

117TH CONGRESS
2D SESSION

H. R. 8251

To authorize the National Science Foundation to make awards to institutions of higher education and non-profit organizations for research, development, and related activities to advance innovative approaches to developing, improving, and expanding evidence-based microelectronics education and workforce development activities and learning experiences at all levels of education, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

JUNE 28, 2022

Ms. STEVENS (for herself, Mr. WALTZ, Mr. KILDEE, and Mr. GONZALEZ of Ohio) introduced the following bill; which was referred to the Committee on Science, Space, and Technology, and in addition to the Committee on Education and Labor, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned

A BILL

To authorize the National Science Foundation to make awards to institutions of higher education and non-profit organizations for research, development, and related activities to advance innovative approaches to developing, improving, and expanding evidence-based microelectronics education and workforce development activities and learning experiences at all levels of education, 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,*

1 **SECTION 1. SHORT TITLE.**

2 This Act may be cited as the “Creating Helpful Ini-
3 tiatives to Produce Personnel In Needed Growth INdus-
4 tries Act of 2022” or the “CHIPPING IN Act of 2022”.

5 **SEC. 2. FINDINGS.**

6 Congress finds the following:

7 (1) While microelectronics are a primary driver
8 of economic growth and scientific advancement, the
9 United States has lost much of its capacity to design
10 and manufacture, test, and package microelectronics
11 and microelectronics systems domestically.

12 (2) Current educational and vocational training
13 opportunities are insufficient to meet the domestic
14 microelectronics industry workforce needs. The def-
15 icit between open jobs and qualified workers is pro-
16 jected to grow as design and manufacturing activi-
17 ties increase.

18 (3) Growth in microelectronics design and man-
19 ufacturing capabilities may be limited by a lack of
20 qualified workers.

21 (4) The United States education pathways for
22 microelectronics faces significant challenges, from a
23 lack of gender and racial diversity to an inability of
24 universities and community colleges to attract and
25 retain faculty and other instructors qualified to
26 teach microelectronics.

1 (5) Students often fail to get the hands-on
2 training they need to succeed in microelectronics ca-
3 reers, especially at the community or technical col-
4 lege level.

5 (6) Skilled technical jobs in the manufacturing
6 industry and in the microelectronics design industry
7 are well-suited for apprenticeship and other paid
8 training models, however prospective participants
9 must have adequate STEM training.

10 (7) The microelectronics industry suffers from
11 a lack of awareness and visibility as pre-college stu-
12 dents, students pursuing STEM degrees, technical
13 workers, and doctorate-level researchers seek em-
14 ployment in other industries.

15 (8) Lack of access to co-located design and fab-
16 rication facilities, including attendant software li-
17 censing issues is a deterrent for United States com-
18 petitiveness and workforce development.

19 (9) In order to help drive forward advances in
20 microelectronics and increase domestic microelec-
21 tronics design and manufacturing capability, the
22 Federal Government must provide sufficient re-
23 sources and use its convening power to facilitate the
24 growth of microelectronics talent in academia, the

1 Federal Government, and the microelectronics indus-
2 try.

3 **SEC. 3. NATIONAL SCIENCE FOUNDATION MICROELEC-**
4 **TRONICS EDUCATION ACTIVITIES.**

5 (a) DEFINITIONS.—In this section:

6 (1) DIRECTOR.—The term “Director” means
7 the Director of the National Science Foundation.

8 (2) FOUNDATION.—The term “Foundation”
9 means the National Science Foundation.

10 (3) HISTORICALLY BLACK COLLEGE OR UNI-
11 VERSITY.—The term “historically Black college or
12 university” has the meaning given the term “part B
13 institution” in section 322 of the Higher Education
14 Act of 1965 (20 U.S.C. 1061).

15 (4) INSTITUTION OF HIGHER EDUCATION.—The
16 term “institution of higher education” has the
17 meaning given the term in section 101(a) of the
18 Higher Education Act of 1965 (20 U.S.C. 1001(a)).

19 (5) K–12 EDUCATION.—The term “K–12 edu-
20 cation” means elementary school and secondary edu-
21 cation, as such terms are defined in section 8101 of
22 the Elementary and Secondary Education Act of
23 1965 (20 U.S.C. 7801).

24 (6) LABOR ORGANIZATION.—The term “labor
25 organization” has the meaning given the term in

1 paragraph (5) of section 2 of the National Labor
2 Relations Act (29 U.S.C. 152), except that such
3 term shall also include—

4 (A) any organization composed of labor or-
5 ganizations, such as a labor union federation or
6 a State or municipal labor body; and

7 (B) any organization which would be in-
8 cluded in the definition of such term under such
9 paragraph (5) but for the fact the organization
10 represents—

11 (i) individuals employed by the United
12 States, any wholly owned Government cor-
13 poration, any Federal Reserve Bank, or
14 any State or political subdivision thereof;

15 (ii) individuals employed by persons
16 subject to the Railway Labor Act (45
17 U.S.C. 151 et seq.); or

18 (iii) individuals employed as agricul-
19 tural laborers.

20 (7) MINORITY-SERVING INSTITUTION.—The
21 term “minority-serving institution” means—

22 (A) a Hispanic-serving institution (as such
23 term is defined in section 502 of the Higher
24 Education Act of 1965 (20 U.S.C. 1101a));

1 (B) an Alaska Native-serving institution
2 and Native Hawaiian-serving institution (as
3 such terms are defined in section 317 of the
4 Higher Education Act of 1965 (20 U.S.C.
5 1059d)); and

6 (C) Predominantly Black institutions,
7 Asian American and Native American Pacific
8 Islander-serving Institutions, and Native Amer-
9 ican-serving Nontribal Institutions (as such
10 terms are defined in section 371 of the Higher
11 Education Act of 1965 (20 U.S.C. 1067q(c))).

12 (8) TRIBAL COLLEGE OR UNIVERSITY.—The
13 term “Tribal College or University” has the meaning
14 given the term “Tribal College or University” in sec-
15 tion 316 of the Higher Education Act of 1965 (20
16 U.S.C. 1059c).

17 (9) STEM.—The term “STEM” means the
18 academic and professional disciplines of science,
19 technology, engineering, and mathematics, including
20 computer science.

21 (10) MICROELECTRONICS.—The term “micro-
22 electronics” means semiconductors and related mate-
23 rials, processing chemistries, design, fabrication,
24 manufacturing, lithography, packaging, sensors, de-
25 vices, integrated circuits, processors, computing ar-

1 chitectures, modeling and simulation, software tools,
2 and related technologies.

3 (b) NATIONAL SCIENCE FOUNDATION MICROELEC-
4 TRONICS EDUCATION ACTIVITIES.—

5 (1) IN GENERAL.—The Director shall make
6 awards to institutions of higher education, non-profit
7 organizations, or consortia thereof, for research, de-
8 velopment, and related activities to advance innova-
9 tive approaches to developing, improving, and ex-
10 panding evidence-based education and workforce de-
11 velopment activities and learning experiences at all
12 levels of education in fields and disciplines related to
13 microelectronics.

14 (2) PURPOSES.—Activities carried out under
15 this section shall be for the purpose of supporting
16 the growth, retention, and development of a diverse,
17 flexible, and sustainable microelectronics workforce
18 that meets the evolving needs of industry, academia,
19 and Federal laboratories.

20 (3) USES OF FUNDS.—Awards made under this
21 subsection shall be used for the following:

22 (A) To develop curricula and teaching
23 modules for topics relevant to microelectronics,
24 including those modules that provide meaning-

1 ful hands-on learning experiences, including at
2 the K–12 education level.

3 (B) To disseminate materials developed
4 pursuant to subparagraph (A), including
5 through the creation and maintenance of a pub-
6 licly accessible database.

7 (C) To implement training, research, and
8 professional development programs for teachers,
9 including innovative pre-service and in-service
10 programs, in microelectronics and related fields.

11 (D) To support learning activities that pro-
12 vide physical, simulated, or remote access to
13 training facilities and industry-standard proc-
14 esses and tools, including equipment and soft-
15 ware for the design, development, and manufac-
16 ture of microelectronics.

17 (E) To increase the integration of micro-
18 electronics content into STEM curricula at all
19 education levels.

20 (F) To provide informal hands-on learning
21 opportunities for K–12 students in microelec-
22 tronics, including competitions.

23 (G) To carry out such other activities as
24 the Director determines appropriate.

1 (4) ADVANCED MICROELECTRONICS
2 TRAINEESHIPS.—

3 (A) IN GENERAL.—The Director shall
4 make awards to institutions of higher education
5 and non-profit organizations (or consortia of
6 such institutions and organizations) to establish
7 traineeship programs for graduate students who
8 pursue microelectronics research leading to a
9 masters or doctorate degree by providing fund-
10 ing and other assistance, and by providing
11 graduate students with opportunities for re-
12 search experiences in government or industry
13 related to such students' microelectronics stud-
14 ies.

15 (B) USE OF FUNDS.—An institution of
16 higher education or non-profit organizations (or
17 consortia of such institutions and organizations)
18 shall use award funds provided under subpara-
19 graph (A) for the following purposes:

20 (i) Paying tuition and fees, and pro-
21 viding stipends, for students receiving
22 traineeships who are citizens, nationals, or
23 aliens lawfully admitted for permanent res-
24 idence.

1 (ii) Facilitating opportunities for sci-
2 entific internship programs for students re-
3 ceiving traineeships in microelectronics at
4 private industry, non-profit research insti-
5 tutions, or Federal laboratories.

6 (iii) Such other costs associated with
7 the administration of the program.

8 (5) MICROELECTRONICS RESEARCH EXPERI-
9 ENCES THROUGH EXISTING PROGRAMS.—The Direc-
10 tor shall seek to increase opportunities for microelec-
11 tronics research for students and trainees at all lev-
12 els by encouraging proposals in microelectronics
13 through existing programs, including the following:

14 (A) Research experiences for undergradu-
15 ates pursuant to section 514 of the America
16 COMPETES Reauthorization Act of 2010 (42
17 U.S.C. 1862p–6).

18 (B) Postdoctoral fellowship programs es-
19 tablished pursuant to section 522 of the Amer-
20 ica COMPETES Act of 2010 (42 U.S.C.
21 1862p–11).

22 (C) Graduate fellowships established pur-
23 suant to section 10 of the National Science
24 Foundation Act of 1950 (42 U.S.C. 1869).

1 (D) Informal STEM education programs
2 established pursuant to section 3 of the STEM
3 Education Act of 2015 (42 U.S.C. 1862q).

4 (E) The Robert Noyce Teacher Scholar-
5 ship Program established pursuant to section
6 10 of the National Science Foundation Author-
7 ization Act of 2002 (42 U.S.C. 1862n–1).

8 (F) Major research instrumentation pro-
9 grams established pursuant to section 7036 of
10 the America COMPETES Act (42 U.S.C.
11 1862o–14).

12 (G) Scientific and technical education pro-
13 grams established pursuant to section 3 of the
14 Scientific and Advanced-Technology Act of
15 1992 (42 U.S.C. 1862i).

16 (6) INDUSTRY PARTNERSHIPS.—In carrying out
17 the activities under this subsection, the Director
18 shall encourage awardees to partner with industry
19 and other private sector organizations to facilitate
20 the expansion of workforce pipelines and enable ac-
21 cess to industry-standard equipment and software
22 for use in undergraduate and graduate microelec-
23 tronics education programs.

24 (7) INTERAGENCY COORDINATION.—The Direc-
25 tor shall collaborate with the Subcommittee on

1 Microelectronics Leadership of the National Science
2 and Technology Council, established pursuant to sec-
3 tion 9906(a) of the William M. (Mac) Thornberry
4 National Defense Authorization Act for Fiscal Year
5 2021 (Public Law 116–283; 15 U.S.C. 4656), to
6 maintain the effectiveness of microelectronics work-
7 force development activities across the agencies.

8 (c) NATIONAL NETWORK FOR MICROELECTRONICS
9 EDUCATION.—

10 (1) IN GENERAL.—The Director shall, on a
11 competitive, merit-reviewed basis, make awards to
12 institutions of higher education and non-profit orga-
13 nizations (or consortia of such institutions and orga-
14 nizations) to establish partnerships to enhance and
15 broaden participation in microelectronics education.

16 (2) ACTIVITIES.—Awards made under this sub-
17 section shall be used for the following:

18 (A) To conduct training and education ac-
19 tivities, including curricula design, development,
20 dissemination, and assessment, and share infor-
21 mation and best practices across the network of
22 awardees.

23 (B) To develop regional partnerships
24 among associate-degree-granting colleges, bach-
25 elor-degree-granting institutions, workforce de-

1 development programs, labor organizations, and
2 industry to create a diverse national technical
3 workforce trained in microelectronics and en-
4 sure education and training is meeting the
5 evolving needs of industry.

6 (C) To facilitate partnerships with employ-
7 ers, employer consortia or other private sector
8 organizations that offer apprenticeships, intern-
9 ships, or applied learning experiences in the
10 field of microelectronics.

11 (D) To develop shared infrastructure avail-
12 able to institutions of higher education, two-
13 year colleges, and private organizations to en-
14 able experiential learning activities and provide
15 physical or digital access to training facilities
16 and industry-standard tools and processes.

17 (E) To create and disseminate public out-
18 reach to support awareness of microelectronics
19 education and career opportunities, including
20 through outreach to K–12 schools and STEM-
21 related organizations.

22 (F) To collaborate and coordinate with in-
23 dustry and existing public and private organiza-
24 tions conducting microelectronics education and
25 workforce development activities, as practicable.

1 (3) NATIONAL NETWORK FOR MICROELEC-
2 TRONICS EDUCATION.—The Director shall make an
3 award to an organization to establish a national net-
4 work of partnerships (referred to in this section as
5 the “National Network for Microelectronics Edu-
6 cation”) to coordinate activities, best practice shar-
7 ing, and access to facilities across the partnerships
8 established in accordance with paragraph (1).

9 (4) INCENTIVIZING PARTICIPATION.—To the ex-
10 tent practicable, the Director shall encourage partici-
11 pation in the National Network for Microelectronics
12 Education under paragraph (3) through the coordi-
13 nation of activities and distribution of awards de-
14 scribed in subsection (b).

15 (5) PARTNERSHIPS.—The Director shall en-
16 courage the submission of proposals that are led by
17 historically Black colleges and universities, Tribal
18 Colleges or Universities, and minority-serving insti-
19 tutions or that include partnerships with or among
20 such institutions to increase the recruitment of stu-
21 dents from groups historically underrepresented in
22 STEM to pursue graduate studies in microelec-
23 tronics.

24 (6) OUTREACH.—In addition to any other re-
25 quirements as determined appropriate by the Direc-

1 tor, the Director shall require that proposals for
2 awards under this subsection shall include a descrip-
3 tion of how the applicant will develop and implement
4 outreach activities to increase the participation of
5 women and other students from groups historically
6 underrepresented in STEM.

7 (7) COORDINATION ACROSS FOUNDATION PRO-
8 GRAMS.—In carrying out the activities under this
9 subsection, the Director shall ensure awardees co-
10 ordinate with, and avoid unnecessary duplication of,
11 activities carried out pursuant to the 21st Century
12 Nanotechnology Research and Development Act
13 (Public Law 108–153), the National Quantum Ini-
14 tiative Act (Public Law 115–368), the National Ar-
15 tificial Intelligence Initiative Act of 2020 (enacted as
16 division E of the William M. (Mac) Thornberry Na-
17 tional Defense Authorization Act for Fiscal Year
18 2021 (Public Law 116–283)), and other related pro-
19 grams, as appropriate.

20 (d) AUTHORIZATION OF APPROPRIATIONS.—There
21 are authorized to be appropriated \$250,000,000 to the
22 Foundation for fiscal years 2023 through 2027 to carry
23 out this section.

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