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EMBEDDED SYSTEMS

H A N D B O O K

Edited by

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Embedded Systems Handbook

Richard (editor) Zurawski



Embedded Systems Handbook:

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and fully autonomous vehicles The next section focuses on networks and protocols including CAN LIN FlexRay and TTCAN The third part explores the design processes of electronic embedded systems along with new design methodologies such as the virtual platform The final section presents validation and verification techniques relating to safety issues Providing domain specific solutions to various technical challenges this handbook serves as a reliable complete and well documented source of information on automotive embedded systems Designing Embedded Systems Steve McClure, 2014-04-10 This Handbook reviews the Software Development and Engineering Principles involved in the Design of Embedded Computer Systems The reason behind developing this book can be answered by the following question What does an embedded software engineer produce Now most people would say prototypes and this might seem like the correct answer but it is not The correct answer is that the engineer produces documentation documentation that shows other people how to understand and build the product Now imagine that you are a software engineer who has newly joined the company and you have been given the unenviable task of maintaining an existing product Why was this work given to the new guy The answer is that no one else in the company wanted to tackle this project Why Because there is no documentation So to figure out what the product does and to fix the bugs the new guy or gal has to reverse engineer the source code So the money that management thought they saved when some code was quickly thrown together by a software engineer who has since left the company they now find that several times more is being spent to fix up all the bugs and possibly add on some minor enhancement This type of problem occurs when there is no development procedure Which brings us to the Handbook The Handbook provides a standard procedure which may be used by the Systems Software Embedded Firmware and Hardware departments Various design and development documents are produced at specific points in the project and are passed out for review prior to being used by other team members By having this consistency the entire team now know which design elements will be produced and the need for implementing any reverse engineering will be eliminated Product costs for maintenance will be greatly reduced Manufacturing and Test departments will now have the necessary details with which to complete their work For shouldn't the designers who intuitively understand the product be the ones to write down their knowledge such that it can be passed on to others By presenting these steps in the form of a Handbook which is distributed to the engineering team it then identifies the documents that are to be generated when they should be produced who should create them and who should be involved in the review process This keeps the entire team synchronized fully aware of their responsibilities Now some companies do have such procedures but they are long winded and stored away in some unknown location on a harddrive But a bright green Handbook that clearly spells out the implementation process along with detail gleaned from the author's 30 years of experience in this field of engineering Now wouldn't that be worth having Please refer to The Guidebook version which only provides the project development information Please refer to The Handbook LAMP Project version which includes an additional embedded Linux project to implement a Web based Home Control Security System source code listing

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or C For an easy entrance into this world of programming the C language was chosen for the code examples presented within this book But what programming application should be tackled An embedded application is a program that continually executes on a computer system and as it does so it interacts with its environment A home control lighting system would be the ideal application and by the time you have finished you would know how To install LAMP Linux Apache Web Server MySQL and PHP on your PC computer To backup restore your Linux hard drive To automatically execute your application at system startup To apply Java Script MySQL and PHP to your own Web page To build C applications that communicate over serial ports To build C applications that use MySQL To write a complete Home Control Security application To have your application send email messages with WebCam images To have your Home Control Security application speak messages To compute and utilize sunrise and sunset times for each day of the year Oh And there s one added bonus With this system you do not require any monthly monitoring fee Since your Home Control Security application simply sends you an email when it detects an intruder you can immediately go home or call a friend or neighbor to check on the house No need to fork out money each month for some service charge They say that knowledge is power That may be true but to sit at home using your iPad or iPhone or some other Tablet or even a web page on one of your computers and to bring up your Home Control web page and click on a button to turn on a light or to initiate a sequence of events for evening television viewing well that is really neat And this book presents all this information to you in an easy to read form The book is also written in such a way that it may be used by both small and large engineering companies By the time you have completed its reading you will have learned that an embedded project is much more than simply writing software code It is an entire documentation process of which code amounts to but a small percentage The reason software generally takes a long time to develop and costs even more to maintain is simply because this design process is often overlooked or bypassed For a fully documented design is required by all company departments in order for them to successfully complete their work So now is the time to get into some fun and start programming an embedded application

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