INFORMATION SOCIETY TECHNOLOGIES (IST) PROGRAMME

Best Practice Action

D2.2 SIDCOM Training Material Examples taken from the FUSE portfolio Period 1: 01. July 2001 – 31. December 2001

Project acronym:	SIDCOM
Project full title:	Network on Sensing, Identification and Data Communications with passive Non-Contact Technologies
Proposal/Contract no.:	29551
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1 Overview

The following chapters show some examples, that have been done by SME companies within the First Users Action FUSE. The given examples address non-contact RF ID technologies with and without power transmission and also an example showing an optical measurement.

The examples include:

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AE 1603	Prototype of a contactless transponder chip card employing flip-chip technology
AE 25111	Accurate optical sensor for distance measurement
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Additional information about the use of other technologies and the use of these technologies in all industrial areas can be found via the FUSE website:

http://www.fuse-network.com

2 Examples

2.1 AE 1008: An ASIC for a wireless RF mouse

Title: An ASIC for a wireless RF mouse; Mixed signal ASIC achieves low-cost, low-power, rechargeable wireless product

Company: DATALABS Information Systems S.A.
131 Gripari Street
17673 Kallithea, Athens
GREECE

Technologies used: Mixed signal ASIC

Industrial sector Computers and other Information Processing equipment

Abstract

DATALABS S.A. designs, manufactures and merchandises office and industrial automation systems, such as Data Switches, Building Management Systems, Naval Fire Alarm Systems and tailor-made Software for Industrial Applications. The objective of this FUSE Application Experiment was the development and introduction to the market of a compact, low-power and cost-effective Wireless Mouse that communicates with a Personal Computer (using the RS-232 port) via RF link. A mixed Analogue-Digital ASIC was developed for this application. This ASIC included all the necessary components for the communication, RF transmission and reception, protocol administration and power management of the whole system.

The major targets/constraints of this A.E. were: Small PCB size, Low Power consumption, Operation on rechargeable batteries, High Reliability in Data Transmission, Simultaneous Operation of four mice in the same area, Robust Construction, User-Friendly Installation and Operation, Attractive Price. The target, as far as the power consumption of the new system is concerned, is that it should be at such low level so that the wireless mouse could be used for a complete working day without need for recharging its batteries. From the other hand, the target cost for the ASIC is in the order of 9 USD per piece, for a production volume of 10000 pieces.

INTRACOM's Center of Microelectronics (CEM) acted as subcontractor to the company and assisted in the specifications, design, and testing phases of the ASIC development, and also provided training on design and testing methodology, and use of CAD tools. A traditional schematic capture design approach was followed. The design was based on AMS 0.8 micron CMOS low-power technology (CYB33) and the prototypes were fabricated by a EUROPRACTICE MPW runs for low-cost prototyping reasons. DATALABS has acquired valuable experience in technical know-how, design and testing methodology for mixed Analogue-Digital ASICs and also in project management. The duration of this A.E. was 15 months (1/8/96 to 31/10/97) and the budget was 152 KECUs. With this new version of the wireless mouse, the company expects to extend its share up to 6% of the total mice market in Greece (~15,000 pieces annually) and, furthermore, enter the European market. Pay-back period is expected to be 21,5 months, while Return-of-Investment is

estimated to be 3,7 times the initial investment four years after the introduction of the product into the market.

The target audience for dissemination of this Application Experiment methodology and results, could be other small-sized companies (of 10 to 15 employees) which currently develop discrete circuit boards but wish to enter the ASIC technology. The specialization areas of those companies could be: computer peripherals and other information processing equipment, instruments for checking/monitoring in houses or hotels (e.g. energy management systems) as well as in electronics appliances focusing on wireless operation.

Further information can be found at FUSE website:

http://www.fuse-network.com/fuse/demonstration/30/1008/1008.pdf

2.2 AE 1603 Prototype of a contactless transponder chip card employing flip-chip technology

Title: Prototype of a contactless transponder chip card employing flip-chip technology for the first time. Bar die technology allowed 60% cost reduction on transponder cards

Company: PAV CARD GmbH
Hamburger Strasse 6
D-22952 Luetjensee

Technologies used: Flip-chip technology

Industrial sector Computers and other Information Processing Equipment
Television and Radio receivers, sound or video recording, etc.

Abstract

A prototype transponder chip card employing a bare die technology (flip-chip) was realised by PAV CARD GmbH, Germany, in 12 month with a budget of 100.000 ECU. PAV CARD GmbH, a former printing company, has about 75 employees with three involved in electronic development. PAV CARD produces a wide range of ID cards like service and guarantee cards, club and credit cards, insurance IDs with and without magnetic strips. They also produce chip cards for policy holders and contactless transponder cards for ticketing and payment. The products are sold to a world-wide market.

The present chip card technology using prefabricated electronic modules with contact areas has been replaced by a custom made telemetric unit with a smart chip and an antenna foil carrying an etched inductivity. This advanced integration technology results in an ultra thin electronic assembly that can be laminated in a conventional plastic chip card and reduces costs and improves the reliability of the cards.

The market for the contactless chip card is now not only limited to health insurance and bank cards as in the past, but now also includes ticket cards for public traffic, access and time control and security systems. The pay-back period has been only some month due to a first big business in the far east in the area of subway automatic access control and payment systems.

The overall time to market was slightly over one year. The pay back period is about one year. The return on investment more than 500%, since the basic investments may directly be used for further products.

Further information can be found at FUSE website:

http://www.fuse-network.com/fuse/demonstration/30/1603/1603.pdf

2.3 AE 25111 Accurate optical sensor for distance measurement

Title: Accurate optical sensor based on advanced signal processing. How DSP and SMT technologies may open new dimensions to optical distance measurement at a 50% lower cost

Company: North Electronic Systems SPA
Via Nazionale 62
17043 Carcare (SV) - ITALY

Technologies used: Digital Signal Processor (DSP)

Industrial sector Industrial process control

Abstract

The Company, NES - North Electronic Systems SpA of Carcare (SV) - Italy, is involved in the design and production of electro-optical sensors and systems for use in application of industrial automation. The Company is active in this field since 1986 and has developed a proprietary and well-recognised know-how for which it is well known and reputed in Italy. NES has 7 employees with 5 involved in the electronic development.

The main products of the Company are the optical distance sensors, based on the triangulation principle and employing LED or laser as a light source. This kind of sensor is used in many industrial processes to provide - on automated machineries and plants (especially for food-processing, woodwork machinery and ceramic production),- dimensional measures, typically for the purpose of quality control.

In some market segments the Company has suffered lately with the competition of more-compact and less-expensive sensors, mostly Japanese. Although, in general less-accurate, they are much more compact and cheaper due to advanced technology. They monopolise the European (as well as the Italian) market. The NES' product which has most-severely suffered the competition is a medium-range distance sensor called LDE, based on old-style analogue electronics and production methods. This product has been totally renewed by the FUSE action, which has led to the design and prototyping of the new generation of sensors, called "LKA".

The ASAP project started in September 1997 and terminated in March 1998 with a planned duration of 7 months. The investment required to design, build and test the prototype has been 40 KEUR. The ASAP project is part of a wider project of technology updating ("SENSOR-2000"), and concerns the design of a new generation of electronic boards for NES' optical distance sensors, based on DSP (Digital Signal Processing) and using SMT (Surface Mount Technology) components and techniques.

The payback period will be 15 months with a return of investments of 280% over a 3 year life cycle.

ASAP is the core of the “SENSOR-2000” Project and it is its initial and its most “technological” part.

In ASAP, the DSP and SMT technologies (both new for the Company) were selected to reduce the overall size of the circuitry of the sensors (overall volume is 1/5 respect the old product) and to improve the accuracy of measurement (typical error of measure half of the previous product).. These two target have been actually met, by ASAP as well as a sensible cost reduction (about 47%) of the sensor. In fact ASAP has successfully led to the realisation of a DSP/SMT PCB for the new generation of NES’ sensors, characterised by compact size, enhanced accuracy and reduced production costs.

While integration with DSP constitutes a jump forward in our design methodology and the usage of advanced development tools, SMT was the enabling technology for miniaturisation and volume and size reduction

Further information can be found at FUSE website:

http://www.fuse-network.com/fuse/demonstration/333/25111/25111.pdf

2.4 AE 25917 Security box with a non-contact smart card

Title: Security box: The use of a 16-bit microprocessor coupled with a contactless programmable smart card to fit the new money transport legislation's requests

Company: Braintronic
Chaussée de Tubize, 455
B-1420 Braine-l'Alleud

Technologies used: Microprocessor

Industrial sector Manufacture of electrical equipment

Abstract

Braintronic is a 10 years old Belgian SME located in Brabant Wallon. It is specialised in electronic design (NACE code 31). Its main business areas are security (with different security boxes), electronic subcontracting and home automation (with the "Centrale Cardio" system). It employs 6 persons among whom one electronics engineer. This last person was hired at the beginning of the project in order to achieve it and to ensure the knowledge transfer. Before the project, the microelectronic experience of the company was limited to the use of discrete components in non-complex PCB.

The aim of the company's application experiment is to improve the reliability of its security transport box in order to satisfy the customer's needs. The PCB which was used in the previous version of the security box has been replaced by a 16-bit microprocessor coupled with the use of a contactless smart card. This new securisation system is more reliable and more flexible than the old one. Furthermore, it has been designed to be in total accordance with the new Belgian legislation on money transport.

This project began on September 1997 and lasted for 12 months. The total budget allowed by the EC was 52 KEuro. The payback period of the project is estimated to 2 years. Braintronic hopes a return on investment of approx. 233 %.

This AE can be interesting for companies working in the security industry or for companies interested in the microprocessor technology coupled with the use of a contactless smart card.

Further information can be found at FUSE website:

http://www.fuse-network.com/fuse/demonstration/31/25917/25917.pdf