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Research Highlights:

EMBEDDED SOFTWARE

2009 MARKET INTELLIGENCE SERVICE

Selected Findings from the 2009 Embedded System Engineering Survey for Survey Participants

VDC Research Group
November 2009

MESSAGE TO OUR RESEARCH PARTICIPANTS

Thank you for your participation in VDC's embedded market research. We greatly appreciate you sharing your insights and requirements.

We hope you find the following survey data of interest and look forward to hearing from you again in the course of our future research on the embedded market.

METHODOLOGY

To develop this report VDC employed the following methodology:

An extensive survey was e-mailed to over 50,000 embedded systems engineers with the primary purpose of understanding the market's interest, opinions, and trends. Developers surveyed include subscribers to eg3.com, Ganssle Group, EmbeddedGurus.net, LinkedIn Embedded Systems Groups, and Google and Yahoo discussion forums, as well as from VDC's embedded developer panel. Entry into a drawing for an Amazon.com gift certificate was offered as an incentive to respond. VDC received over 780 interview responses.

SUMMARY OF CONTENTS

Included in this report are survey data relating to:

- Developer demographics
- Current/Future Project requirements and trends

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SURVEY DATA

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SURVEY DATA

	All Survey Respondents	
	Value	N =

Survey Respondents Segmented by Geographic Region

(Percent of Respondents)

Americas	28.9%	781
EMEA	27.3%	781
Asia-Pacific	43.8%	781

Survey Respondents Segmented by Geographic Sub-Region

(Percent of Respondents)

North America	27.3%	781
India/Pakistan/Bangladesh	34.7%	781
Western Continental Europe (excluding Scandinavia)	9.2%	781
UK and Ireland	4.7%	781
Eastern Europe	3.1%	781
Latin/South America	1.7%	781
Africa	0.3%	781
Middle East	4.6%	781
Scandinavia	2.3%	781
Japan/South Korea	0.5%	781
Oceania	2.6%	781
East Asia (excluding Japan, S. Korea, Oceania, India, Pakistan, Bangladesh)	6.0%	781
Other Europe/Middle East/Africa	3.1%	781

Types of Company/organization for which Respondents Work

(Percent of Respondents)

Embedded systems/device manufacturer	38.9%	781
Software/tools vendor	5.8%	781
Board vendor	2.2%	781
Semiconductor supplier (e.g., Intel, Texas Instruments)	2.7%	781
Semiconductor IP vendor (e.g., ARM, MIPS)	0.5%	781
Engineering services company or systems integrator (e.g., Wipro)	15.9%	781
Consultancy or independent consultant	10.6%	781
Research/government institution	5.8%	781
Academic institution	9.1%	781
Other	8.6%	781

Survey Respondents Segmented by Primary Role within Company

(Percent of Respondents)

Project manager	14.5%	780
System architect/engineer	25.3%	780
Algorithm developer/functional expert	2.6%	780
Software engineer	35.5%	780
IC/SoC engineer	2.4%	780
Board engineer	1.9%	780
Mechanical engineer	0.3%	780
Test/verification/validation engineer	4.2%	780
Other	13.3%	780

Number and Types of Embedded System Engineers at Respondents' Companies

(Mean of Respondents)

Project manager	19.7	713
System architect/engineer	18.6	713
Algorithm developer/functional expert	23.3	713
Software engineer	695.1	713
IC/SoC engineer	30.1	713
Board engineer	36.5	713
Mechanical engineer	24.5	713
Test/verification/validation engineer	61.4	713
Total	**909.1**	713

	All Survey Respondents	
	Value	N =

Number of Different Embedded Engineering Projects Started by Respondents' Companies in 2008

(Average of Respondents)

Mean	17.6	714
Median	4.0	714

Which of the following best describes the type of product your project team is developing?

(Percent of Respondents)

Embedded device/system	65.0%	781
Semiconductor (e.g. MPU/MCU, ASIC, SoC, FPGA, etc.)	8.7%	781
Semiconductor IP	0.8%	781
Embedded computer board	4.0%	781
Embedded software	16.8%	781
Other	4.1%	781
Don't know	0.6%	781

Project Tasks in which Respondents are Personally Involved on the Current Project

(Percent of Respondents)

Project management/planning	40.1%	481
Requirements management /specification	39.1%	481
System architecture engineering	44.9%	481
Algorithm engineering	29.7%	481
Software application/middleware development/test	47.0%	481
Operating system development/test	18.7%	481
Firmware development/test	40.1%	481
IC/SoC design/verification	9.6%	481
Board level engineering/test	22.0%	481
Mechanical engineering	5.6%	481
Prototype development	24.5%	481
System integration /test/verification	34.3%	481
None of the above	5.4%	481

Note: Percentages sum to over 100% due to multiple responses.

Engineering Tasks Outsourced to External Companies

(Percent of Respondents)

Not outsourcing any engineering tasks	52.6%	483
Project management/planning	5.6%	483
Requirements management/specification	3.5%	483
System architecture engineering	5.2%	483
Algorithm engineering	5.0%	483
Software application/middleware development/test	13.9%	483
Operating system development/test	6.4%	483
Firmware development/test	9.3%	483
IC/SoC design/verification	6.0%	483
Board level engineering test	11.6%	483
Mechanical engineering	8.3%	483
Prototype development	6.8%	483
System integration/test/verification	8.1%	483
Don't know	8.9%	483

Note: Percentages sum to over 100% due to multiple responses.

Expected Change in the Amount of Outsourcing for a Typical Project at Respondents' Companies

(Percent of Respondents)

Significantly increase	9.4%	202
Increase somewhat	21.3%	202
Stay the same	40.1%	202
Decrease somewhat	8.9%	202
Significantly decrease	4.0%	202
Don't know	16.3%	202

	All Survey Respondents	
	Value	N =

Survey Respondents Segmented by the Target Industry/application of their Current Project

(Percent of Respondents)

Automotive/transportation	15.1%	781
Consumer electronics	13.1%	781
Industrial automation	20.1%	781
Medical devices	7.6%	781
Military/aerospace	11.7%	781
Mobile Phones	4.5%	781
Office/business automation	0.8%	781
Retail automation	1.9%	781
Telecom/datacom	10.1%	781
General Purpose or non-industry specific	7.8%	781
Other	7.4%	781

Estimate of the Number and Types of Full-time Engineers that are Working on Respondents' Current Projects

(Mean of Respondents)

Project managers	2.1	455
System architect/engineer	2.7	455
Algorithm developers/functional experts	3.2	455
Software engineer	11.4	455
IC/SoC engineer	2.0	455
Board engineer	2.6	455
Mechanical engineer	2.5	455
Test/verification/validation engineer	4.9	455
Total engineers	**31.4**	455

Percent of Respondents' Time Spent in Different Tasks over the Course of the Current Project

(Mean of Respondents)

Project management/planning	15.2%	403
Requirements management planning	7.6%	403
System architect planning	11.9%	403
Algorithm engineering	5.6%	403
Software application/middleware development/test	18.4%	403
Operating system development/test	3.1%	403
Firmware development/test	16.7%	403
IC/Soc design/verification	3.3%	403
Board level engineering/test	4.7%	403
Mechanical engineering	0.4%	403
Prototype development	5.2%	403
System integration/test/verification	7.9%	403
Other	0.0%	403

Processing Unit(s) Used on Current Designs

(Percent of Respondents)

MPU (Microprocessor Unit)	36.9%	279
MCU (Microcontroller Unit)	68.5%	279
FPGA (Field Programmable Gate Array) or PLD (programmable Logic Device)	31.2%	279
DSP (Digital Signal Processor)	26.9%	279
MPPA (massively Parallel Processor Array)	2.2%	279
SoC (System on Chip)	24.0%	279
Custom ASIC (Application Specific Integrated Circuit)	12.2%	279
System relies on external/distributed processing	9.7%	279
Other	0.7%	279

Note: Percentages sum to over 100% due to multiple responses.

	All Survey Respondents	
	Value	N =

Processing Architecture Used on the Current Project

(Percent of Respondents)

Single processor	61.2%	278
Multiprocessor (more than one processor on separate silicon)	21.9%	278
Multi-core (More than one processor core on the same silicon)	6.5%	278
Multi-core and multiprocessor	8.6%	278
Don't know	1.8%	278

Multiprocessing Methodology Employed for Current Project

(Percent of Respondents)

Asymmetric processing (application tasks/memory are processor specific)	57.4%	101
Symmetric processing (processors share application tasks/memory equally)	11.9%	101
Mix of both asymmetric and symmetric processing	12.9%	101
Don't know	17.8%	101

Multiprocessing Architecture Used in the Current Project

(Percent of Respondents)

Homogeneous cores/processors (processor are physically/architecturally similar)	29.7%	101
Heterogeneous cores/processors (processor are physically/architecturally different)	35.6%	101
Mix of both homogeneous and heterogeneous cores/processors	15.8%	101
Don't know	18.8%	101

Instruction Set Architecture(s) Used within the Embedded System/device Currently Being Designed

(Percent of Respondents)

8 bit	37.4%	278
16 bit	28.8%	278
32 bit	64.4%	278
64 bit	5.4%	278
Other	3.2%	278
Don't know	2.9%	278

Note: Percentages sum to over 100% due to multiple responses.

Operating System(s) Used on the Target Embedded System on the Previous Project

(Percent of Respondents)

No formal operating system	46.9%	243
In-house developed operating system	20.6%	243
Commercially licensed operating system	23.0%	243
Commercially supplied/open source operating system (e.g., MontaVista Linux, Wind River	14.8%	243
Publicly obtained open source operating system	16.0%	243
Chip/board vendor supplied operating system	5.8%	243
Don't know	2.1%	243

Note: Percentages sum to over 100% due to multiple responses.

Operating System(s) Used on the Target Embedded System on the Current Project

(Percent of Respondents)

No formal operating system	36.2%	268
In-house developed operating system	22.4%	268
Commercially licensed operating system	30.2%	268
Commercially supplied/open source operating system (e.g., MontaVista Linux, Wind River	16.4%	268
Publicly obtained open source operating system	16.0%	268
Chip/board vendor supplied operating system	9.7%	268
Don't know or not yet decided	3.4%	268

Note: Percentages sum to over 100% due to multiple responses.

	All Survey Respondents	
	Value	N =

Importance of Embedded Operating System Characteristics during Selection for Current Project

(Mean of Respondents, 1= Not at all important, 5 = Very important)

Familiar programming interface	3.76	221
Variety of microprocessors supported	3.32	213
Availability of development tools	4.27	224
Security	3.24	225
Technical capabilities	4.21	219
Real-time capabilities/performance	4.13	220
Reliability/stability	4.58	217
Small footprint	3.63	213
Support for multi-core architectures	2.50	209
Run-time royalty cost	3.99	208
Overall cost	4.18	218
Support for multiprocessing architectures	2.66	211
Virtualization capabilities	2.30	205
Size of developer community	3.19	216
Bundled software components	3.36	214

Commercially Licensed Operating Systems Used on Target Device for Current Project

(Percent of Respondents)

AMX (Kadak)	0.0%	77
CMX-RTX (CMX Systems)	2.6%	77
DOS (Microsoft)	3.9%	77
DSP/BIOS (Texas Instruments)	1.3%	77
INTEGRITY (Green Hills Software)	3.9%	77
LynxOS (LynuxWorks)	9.1%	77
Neutrino (QNX)	9.1%	77
Nucleus (Mentor Graphics)	1.3%	77
OSE (Enea)	1.3%	77
PikeOS (SYSGO AG)	0.0%	77
pSOS (Wind River Systems)	2.6%	77
RTXC (Quadros)	1.3%	77
Salvo (Pumpkin)	0.0%	77
Solaris (Sun)	0.0%	77
Symbian OS (Symbian/Nokia)	2.6%	77
ThreadX (Express Logic)	0.0%	77
µC/OS II (Micriµm)	10.4%	77
u-velOSity (Green Hills Software)	0.0%	77
VxWorks (Wind River Systems)	18.2%	77
velOSity (Green Hills Software)	1.3%	77
Windows Embedded CE (Microsoft)	19.5%	77
Windows Embedded Enterprise (Microsoft)	0.0%	77
Windows Embedded NavReady/Automotive (Microsoft)	0.0%	77
Windows Embedded POS/POS Ready (Microsoft)	0.0%	77
Windows Embedded Standard (Microsoft)	2.6%	77
Windows Mobile (Microsoft)	5.2%	77
Windows XP Embedded (Microsoft)	9.1%	77
Windows XP (Microsoft)	7.8%	77
Windows Vista (Microsoft)	2.6%	77
RTX (Keil)	2.6%	77
VRTX (Mentor Graphics)	1.3%	77
Other	13.0%	77
Don't know or not yet decided	5.2%	77

Note: Percentages sum to over 100% due to multiple responses.

	All Survey Respondents	
	Value	N =

Publicly Obtained Open Source Operating System(s) Used on Target Device for Current Project

(Percent of Respondents)

BSD	0.0%	42
eCos	4.8%	42
FreeRTOS	11.9%	42
Linux (Debian)	11.9%	42
Linux (Fedora)	9.5%	42
Linux (kernel.org)	14.3%	42
Linux (LinuxPPC)	4.8%	42
Linux (µClinux)	7.1%	42
Linux (Slackware)	4.8%	42
Linux Other	35.7%	42
TinyOS	4.8%	42
Other	16.7%	42
Don't know or not yet decided	4.8%	42

Note: Percentages sum to over 100% due to multiple responses.

Commercially Obtained Open Source Operating System(s) Used on Target Device for Current Project

(Percent of Respondents)

eCosPro (eCosCentric)	7.7%	39
BlueCat Linux (LynuxWorks)	7.7%	39
ELDK Linux (Denx)	2.6%	39
Mandriva Linux (Mandriva)	2.6%	39
MontaVista Linux (MontaVista Software)	25.6%	39
uLinux (Lineo Solutions)	10.3%	39
Red Hat Linux (Red Hat)	10.3%	39
SuSE Linux (Novell)	7.7%	39
TimeSys LinuxLink (TimeSys)	5.1%	39
Wind River Linux (Wind River Systems)	20.5%	39
Concurrent RedHawk Linux (Concurrent Computer)	0.0%	39
ELinOS (SYSGO AG)	2.6%	39
Android (Open Handset Alliance)	2.6%	39
LiMo (LiMo Foundation)	0.0%	39
Symbian (Symbian Foundation)	2.6%	39
BSD	5.1%	39
ITRON	2.6%	39
OSEK	5.1%	39
Other	10.3%	39
Don't know or not yet decided	15.4%	39

Note: Percentages sum to over 100% due to multiple responses.

Software Elements/applications Required by Current Device/system

(Percent of Respondents)

Hypervisor/virtualization layer/microkernel	3.3%	274
Middleware	16.1%	274
Java virtual machine	11.3%	274
Audio/video codecs	17.9%	274
File system	32.5%	274
Embedded database	19.7%	274
Digital rights management	5.8%	274
Remote management	19.3%	274
User interface or HMI stack	17.5%	274
Security stack	10.2%	274
801.11x connectivity stack	10.6%	274
TCP/IP stack	36.5%	274
USB connectivity stack	40.9%	274
Zigbee connectivity stack	10.6%	274
TCP/IP stack	32.5%	274
E-mail/messaging client	8.0%	274
Web browser	14.2%	274
Other	6.6%	274
None of the above	14.2%	274
Don't know or not yet decided	3.6%	274

Note: Percentages sum to over 100% due to multiple responses.

	All Survey Respondents	
	Value	N =

Types of Tool(s) Used for Current Project

(Percent of Respondents)

Compilers	80.0%	425
Debuggers	70.6%	425
Editors	67.8%	425
Build tools	50.4%	425
JTAG debuggers/In-circuit emulators	56.9%	425
Instruction set simulators	13.9%	425
Virtual platforms or virtual prototyping/simulation tools	14.1%	425
Static analysis tools	24.2%	425
Dynamic software testing tools	12.0%	425
Model-based software testing tools	12.2%	425
Software/system modeling tools (Standard-language-based)	12.9%	425
Software/system modeling tools (Proprietary-language-based)	6.8%	425
Dynamic GUI/HMI design tools	10.6%	425
None of the above	4.7%	425
Don't know or not yet decided	2.1%	425

Note: Percentages sum to over 100% due to multiple responses.

Approximate Cost Budgeted for All of the Tools Respondents are Using on the Current Project

(Percent of Respondents)

$0 (Free)	5.8%	398
$1 to $999	14.8%	398
$1,000 to $1,999	13.3%	398
$2,000 to $2,999	4.3%	398
$3,000 to $3,999	5.0%	398
$4,000 to $4,999	8.0%	398
$5,000 to $7,499	8.0%	398
$7,500 to $9,999	4.8%	398
$10,000 to $12,499	7.5%	398
$12,500 to $14,999	2.3%	398
$15,000 to $19,999	1.8%	398
$20,000 to $24,999	3.0%	398
$25,000 to $29,999	2.3%	398
$30,000 to $39,999	2.5%	398
$40,000 to $49,999	1.0%	398
$50,000 to $59,999	3.0%	398
$60,000 to $74,999	1.3%	398
$75,000 to $99,999	1.5%	398
$100,000 to $124,999	1.0%	398
$125,000 to $149,999	0.3%	398
$150,000 to $174,999	0.0%	398
$175,000 to $199,999	0.0%	398
$200,000 or more per developer per year	0.5%	398
Don't know	8.0%	398

Expected Change in Respondents' Tool Budgets

(Percent of Respondents)

Increase	30.8%	422
Remain about the same	40.8%	422
Decrease	13.3%	422
Don't know	15.2%	422

Expected Percent Increase (or Decrease) in the Total Lines of Software Code for the Next Project

(Average of Respondents)

Mean	28.7%	221
Weighted Mean (by number of lines of code)	16.7%	197
Weighted (by project team size and tools budget) Annualized (by project length) Mean	17.2%	187
Median	10.0%	221

	All Survey Respondents	
	Value	N =

Language(s) Used to Develop Software for Current Project

(Percent of Respondents)

Ada	4.3%	256
Ada-based SPARK	0.8%	256
Assembly	46.5%	256
C	85.9%	256
C++	42.2%	256
C#	8.2%	256
Forth	0.8%	256
Java	14.1%	256
LabVIEW	7.0%	256
MATLAB	16.8%	256
Perl	6.3%	256
Python	9.4%	256
SDL	0.8%	256
SystemC	2.3%	256
UML	9.0%	256
In-house developed	3.5%	256
Other	8.6%	256
Don't know	0.4%	256

Note: Percentages sum to over 100% due to multiple responses.

Language(s) Used to Describe IC/SoC Designs for Current Project

(Percent of Respondents)

Netlists	8.3%	36
C	36.1%	36
C++	44.4%	36
e	5.6%	36
OpenVera	5.6%	36
PSL	2.8%	36
System Verilog	22.2%	36
SystemC	22.2%	36
Verilog	38.9%	36
VHDL	41.7%	36
In-house developed	5.6%	36
Other	0.0%	36
Don't know or N/A	11.1%	36

Note: Percentages sum to over 100% due to multiple responses.

Language(s) Used to Design Algorithms for Current Project

(Percent of Respondents)

Ada	5.5%	127
Ada-based SPARK	0.0%	127
Assembly	23.6%	127
C	74.8%	127
C++	43.3%	127
Embedded C++	13.4%	127
Forth	0.8%	127
C#	7.1%	127
Java	6.3%	127
LabVIEW	6.3%	127
MATLAB	16.5%	127
Python	6.3%	127
Perl	3.9%	127
UML	10.2%	127
VHDL	11.8%	127
Verilog	7.1%	127
Simulink	7.9%	127
System Verilog	2.4%	127
SystemC	3.1%	127
In-house developed	3.1%	127
Other	6.3%	127
Don't know	2.4%	127

Note: Percentages sum to over 100% due to multiple responses.

	All Survey Respondents	
	Value	N =

Estimate of the Total Project Length in Calendar Months (Actual Time from Initial Specification to Shipment)

(Average of Respondents)

Mean	15.2	448
Median	12.0	448

Adherence to Schedule for Current project (or Best Estimate Upon Completion)

(Percent of Respondents)

More than 6 months ahead of schedule	3.7%	493
3 to 6 months ahead of schedule	6.1%	493
1 to 2 months ahead of schedule	4.7%	493
On schedule	38.7%	493
1-to 2 months behind schedule	20.3%	493
3 to 6 months behind schedule	11.8%	493
More than 6 months behind schedule	7.5%	493
Don't know	7.3%	493

Age of Respondents

(Average of Respondents)

Mean	37.6	390
Median	36.0	390

Number of Years Experience Designing Embedded Systems

(Average of Respondents)

Mean	12.2	390
Median	10.0	390

Number of Projects on which Respondents are Currently Working (that Require 5% or more of their Work Time)

(Average of Respondents)

Mean	4.1	392
Median	3.0	392

Number of Years Working at Current Company

(Average of Respondents)

Mean	5.9	390
Median	4.0	390

Description of the Health of the Current Engineering Job Market in the Country of Respondent

(Percent of Respondents)

Much better than last year	5.9%	393
Better than last year	11.2%	393
About the same as last year	21.6%	393
Worse than last year	39.4%	393
Much worse than last year	14.5%	393
Don't know	7.4%	393

Cost Reduction Measures Conducted by Respondent's Company over the Past 6 Months

(Percent of Respondents)

Staff layoffs	32.9%	386
Across-the-board salary decrease	13.5%	386
Hiring Freeze	42.0%	386
Promotion/salary increase freeze	35.5%	386
Non-labor related budget cuts	32.4%	386
None of the above	22.3%	386
Don't know	9.8%	386

Note: Percentages sum to over 100% due to multiple responses.

	All Survey Respondents	
	Value	N =

Expected Cost Reduction Measures by Respondent's Company over the Next 6 Months

(Percent of Respondents)

Staff layoffs	21.2%	381
Across-the-board salary decrease	8.3%	381
Hiring Freeze	28.2%	381
Promotion/salary increase freeze	25.1%	381
Non-labor related budget cuts	24.1%	381
None of the above	26.7%	381
Don't know	20.7%	381

Note: Percentages sum to over 100% due to multiple responses.

Percent of Time Spent in Different Work Environments

(Mean of Respondents)

Working at the office	74.9%	379
Working from home	14.3%	379
Working at a client site	7.4%	379
Working on the road (conference, industry event, traveling, etc.)	3.3%	379

Annual Salary of Survey Respondents

(Average of Respondents)

Mean	$62,508	316
Median	$50,000	316

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