International Journal of Applied Research 2016; 2(8): 672-674

ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2016; 2(8): 672-674
www.allresearchjournal.com
Received: 09-06-2016
Accepted: 10-07-2016

SN Ilakkiya
UG Scholar, Department of ECE, SNS College of Technology, Coimbatore-641035, Tamil Nadu, India.

M Ilamathi
UG Scholar, Department of ECE, SNS College of Technology, Coimbatore-641035, Tamil Nadu, India.

J Jayadharani
UG Scholar, Department of ECE, SNS College of Technology, Coimbatore-641035, Tamil Nadu, India.

RL Jeniba
UG Scholar, Department of ECE, SNS College of Technology, Coimbatore-641035, Tamil Nadu, India.

C Gokilavani
Assistant Professor, Department of ECE, SNS College of Technology, Coimbatore-641035, Tamil Nadu, India.

Correspondence
C Gokilavani
Assistant Professor, Department of ECE, SNS College of Technology, Coimbatore-641035, Tamil Nadu, India.

A survey on recent trends and applications in embedded system

SN Ilakkiya, M Ilamathi, J Jayadharani, RL Jeniba and C Gokilavani

Abstract
An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system. The embedded part of a complete device includes hardware and mechanical parts. Embedded systems control many devices in common use today. Almost all microprocessor are manufactured by using embedded technology. In wireless networking area embedded system is most widely used. It is also used in automated fault diagnosis that uses high level languages such as C programming. The management of safety system includes blind spot, long range and mid range radar adaptive technologies. The most dominant area in wireless technology is Bluetooth communication.

Keywords: Embedded, wireless, architecture, emerging trends, radar technology

1. Introduction
Embedded system is the recent emerging area. It is almost used in every field. Wireless networking system also uses embedded system. Wireless sensor nodes are placed in various placed for the measurement of light, temperature, humidity etc…As wireless sensors are application specific, they should involve the combination of both hardware and software. To provide network connectivity for large number of users in an effective way, a vision of "smart-dust" is put forward. By the extreme over-provision of dust, devices become small and cheap. Sensor nodes are used for large and heterogeneous system. These sensor nodes are embedded. Wireless sensor nodes are used in many fields such as video surveillance, traffic control, monitoring, Industrial automation etc…GIS(Geographical Information System) is one of the environmental monitoring system was developed at NASA's Jet Propulsion Laboratory tested in many places such as Huntington Botanical garden for the survey of botanical conditions including soil moisture and temperature. And also in Great dusk Island about 150 sensors are placed to observe nesting of birds. For the convenience of users, raw stream of sensor data are passed through a gate-way to back-end system as an input in many cases. Development of running a prototype with more than a few nodes is a complex task. In addition to hardware and software involved non- functional constrains are also be observed. Sensor network system design involves the partition, the complete application into a number of sub-components both in hardware and software.
Embedded system involves the combination of hardware and software. But mostly dominated by hardware constrains such as memory, battery charge and processing power. They provide low to moderate software complexity. Embedded system should have the following characteristics such as high speed, low power dissipation, small weight and size, must be accurate, and must be reliable over a long period. The networked embedded system is the fastest growing area in the embedded application.
The software running on smart phones is almost 5-7Mloc and growing. The running applications of embedded system were developed for PC world, so it creates increasing demand for high level operating system. The memory capacity is less. Embedded system has become the more first family two important part of everyday life. It almost makes us to think that it is hard to live without embedded system.

1.1 Architecture of Embedded system

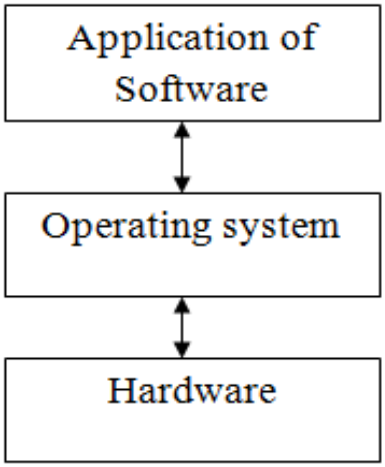

Fig 1: Architecture of Embedded system

2. Recent advances in In-Vehicle embedded system

The number of computer based functions embedded in vehicle has increased significantly in past two decades. The development of this work is being conducted. An embedded system is typically micro computer system. The embedded system designers have two families of digital device technologies. The first family consists of microcontroller and DSP's, based on software platform. The alternative family is FPGAs based on hardware system. The development of embedded software is improved in terms of safety, cost, performance and comfort. Electronic Control Units (ECUs) is the hardware in the automotive software runs on. The different software components developed by OEMs (Original Equipment Manufacturer) and several tier1 suppliers. The modeling language used for design process is EAST-ADL, EAST-ADL 2. The vehicular software is developed using Autosar (Automotive Open System Architecture). It contains the functions like scalability to vehicle, software updates and upgrades over the vehicle's lifetime. But the demand for computing power is becoming higher. So we use multi-core ECUs, The OEMs and suppliers will require new tools and methodologies for validation. The multi-core ECUs uses real time operating system based on the OSEK/VDK multiple functions. In-vehicle embedded systems are related our everyday life. The development of embedded system comforts the people's life.

3. Automated fault diagnosis in embedded system

The term diagnosis was first proposed by Reiter and De Kleer. It was implemented in the general diagnostic engine. The principles of model-based diagnosis consist of three logical inverters. If the output is equal to the inverted input, it denotes the healthy nominal behavior of an inverter. The fault behavior makes the inverter a weak model. There are number of ways to reduce this uncertainty and improve the quality of diagnosis. To overcome this fault a greedy stochastic algorithm called SAFARI (Stochastic Fault Diagnosis algorithm) is implemented. The five subsystems of ASML wafer scanners have been modeled in Lyida for diagnosis which is a part of Trngram project. One of the example for existing system for diagnosis and debugging that implement Spectrum based Fault localization are pinpoint which focuses on large, dynamic on-line transaction processing system and Taratula which focuses on C software.

4. Bluetooth embedded system as an application

Bluetooth is a dominant Wireless technology, in which communication of both voice and data is performed in 2.4GHz. This technology is designed for low cost, low power and short range personal Area Network applications. Bluetooth technology has overcome the limitations of line of sight and one to one communication, in which maximum data rate is of 720kbps.The developed application of Bluetooth technology is (API) Application Programming Interface. Information is passed between client and server. The development tools are Graphical User Interface (GUI) from the client (i.e.) PC holding data. Communication is done by active connection between the client and server without user. Thus a smart billboard application has been developed.

5. A wireless embedded source architecture for system level optimization

In embedded system power consumption and capabilities of radio communication layer are the dominant in overall system performance. The operational design of architecture is represented by using microcontroller and radio technology. The optimization of system performance is done by using protocols demonstrated by power management, synchronization, localization and wake up using RF. For a wide range of network, the system should be compact, low power and flexible. It contains a central microcontroller that performs all sensing, communication, computation for the operation hardware platform for which a Tiny OS execution model is preferred. The use of Tiny OS programming model has a significant impact on the communication sub-system design. The Smart Dust project targets at the extreme miniaturization and low power consumption and to produce a tiny microcontroller for an optimized performance. Now- a-days communication protocols are trying to be implemented by using silicon to meet power consumption.

6. Automotive Safety through Embedded Radar Technology

Due to the improvements in MCU (Multipoint Control Unit) and sensor technologies Advanced Driver Assistance Systems (ADAS) such as electronic stability, rear-view facing camera and vision-based pedestrian detection has become possible.

Fig 1: Automotive safety by using embedded radar technology

The management of radar based safety system includes blind spot, side impact reduction, long range and mid range frontal radar for adaptive cruise control. The new innovations in embedded MCUs and 77GHz millimeter wave integrated circuit especially tailored for radar application. The radar module consists of a transmitter section, voltage control oscillator (VCO) and three channel receiver IC with MCU. The MPC577Xk is a specially designed MCU to enable a cost effective radar system with increased performance in a single chip. The MR2001 radar transceiver chipset is designed with advanced packaging technology that delivers excellent thermal and electrical applications. In open loop radar system, MCU is the chirp master with digital to analog conversion providing tuning voltage for VCO. Depending on the tuning voltage, VCO generates a high frequency signal, which then drives the transmitter and receiver chip. The increasing global need for active predictive safety system in mainstream vehicles is driving the need for semiconductor to deliver new innovations.

7. Ubiquitous embedded system revolution applications and emerging trends

The embedded systems revolution is embedded into digital and is widespread all over the world due to the birth of microcontrollers. In the 18th century manufacturing process is done by hand production. The revolution has been grown by electronic revolution (i.e.) analog to digital. The development of embedded system results in electronic computer, the PC, the microcontroller. External components are integrated into a single system on-chip. This single system on-chip results in dramatic reduction in size and cost of embedded system. PC used in office and home is an embedded system. However PC in lab is an embedded processor. In embedded systems we can communicate over computer networks, store and process our information. So, embedded systems are dedicated to do specific tasks. This development causes the resolution of embedded system. Embedded system is applied in electronics, medical, automotive, industrial, aerospace etc… By embedded systems, new complex systems has been implemented due to its opportunities and challenges by compact size, more reliable and long performance.

8. Conclusion

Embedded system has almost become the part of everyday life. It is used in every field. A large number of people are already depending on operating systems for real time applications. Embedded system effectively uses the concept of operating system. This paper presents some of the areas where the embedded technology is used. In automobiles, embedded systems can also make drive-less vehicle control a reality. Major automobile manufacturers are already engaged in work on these concepts. Robotic technologies such as range, velocity and acceleration measurements, and their processing and fusion were used as part of the system. All these application areas are just tiny drops in the big ocean of embedded systems technology.

9. References

1. Application Development for Bluetooth Embedded Systems Abu Ahmed Sayeem Reaz, Rajibul Alam, Bakhtiar Kamal and Fakhrul Alam Department of Computer Science and Engineering, North South University.
2. Automated Fault Diagnosis in Embedded Systems, Peter Zoeteweij, Jurryt Pietersma, Rui Abreu, Alexander Feldman, and Arjan J.C. van Gemund Delft University of Technology.
3. Increasing Automotive Safety through Embedded Radar Technologies Andrew Robertson Senior Applications Engineer, Free scale Automotive MCUs Maik Brett System Architect, Free scale Automotive MCUs Ralf Reuter Systems Engineering Manager, free scale Analog Safety Systems.
4. The Role of Virtualization in Embedded Systems: Gernot Heiser Open Kernel Labs and NICTA_ and University of New South Wales Sydney, Australia.