 inappropriate bias in training data and
- 6 output;
- 7 (v) societal and ethical implications of
- 8 the use of artificial intelligence;
- 9 (vi) algorithm trustworthiness; and
- 10 (vii) algorithmic forecasting;
- 11 (D) to engage with institutions of higher
- 12 education, research communities, potential
- 13 users of information produced under this sec-
- 14 tion, entities in the private sector, and non-Fed-
- 15 eral entities—
- 16 (i) to leverage the collective body of
- 17 knowledge from existing research and edu-
- 18 cation activities with respect to artificial
- 19 intelligence and artificial intelligence engi-
- 20 neering; and
- 21 (ii) to support partnerships among in-
- 22 stitutions of higher education and industry
- 23 that facilitate collaborative research, per-
- 24 sonnel exchanges, and workforce develop-

1                   ment with respect to artificial intelligence  
2                   and artificial intelligence engineering;

3                   (E) to coordinate research efforts with re-  
4                   spect to artificial intelligence and artificial intel-  
5                   ligence engineering funded through existing  
6                   programs across the directorates of the Na-  
7                   tional Science Foundation;

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

15                  (G) to increase participation rates in re-  
16                  search and education on artificial intelligence  
17                  among underrepresented communities by engag-  
18                  ing with minority-serving institutions.

19                  (c) GRADUATE TRAINEESHIPS.—In carrying out the  
20                  program required under subsection (a), the Director may  
21                  provide traineeships to graduate students at institutions  
22                  of higher education who—

23                   (1) are United States nationals or aliens law-  
24                   fully admitted for permanent residence in the United  
25                   States; and

1           (2) who choose to pursue masters or doctoral  
2           degrees in artificial intelligence or artificial intel-  
3           ligence engineering.

4 **SEC. 1732. MULTIDISCIPLINARY CENTERS FOR ARTIFICIAL**  
5 **INTELLIGENCE RESEARCH AND EDUCATION.**

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

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

- 18           (1) An institution of higher education.
- 19           (2) A relevant nonprofit organization.
- 20           (3) A State or local government.
- 21           (4) A consortium of entities that consists of—  
22                (A) two or more entities specified in para-  
23                graphs (1) through (3); or

1                   (B) at least one entity specified in such  
2                   paragraphs and a relevant private sector orga-  
3                   nization that is not a nonprofit organization.

4           (c) MINIMUM NUMBER OF GRANTS FOR CERTAIN  
5 PURPOSES.—

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

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

13           (d) APPLICATION.—An eligible entity seeking funding  
14           under this section shall submit an application to the Direc-  
15           tor at such time, in such manner, and containing such  
16           information as the Director may require. The application  
17           shall include—

18           (1) a plan for the proposed Center—

19                   (A) to work with other research institu-  
20                   tions, emerging research institutions, and in-  
21                   dustry to leverage expertise in artificial intel-  
22                   ligence, education and curricula development,  
23                   and technology transfer;

24                   (B) to promote active collaboration among  
25                   researchers in multiple disciplines and across

1 multiple institutions involved in artificial intel-  
2 ligence research including physics, engineering,  
3 mathematical sciences, computer and informa-  
4 tion science, biological and cognitive sciences,  
5 material science, education, and social and be-  
6 havioral sciences (such as industrial-organiza-  
7 tional psychology);

8 (C) to integrate into the activities of such  
9 Center consideration of the ethics of develop-  
10 ment, technology usage, and data collection,  
11 storage, and sharing (including training data  
12 sets) in connection with artificial intelligence;

13 (D) to support long-term and short-term  
14 workforce development in artificial intelligence,  
15 including broadening participation of underrep-  
16 resented communities; and

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

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

23 (e) SELECTION AND DURATION.—

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

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

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

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

14          **Subtitle D—Department of Energy**  
15                  **Artificial Intelligence Research**  
16                  **and Development Program**

17          **SEC. 1741. RESEARCH AND DEVELOPMENT PROGRAM ON**  
18                  **ARTIFICIAL INTELLIGENCE.**

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

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

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

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

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

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

12          (5) build, maintain, and, to the extent prac-  
13          ticable, make available for use by academic, govern-  
14          ment, and private sector researchers the computing  
15          hardware and software necessary to carry out the  
16          program; and

17          (6) establish and maintain on an Internet  
18          website of the Department available to the public a  
19          resource center that—

20                 (A) provides current information and re-  
21                 sources on training programs for employment in  
22                 artificial intelligence; and

23                 (B) otherwise serves as a resource for edu-  
24                 cational institutions, State and local workforce  
25                 development boards, nonprofit organizations,

1           and apprenticeship programs seeking to develop  
2           and implement training programs for employ-  
3           ment in artificial intelligence.

4           (c) RESEARCH CENTERS.—

5           (1) GRANTS.—In carrying out this section, the  
6           Secretary may award grants to eligible entities to es-  
7           tablish and operate up to 5 artificial intelligence re-  
8           search centers (in this subsection referred to as  
9           “Centers”) for the purposes described in paragraph  
10          (3).

11          (2) SELECTION.—

12           (A) IN GENERAL.—Except as provided in  
13           subparagraph (C), grants under this subsection  
14           shall be awarded through a competitive, merit-  
15           reviewed process.

16           (B) ELIGIBLE ENTITIES.—For purposes of  
17           this subsection, an eligible entity is any entity  
18           as follows:

19                   (i) An institution of higher education.

20                   (ii) A relevant nonprofit organization.

21                   (iii) A State or local government.

22                   (iv) A National Laboratory or a feder-  
23                   ally funded research and development cen-  
24                   ter.



1 (v) A consortium of entities that con-  
2 sists of—

3 (I) two or more entities specified  
4 in clauses (i) through (iv); or

5 (II) at least one entity specified  
6 in such clauses and a relevant private  
7 sector organization that is not a non-  
8 profit organization.

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

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

16 (A) to serve the needs of the Department  
17 and such academic, educational, and private  
18 sector entities as the Secretary considers appro-  
19 priate;

20 (B) to advance research and education in  
21 artificial intelligence and facilitate improvement  
22 in the competitiveness of the United States; and

23 (C) to provide access to computing re-  
24 sources to promote scientific progress and en-  
25 able users from institutions of higher education,

1 educational institutions, the National Labora-  
2 tories, and industry—

3 (i) to make scientific discoveries rel-  
4 evant to research in artificial intelligence;

5 (ii) to conduct research to accelerate  
6 scientific breakthroughs in science and  
7 technology with respect to artificial intel-  
8 ligence;

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

11 (iv) to increase the distribution of re-  
12 search infrastructure and broaden the  
13 spectrum of students exposed to research  
14 in artificial intelligence at institutions of  
15 higher education (including emerging re-  
16 search institutions).

17 (4) COORDINATION.—The Secretary shall en-  
18 sure the coordination of, and avoid unnecessary du-  
19 plication of, the activities of each Center with the ac-  
20 tivities of—

21 (A) other research entities of the Depart-  
22 ment, including the Nanoscale Science Research  
23 Centers, the Energy Frontier Research Centers,  
24 and the Energy Innovation Hubs; and

25 (B) industry.

1 (5) DURATION.—

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

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

9 (C) TERMINATION.—Consistent with exist-  
10 ing authorities of the Department, the Sec-  
11 retary may terminate for cause a Center that  
12 underperforms during the performance period.

13 (d) AUTHORIZATION OF APPROPRIATIONS.—There  
14 are authorized to be appropriated for each of fiscal years  
15 2020 through 2024 for the Department of Energy,  
16 \$300,000,000 to be available for the Department to carry  
17 out this section.