STMicroelectronics - Tunis

2012 Internship projects (PFE)

PFE1 : CPAL Development for STM32 SPI's

- *Graduation Project Tutor* : Mohamed Amine M'TAALLAH

- *Project name* Communication Peripheral Application Layer Development for STM32 Microcontrollers SPI's

- *Description:*

  The objective of this project is to develop a library providing high layer API (CPAL) that allows interfacing the SPI peripherals embedded in STM32 microcontrollers and validate the robustness of this solution. A User manual describing this library should be developed after development and validation phases.

  The SPI CPAL Library must provide:

  - Complete management of SPI peripheral for communication and errors handling.
  - High level features customization and integration.
  - Device abstraction layer (supports all STM32 Products).

- *Key words:* STM32 Microcontrollers, Embedded C programming, SPI.

PFE2 : Audio Streaming over Ethernet for STM32

- *Graduation Project Tutor* : Amin ZITOUN

- *Project name* Audio Streaming over Ethernet for STM32

- *Description:*

  The objective of this project is to develop an audio streaming application over Ethernet for the STM32 microcontrollers Family.

  - Implement real time protocols (RTP, CRTP, SIP,…) to manage Audio files transfer.
  - Decode and play received Audio files such as MP3, WMA,…
  - This demonstration will use STM32 ‘s embedded Ethernet controller and LwIP TCP/IP stack.

- *Key words:* STM32 Microcontrollers, Embedded C programming, Ethernet, TCP/IP, RTP, CRTP, SIP, MP3, WMA.

PFE3 : POSIX evaluation: eCos porting and evaluation on STM32F4 ARM Cortex-M4 platform

- *Graduation Project Tutor* : Anis BEN ABDALLAH

- *Project name proposal*: eCos porting and evaluation on the STM32F4 ARM Cortex-M4 platform

- *Description*:

  eCos is an open source real-time operating system (RTOS) intended for embedded applications, it has a POSIX level1 compatibility layer.

  The purpose of the internship project is to port eCos to the STM32F4 platform, evaluate its main features and particularly the POSIX layer.

  Optionally a demo can be developed on top of the RTOS (example: using the Nano-X graphical library).

- *Key words:* STM32 Microcontrollers, eCos, RTOS, POSIX

PFE4 : Secure Digital I/O Performance in Systems and Cards

- *Graduation Project Tutor* : *Youssef GHANNOUCHI*
- *Project name*: Secure Digital I/O Performance in Systems and Cards
- *Description*:
  - Secure Digital I/O has its roots in Secure Digital Memory and Multimedia Memory card technology.
  - The objective of this project is to describe some of the performance issues that should be taken into consideration when designing SDIO capable systems and cards. Design issues can be encountered on both host and card side implementations, from silicon to software. A software implementation with a cross benchmarks will illustrate the results of this analysis (SDIO Software Architectures, Driver Model, Software Performance, SDIO Host Performance(Electrical Interface, Clocking Issues, Power Management), Controller Performance (Programmed I/O, Direct Memory Access, Controller Interrupts, Card Compatibility), System Software, SDIO Card Performance (Electrical Interface, Interrupt Latency, I/O Transfers).

- *Key words*: STM32 Microcontrollers, embedded C, SD/SDIO Host/Card

PFE5 : STM32 Video decoding solution

- *Graduation Project Tutor* : Maher MASTOURI

- *Project name* : STM32 Video decoding solution based on the Motion JPEG

- *Description*:

  In multimedia, Motion JPEG (M-JPEG) is an informal name for a class of video formats where each video frame or interlaced field of a digital video sequence is separately compressed as a JPEG image. Originally developed for multimedia PC applications, where more advanced formats have displaced it, M-JPEG is now used by many portable devices with video-capture capability, such as digital cameras.

- *Key words: STM32 Microcontrollers, M-JEPEG*

PFE6 : MicroXplorer Android mobile version

- *Graduation Project Tutor* : Houssemeddine GADACHA

- *Description:* The aim of this project is to convert the existing standalone MicroXplorer tool (swingx) to native Android mobile application.

- Required Technical Competences: Java (swingx), XML, Microcontrollers.

  Previous experience with developing for smart phone platforms (Android, Iphone, Windows Mobile...) is an advantage.

- Key words: MicroXplorer, swingx, XML based UI, Android, mobile development and testing, Java (Client side).

PFE7 : MicroXplorer validation automation

- *Graduation Project Tutor :* Khaoula ELHAJ

- *Description:* Set up the validation plan to cover all MicroXplorer features and develop automatic test scenarios using HP QuickTest Professional environment.

- Required Technical Competences: Software Project life cycle, Object Oriented Programming, VBScript, Microcontrollers architecture, STM32.

- Key words: G.U.I. validation automation, Microcontrollers, STM32.

PFE8 : USB test development and validation for STM32F4 MCUs

- *Graduation Project Tutor :* Wissem ARFAOUI

- *Description:* Develop test scenarios to cover USB HID and Mass Storage classes and integrate these tests into IP Validation Platform to be able to run them automatically.

- Required Technical Competences: USB, Embedded C, Microcontrollers architecture, STM32.

- Key words: STM32, USB, HID, Mass Storage.

PFE9 : STM32 Projects conversion automation

- *Graduation Project Tutor :* Ibtissem MALOUCHE/ Marwen BEN MBARKA

- *Description:* The purpose of the project is to design and develop a software tool that automates the conversion of an existing STM32 EWARM (or MDK-ARM) project to an MDK-ARM(or EWARM) project

- Required Technical Competences: C++, .net, xml, object oriented programming

- Key words: EWARM, MDK-ARM, automation

PFE10 : Microsoft .Net Micro Framework Porting on STM32 F4

- *Graduation Project Tutor* : Ibtissem MALOUCHE/ Marwen BEN MBARKA

- *Description*:
  - .Net Micro Framework is a tiny version of the .Net Framework dedicated for resource-constrained devices. The project consist of porting the Micro Framework with its different layers HAL, PAL and managed class library on the new STM32 F4 devices (Cortex-M4).

- Required Technical Competences: Microcontrollers, Embedded C, C++, C#

- Key words: .NET Micro Framework, STM32, Cortex-M4, HAL, PAL , managed class library

PFE11 : LED backlighting for LCD TV

- *Graduation Project Tutor* : Hatem CHEBIL

- *Project name :* Developing a reference design LED backlighting for LCD TV on STM32 Low cost MCUs.

- *Description*: Today LCD TV are moving to LED Technology. LEDs require a special driving for luminosity lighting that is managed by special ASICs. The purpose of this graduation project is to develop a reference design based on general purpose low cost MCUs (STM32F100) using embedded peripherals such as Timers, PWM

- *Key words:* STM32 Microcontrollers, Timers, PWMs, LED driving, C, embedded

PFE12 : MCU Benchmarking

- *Graduation Project Tutor* : Kaouther BELHADJ/ Abdelhamid GHITH

- *Project name*: MCUs Benchmarking

- *Description*: The purpose of this Graduation project is to benchmark the STM32 (Cortex-M4, CortexM0) microcontroller vs. competitive microcontrollers & DSCs.

  The main objectives will be:

  - Run performance measurements on STM32 and competitive microcontrollers based on industry standard and specific tests
  - Present clear and comprehensive reports of the performance measurements
  - Present comparative charts between the STM32 and other microcontrollers
  - Develop technical documents and presentation demonstrating the advantages of STM32.

- *Key words*: Microcontrollers, STM32, Embedded C/C++ programming, DSP, English writing techniques and Synthesis

PFE13 : Analog Peripherals characterization

- *Graduation Project Tutor* : Hassen JENHANI / Anis BEN ABDENNEBI

- *Project name*: STM32 Analog peripherals performance characterization

- *Description*: The goal of this project is to design an internal reference Software that demonstrate STM32 analog (Analog to Digital and Digital to Analog : from 12-bits and above) peripherals without a need of external high-end equipments, in order to show intrinsic performance and accuracy/errors either static or dynamic (SNR,THD, ENOB etc…)

  The Front-end software is based on Labview GUI interface in serial communication with a standalone STM32 boards (EVAL or Discovery).

- *Key words*: LABVIEW, Microcontrollers, STM32, Embedded C programming, Analog back-ground (ADC/DAC) , Details oriented and Methodology.

PFE14, PFE15 : Bluetooth Low Energy Stack

- *Graduation Project Tutor* : Zied GRISSA

- *Project name*: STM32 Bluetooth Low Energy Stack demonstrator

- *Description*: The goal of this project is to design software solutions that demonstrate Bluetooth Low Energy basic features in order to show the BLE capabilities of ST solutions. To do so, the trainee will be integrated in the RF software development team, and will have to develop a knowhow about the Bluetooth Low Energy stack on the STM32.

- *Key words*: Microcontrollers, Bluetooth Low Energy (BLE), Embedded C programming, Details oriented and Methodology.

PFE16 : ZigBee PRO / IP

- *Graduation Project Tutor* : Orazio PRIVITERA

- *Project name*: STM32 ZigBee PRO/IP Demonstrator
- and Zigbee (HA, SE, ZLL Applications Profiles) and Zigbee IP.

- *Description*: The goal of this project is to design software solutions that demonstrate ZigBee PRO / IP basic features and related application profiles (HA, SE, ZLL, SE2.0) on STM32W product. To do so, the trainee will be integrated in the RF software development team, and will have to develop a knowhow about the ZigBee stack, profiles and demonstration on the STM32.

- *Key words*:, Microcontrollers, STM32W, Embedded C programming, ZigBee PRO, ZigBee IP, Home Automation, Smart Energy, ZigBee Light Link, IPv6, Details oriented and Methodology.

PFE17 : STM32W RF Demonstration Kit

- *Graduation Project Tutor* : Anis KORKADE

- *Project name*: STM32W108 Demonstration Kit

- *Description*: The goal of this project is to develop a new STM32W108 Starter Kit (replacing current STM32W108B-SK based on STM32 Primer2). This new starter kit will be based on a new STM32 hardware board, and will have to demonstrate STM32W RF features such as SimpleMAC, RF4CE, ZiBee PRO/IP with dedicated firmware and software GUI.

- *Key words*: Microcontrollers, STM32W, Embedded C programming, GUI, Python, Details oriented and Methodology.

PFE 18: Design and development of an advanced querying tool

- *Graduation Project Tutor :* Sabra GARGOURI
- *Project name proposal:* Design and development of an advanced querying tool on a system tracing solution for STLinux (KPTrace Viewer)

- *Description:*

The scope of the project is to develop a set of queries to extract from the trace database relevant statistics about the kernel/user space applications tracepoints (interrupts/system calls/threads/etc.). The purpose being to re-use these queries by validation teams for benchmarking tests and performance evaluation of the application/system.

- *Required Technical Competences:*

Java, SQL, Unix shell scripting, Linux, Eclipse

- *Key words:*

KPTrace, kernel tracing, performance analysis, database queries

PFE 19: Outil d'analyse post-mortem d'informations de debug.

- *Graduation Project Tutor :* Ismail Khachine
- *Project name proposal:* Outil d'analyse post-mortem d'informations de debug.

- *Description:* Développement d'un outil permettant l'affichage et l'analyse d'informations de debug générés pas un décodeur vidéo.

- Required Technical Competences: C, anglais (lu, écrit).

PFE20: Analyse qualité de vidéos corrompus

- *Graduation Project Tutor :* Aymen Abderrahmen
- *Project name proposal:* Analyse qualité de vidéos corrompus

- *Description:* Développement d'un outil permettant l'analyse qualité automatique (à base de métriques) de vidéo corrompus. Augmentation de la base de vidéos corrompus (nouvelles vidéos H264/mpeg2 + nouveaux standards).

- *Required Technical Competences:* C, anglais (lu, écrit).

PFE 21: Développement de « sanity tests »

- *Graduation Project Tutor :* Slim Elabed
- *Project name proposal:* Développement de « sanity tests » permettant de tester l'interface hardware d'un décodeur vidéo.

- *Description:* Développement de « sanity tests » permettant de facilement tester l'interface entre les CPUs avec les décodeurs videos. A utiliser sur silicum et plateformes d'émulation de silicium. Ca doit fonctionner en OS21 et en Linux.

- *Required Technical Competences:* C, anglais (lu, écrit).

PFE 22: Config TLM IP generator

- *Graduation Project Tutor :* Riadh FEKIH
- *Project name proposal:* Config TLM IP generator
- *Description:* Conception and development of a tool helping SPG Team in co-simulation flow methodology
- *Required Technical Competences:* Object Oriented knowledge (mandatory),Java (preferably),Eclipse (optional)
- *Key words:* Java, eclipse, plug-in, Transaction-Level modeling, xml

PFE 23: Generation of TLM Model from document specification

- *Graduation Project Tutor:* 1- Amel BEN KHALIFA-- Mohamed Arafat GHRAB--3- Irad LASSOUED
- *Project name proposal:* Generation of TLM Model from document specification
- *Description:* Implementation of an interface in Eclipse to create a TLM model from a specification document.
- *Required Technical Competences:* Object Oriented knowledge (mandatory),Java (preferably),Eclipse (optional)
- *Key words:* Java, eclipse, plugin, Transaction-Level modeling, IP-Xact

PFE 24: Generation of TLM Model from document specification

- *Graduation Project Tutor:* 1- Irad LASSOUED--2- Amel BEN KHALIFA

- *Project name proposal:* Generation of the TLM (Transaction-Level modeling) view.
- *Description:* Implement an interface to manage the generation of the TLM view basing on the IP-Xact component Description
- *Required Technical Competences:* Object Oriented knowledge (mandatory),Java (preferably),Eclipse (optional)
- *Key words:* Java, eclipse, plugin, Transaction-Level modeling, IP-Xact

PFE 25: Interfaces validation team

- *Graduation Project Tutor :* Nabil JOMAA
- *Project name proposal:* Performances measurements on USB2 & USB3 of SetTopBox under STLinux environment
- *Description:*
  - USB2.0 and Bluetooth support
    - Integrate driver and evaluate performances of Bluetooth to USB dongle on ST SetTopBox (STB) platform.
    - Demonstrate consumer typical Bluetooth application: exchange data between two STB's connected via BT
  - USB3.0 and mass storage
    - Setup PCIe to USB3.0 solution on existing STB platform,
    - Performances evaluation and traffic analysis using protocol Analyzer
- Required Technical Competences:
- Embedded systems; C/C++/Linux programming
- *Key words:* STB, STLinux, Embedded, USB2.0, USB3.0 SuperSpeed, Bluetooth

PFE 26:Interfaces validation team

- *Graduation Project Tutor:* Nabil JOMAA
- *Project name proposal:* Developing coms validation driver under STLinux and for SetTopBox platform.
- *Description:* Trainee is required to develop two different low level drivers on top of STLinux Kernel driver and in order to help validation team to cover full IP validation with actual STLinux driver

- *Required Technical Competences:* Embedded systems; C/C++/Linux programming
- *Key words:* STB, STLinux, Embedded, comms, I2C, UART, MAFE, IRBlaster

PFE 27: Automated Code Review

- *Graduation Project Tutor* Nouha Terzi
- *Project name proposal:* Automated Code Review
- *Description:*

In its approach to continuous integration, the team seeks to improve the quality of its source code. The benefits of code

review are great, but the practice can be painful. To take this pain away, the intern will benchmark different tools aiming

at: automate the generation of code Review, enhancing the peer code Review, capture code Review metrics, generates customizable reports, Etc, ...

Then select the most appropriate alternative to Tuleap, integrate it into the platform.

Some solution: CodeCollab, fishEye, ...

- *Required Technical Competences*: PHP5, MySQL5, good knowledges on object approach
- *Key words:* Quality assurance, agile methods, code review, Subversion, Git.

PFE 28: Virtual Scrum Table integrated with Tuleap tracker

- *Graduation Project Tutor:* Nouha Terzi
- *Project name proposal:* Virtual Scrum Table integrated with Tuleap tracker
- *Description:* To make this feature more adapted to scrum framework, the existing feature needs some enhancements:
  - Make the feature more intuitive so it encourage teams to use it for daily stand up
  - Add a countdown watch to monitor time spent on daily stand up
  - Add colors to post'it (by user, by status, by time left, etc)
  - Add a mail notification containing a picture overview on today's table
  - Adapt the table to browser's size
  - Student is called to make this feature as complete as possible to fit with agile software development
- *Required Technical Competences:* PHP5, Javascript

- *Key words:* Agile methods, SCRUM, CardWall

PFE 29:Implement an automatic validation framework

- *Graduation Project Tutor:* Asma Abdelmoumen
- *Project name proposal:* Implement an automatic validation framework
- *Description:*

  In order to gain in productivity and quality, the team needs to automate the validation process.

The intern will be responsible for :

- Testsuite definition (not implementation of tests).
- Automate the testsuite execution.
- The output definition and tools integration for analyzing results, checking for regressions.

- *Required Technical Competencies:* Python, PHP5

- *Key words:* Validation, functional tests, Selenium API, Python webdriver

PFE 30: Emulateur fonctionnel de l'accélérateur graphique BDisp2

- *Graduation Project Tutor :*Ilyes Gouta

- *Project name proposal:* Emulateur fonctionnel de l'accélérateur graphique BDisp2

- *Description*: Il s'agit en un premier lieu d'étudier l'architecture de l'accélérateur graphique, d'étudier une implémentation prototype en deuxième lieu et enfin de la compléter en implémentant les blocks fonctionnels qui manquent.

- *Required Technical Competences:* Microsoft Windows ou Linux, Langages de programmation C/C++ (expert), Qt SDK, Microsoft Visual Studio ou Qt Creator
- *Key words*: emulation fonctionnelle, graphisme,

PFE 31: Evaluation et intégration de systemd dans STLinux-2.4

- *Graduation Project Tutor* : Ilyes Gouta
- *Project name proposal*: Evaluation et intégration de systemd dans STLinux-2.4
- *Description:* Il s'agit d'étudier systemd, l'initiateur de services pour Linux, d'en esquisser l'architecture et puis d'en faire le portage pour notre distribution STLinux.
- *Required Technical Competences*: Linux, init sysV, shell, GCC, C
- *Key words*: Linux, boot, init, shell, embedded

PFE 32: Metrics Reporting Tools

- *Graduation Project Tutor* : Imtinene Rjeb
- *Project name proposal*: Metrics Reporting Tools

- *Description*: Develop and Implement a reporting system to track the defects backlog, and SW development activities to measure the development process efficiency

- *Required Technical Competences:*

SW Developer background on Linux and Windows platforms with good skills in Perl, PHP, Java, C, C++ languages

- *Key words:* BIRT, SOA, XML, Jenkins, SQL Database

PFE 32: Development of a validation platform for the deinterlacing process in the Set-top box.

- *Graduation Project Tutor* : Emir ELAROUI

- *Project name proposal:* Development of a validation platform for the deinterlacing process in the Set-top box.

- *Description:*
  - Selecting the best method to be used for the validation.
  - Software development and adding related features.
  - Automation of the test.

- *Required Technical Competences:* C programming, Linux, Embedded systems.

- *Key words:* Set-top box, Deinterlacing, Image quality, Validation.

Comment Postuler ?

- Envoyez un e-mail aux adresses suivantes :

  sttunis.recrutement@st.com

  En copie :

  imen.jemai@st.com

  Avec en pièces jointes : CV Personnalisé ainsi qu'un corps du texte de l'e-mail sous forme de lettre de motivation mentionnant le sujet du projet de fin d'études

Les entretiens dans nos Locaux seront programmés durant les vacances scolaires (décembre 2011)