

Computers on wheels, the modern car

I wonder how many of you know how much software there is in the humble car these days ? I wouldn't mind betting that you would be out by a factor of 10. I started working with the car industry in about 1996 when there were something like 50,000 lines of assembler in the electronic control systems of cars. In those days, systems in the range of 2-3 million lines of code, (usually C, C++ or Ada), were relatively uncommon and generally confined to traditional high technology industries like defence and aerospace products such as the Boeing 777 or Airbus 340. It took these industries the best part of 25 years to get to this amount of code. The car industry has done it in about a third of that time. Yes, indeed, modern cars have reached 7 figures when measured in lines of code, distributed across up to 100 micro-processors.

Systems of this size have always presented a major problem in reducing the amount of defect to an acceptable level. The problems simply get much bigger when you grow to this size too quickly. Let's do a few thumbnail calculations. If you measure a system in terms of the number of lines of source code which directly generate executable code - it doesn't really matter which of the hundreds of programming languages you use - then a really good system will manifest less than one defect (fault that failed) per 1000 of these lines in its entire life-cycle. Furthermore, about 10% of these will be show-stoppers. Its really hard to stay this low, (the very best systems in the world are only around 0.1 by this measure), so it means that if you put 2 million lines in a car, then you will have around 200 serious defects rolling around waiting to fail. This of course is only if you have done a really good job.

I was minded of this by seeing a number of news items in the last few months describing major recalls in the car industry because of defects in the electronic systems software of various kinds. Where does all this software get put ? Well, basically everywhere - airbags, brakes, engine control, climate control, music systems, seats, navigation and so on all contain substantial amounts. Given that those of us with airbags are sitting half a metre from a software-controlled bomb, it certainly gives pause for thought.

Of course we shouldn't be surprised by this, (in fact the car industry has so far done a pretty good job). My television digital set-top box, a woeful piece of junk, is very close to an unaided flight into the street. The answering machine in front of me according to my records, has crashed with a continuously engaged tone three times in the last four days and on average has crashed about every three days since I bought it. To reset it, you have to unplug it, wait for the CMOS to recover from the excitement and then plug it in again not forgetting of course that you have to re-enter the date and time and then wait for it to crash again. Our third central heating controller is even more loopy than its predecessors.

If you have similar stories, I'd love to hear them. Come back analogue, all is forgiven.

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