Electronics & Semicon

03701

Electronics Industry Roadmap

Updated as of 21 September 2023

OVERALL STRATEGIES

Facilities and Services

- Establishment of Electronics Product Inclusive Innovation Center (EPIIC)
- · Establishment of Center for Integrated Circuits and Devices Research (CIDR)
- Establishment of Wafer Fabrication Laboratory

Human Resources

- · Conduct of joint graduate-level programs in IC design
- Integration of IC design in CHED curriculum
- Nationwide training to achieve critical mass of IC design engineers
- Creation of DOST-PCIEERD Electronics / IC Design Board

R&D Technologies

Semiconductor Manufacturing Services (SMS):

- · Development of microcontroller with power management and energy harvesting
- Application of machine learning in IC layouting
- Development of new classes of electronics which are printed, reconfigurable, self-healing, batteryless, flexible, paper-based, radiation-hardened, liquid, transient, edible, and epidermal
- · Advancement in memory technologies: development of DRAM, Flash, and prototypical and emerging nonvolatile memory (NVM) devices
- Advancement in logic technologies: (1) adoption of device architectures for CMOS devices; (2) development of novel architectures for Beyond-CMOS
- Development of Beyond-CMOS devices for More-than-Moore (MtM) applications including PUFs and RNGs

Electronics Manufacturing Services (EMS): Prototyping of robots including

- collaborative, swarm, soft, inflatable, shape shifting, exo-suits, and general robots, and implementation of robot-asa-service
- Prototyping of ventilators and oxygen concentrators
- Development of smart wearables Development of versatile and errorresilient IoT trainer boards
- Development of advanced driver assistance systems (ADAS)
- Prototyping of electronic components for autonomous vehicles
- Prototyping of integrated and intelligent actuators and sensors which are biosensing, biophotonic, chemical, optoelectronics, mechanical, thermal, micromechanics, magnetics, chemometrics, and microarray Development of advanced sensors including biomimetic, smart dust, hyperspectral, event-based, nano, lenseless, and sensor fusion

S&T Policies

Develop policies, standards, and incentives for local electronics industry

210 M

Development of microcontroller: Application of machine learning in IC layouting; Prototyping of robots, ventilators, and smart wearables: Establishment of **EPIIC**



Printed electronics: Robot prototype

...2021

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Microcontroller with power management and energy harvesting; IC layouting with machine learning; Robots, ventilators, and smart wearables: EPIIC

sed,	300 M	Development of Beyond-CMOS devices for MtM applications; Prototyping of
1103,	Advancement in memory and logic technologies;	soft, inflatable, and shape shifting robots; Prototyping of
r-	Prototyping of	electronic
r	swarm robots;	components for
ng	Development of	autonomous
bot	biomimetic	venicies
n n	sensor and	

500 M

Development of

and radiation-

flexible, paper-ba

hardened electror

Development of

computing-in-



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2025
Intelligent
sensors and
actuators:
Computing-
in-memory
technology;
IoT trainer
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boards

MILESTONES

2024

Models for

reconfigurable,

and batteryless

self-healing,

electronics;

CIDR

2026 Prototypes for flexible, paperbased, and

300 M

radiation-Cobot Fab Lab

hardened electronics: prototype; ADAS: Wafer

Development of edible and Development of advanced



2028...

with PUFs and RNGs: Soft, inflatable, and shape-shifting robots: Electronic components for autonomous vehicles

R&D SOLUTIONS

300 M Development of liquid, and transient electronics:

nano,

lenseless)

2027

emerging

robots:

dust

Biomimetic

Prototypes for

memory devices

and novel logic

devices: Swarm

sensor and smart





Legend

(Text Font)



ONGOING TARGET

VISION

By 2030, the

Philippines will carve

a niche in the global

electronics market,

building a "Made in

that will capture

the Philippines" brand

market opportunities

among end-product

manufacturers and

end-users.

epidermal

general robots: Development of

DONE

300 M



Beyond-CMOS devices

OVERALL OUTCOME

Locally developed software and hardware prototypes, established facilities, and trained personnel for the advancement of local electronics industry and upgrading the Global Innovation Index of the Philippines



Republic of the Philippines DEPARTMENT OF SCIENCE AND TECHNOLOGY PHILIPPINE COUNCIL FOR INDUSTRY, ENERGY AND EMERGING TECHNOLOGY RESEARCH AND DEVELOPMENT

Development of printed electronics; Prototyping of oxygen concentrators

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List of Electronics and Semicon Projects (for the whole duration of the roadmap)

R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	Status
Electronics	Helmet-Integrated Medium-Range IR Thermal Scanner								Completed in 2021 (PCIEERD-GIA)
	Design, Development, and Testing of 10 units of Low-cost Ventilators based on DOST-PCIEERD specifications								Completed in 2021 (PCIEERD-GIA)
	"EPDC as Platform for Innovation and Collaboration (EPIC) Project 1: Electronics Product Development Center (EPDC) Upgrade and Operation								Completed in 2021 (PCIEERD-GIA)
	EPDC as Platform for Innovation and Collaboration (EPIC) Project 2: Electronics Product Inclusive Innovation Center (EPIIC)								Completed in 2021 (PCIEERD-GIA)
	BRAVE: Bomb Removal Automated Vehicle								Completed (PCIEERD-GIA)



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		2022	2023	2024	2025	2026	2027	2028	Status
Electronics	CIDR Project 1. Energy-Efficient RF Front-end Architectures for Large-Scale Sensor Networks	23,892,619.32	10,883,372.20	12,114,125.08					Ongoing (DOST-GIA)
	CIDR Project 2. Model-Driven Co-Design of MEMS-Based Sensors and Interface Circuits	23,811,474.68	10,811,474.68	11,475,226.12					Ongoing (DOST-GIA)
	CIDR Project 3. Energy Efficient Machine Learning Hardware Co-design	19,058,483.00	13,359,355.68	7,259,355.68					Ongoing (DOST-GIA)
	CIDR Project 4. Energy Harvesting for Battery- less IoT Device Operation	28,774,100.80	7,624,100.80	7,624,100.80					Ongoing (DOST-GIA)
	FUTURE-LAB: Fault-Tolerant and User- Friendly Trainer Board for Upcoming Research and Engineering Education Lab Kit Integrating Emerging Technologies		2,675,015.00						Ongoing (PCIEERD-GIA)
	[CRADLE] Project IOT-POD: Development of an IoT Printed Circuit Board and Online Dashboard for SIoT and IIoT		3,307,614.40	1,692,385.60					Ongoing (DOST-GIA)
	Design and Development of a 16-nm FinFET CMOS Multifunctional Computing-in-Memory (CiM) Architecture using a Non-Volatile One- Time Programmable Read-Only Memory (OTP ROM) for Advanced AI Applications			26,037,042.91	16,127,986.78				Ongoing (DOST-GIA)



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