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Alliance for Batteries Technology, Training and Skills

2019-2023

Software Developers



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Software developers

A battery software developer is responsible for designing, developing, and maintaining software systems for batteries and battery management systems. They work with a team of engineers and scientists to create efficient and cost-effective solutions for electric vehicles, consumer electronics, grid storage and other applications. They are responsible for the software design, implementation, and maintenance of the battery management systems (BMS), which includes the control and monitoring of the battery's state of charge, state of health, and other performance parameters, as well as for the implementation of safety measures and protection of the battery against abuse and malfunction.

ESCO Occupations - ESCO - Occupations - European Commission (europa.eu)

ID	NAME	Concept URI
2514.2.1	embedded systems software developer	http://data.europa.eu/esco/occupation/57af9090-55b4-4911-b2d0-86db01c00b02
2511.5	embedded system designer	http://data.europa.eu/esco/occupation/10469d70-78a3-4650-9e29-d04de13c62c1

Context

Minimum EQF	6/7
Value Chain	Raw Materials and Processing
	Cells and Components Manufacturing
	Packs and Modules
	Battery Integration
	Operation, Repair, and Maintenance
	Second Life
	Recycling
Departments	IT/Digitalisation
Specialisations	Battery Algorithms Engineer
	Automotive Software Developer
	Software Engineering Manager
	SW Engineer Tech Lead
	SW QA Engineer



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Battery Monitoring System SW Engineer
EV General - Software Developers
SW Component Owner
SW Developer - Applications
Software Engineer
Lead Software Configuration Engineer
Senior Battery Software Architect

Cross-sectoral Specific Competence

Name	Туре	Description/Context	Level	ESCO
	(S/K)			
Models/Modelling/Di	S	- Develop models of batteries under extreme operating	Expert	develop
agrams/Schematics		conditions based on electrochemistry knowledge and		models
		test data		
		- Develop robust battery models to predict cell behavior		
		including but not necessarily limited to rate		
		performance, life degradation, calendar aging,		
		electrochemical and thermal response, and safety		
		related behavior		
		- Develop advanced deep learning models and tools for		
		data analysis and optimization		
		- Develop advanced performance, lifetime, and algorithm		
		models		
General Programming	К	- Knowledge of the programming languages C and C++	Expert	computer .
Languages		- Knowledge of Python and other scripting language		ng
		- knowledge of database systems (PostgreSQL, NoSQL		
		(MongoDB))		
		- MATLAB and Simulink		
(Automated) Product	S	- Formulate and execute designs of experiments to	Expert	perform
Testing		acquire sufficient data to train, validate, and test		product testing
		products and models		
		- Create and integrate models, define algorithms, write		
		testing code, and evaluate the performance of		
		algorithms throughout the life of the product		
Embedded Systems	К	- Knowledgeable in embedded systems	Expert	embedded
		- Develop embedded software for BMS applications		systems
SW Development	К	- Drive the definition and implementation of software QA	Expert	software
		standards		application
		- Software development skills		s developme
		- Develop Realtime software for electric machine		nt and
		controls		allarySIS



	-	Testing of software systems	
	-	Driving the definition and implementation of software	
		QA standards	
	-	Identify and propose areas for improvement in the BMS	
		software or hardware	
	-	Lead software pre study and software documentation	
		updates	
	-	Defining the SW verification plan	
	-	Software and hardware knowledge of PLC, HMI,	
		Network Infrastructure, IED programming and logic	
		control concept	
	-	Design and development of control algorithms and	
		support software	
	-	Experience with SW Functional Development	
	-	Knowledge of algorithms and data structures	

Sector Specific Competence

Name	Туре	Description/Context	Level	ESCO
	(S/K)			
(Battery SoC,	К	- Work on battery estimation algorithms regarding SOC,	Expert	algorithms
SoH) Algorithms		SOH, impedance, and performance limitation under given		
		operating conditions		
		- Develop advanced performance, lifetime, and algorithm		
		models		
		- create feedback control and estimation algorithms for high		
		voltage battery packs		
		- Create and integrate models, define algorithms, write		
		testing code, and evaluate the performance of algorithms		
		throughout the life of the product		
		- Knowledge of battery operation		

Soft Competence

Name	Туре (S/K)	Description/Context	Level	ESCO
Teamwork	К	 Work in specialised teams to deliver optimal results Work with cross-functional teams to develop, implement, test, and maintain models Work in an integrated, interdisciplinary product team to examine, discuss, and develop solutions to difficult/complex 	Expert	teamwork principles
		issues with both internal and external stakeholders		



			(customers, suppliers, internal management, etc.)		
Problem	S	-	Ability to autonomously solve problems	Expert	problem
Solving/Trouble		-	Identify, troubleshoot, and resolve issues e.g. failing MIL/HIL		troubleshoot
shooting			test results		

General Transversal Competence

Name	Type (S/K)	Description/Context	Level	ESCO
		-		

Academic Competence (can be taken from University programme)

Name	Туре	Description/Context		ESCO
	(S/K)			
Computer	К	- Knowledge of Python and other scripting language	Expert	computer
Science / IT		- Knowledge of Django, Rails, Node or similar web framework		science
		- Knowledge of RESTful web services, JSON		
		- Knowledge of database systems such as PostgreSQL, NoSQL		
		(MongoDB)		
		- Knowledge of Payment systems		
		- Drive the definition and implementation of software QA		
		standards		
		- Knowledge of QA automation processes and tools		
		- Software development skills with the ability to autonomously		
		solve problems		
		- C/C++ skills, as well as the ability to: design programs and		
		systems based on defined requirements; prepare program		
		specifications; code, test, document, and debug software;		
		interpret technical information relating to software		
		development; and communicate effectively		
		- MATLAB and Simulink		

