Android-based boot system

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1 About you

What is your name?
Vlad Victor Ungureanu

What is your email address?
ungureanuvladvictor@gmail.com

What is your eLinux.org wiki username?
ungureanuvladvictor

What is your IRC nickname
vvu, vvu|Mobile

What is the name of your School and in what country?
Computer Science class of 2015 at Jacobs-University Bremen, Germany

What is your primary language?
Romanian

Where are you located, and what hours do you tend to york?
During the project I will be back in Romania (GMT +2). My usual hours of working at mainly during night after 10PM.

Have you ever participated in an open-source project before?
I participated in Google Code-IN 2011 especially working for FFmpeg, finding bugs and submitting reports. All my work is under the name oanastratulat. List of bugs and patches can be find here. I want to work again close with an open source organization because I am using embedded platform on a daily basis(Raspberry PI and RoBoard for robotics) and I feel that I need to give something in exchange to the community. Being only a simple user does not comfort me anymore and having chance of doing something that lots of members will use is just magnificent.

2 About your project

What is the name of your project?
Android-based boot system

Describe your project in 10-20 sentences.What are you making? For whom are you making it, and why do they need it? What technologies will you be using?
The goal of the project is to semi-boot a BeagleBoard from an Android phone/tablet then use it as an external touchscreen. The Android device will provide the kernel and the root filesystem for the boot and will communicate with the board using ADK. At startup the board will read from from the MMC the MLO, U-Boot and a Linux Kernel. After that the binary which is the main communication line between the board and the Android device is ran and this tool requests the real final kernel, fs and will kexec the old kernel with the new one

which will result in a fully functionally BeagleBoard but with no display output. To tackle this problem my idea was to use DisplayLink in order to make the Android device's touchscreen the output/input of the BeagleBoard. For this method I need to overwrite the FrameBuffer of the device to output them on the display and to catch the touches and translate them in clicks for the BeagleBoard.

This project will be just a kickstart to show the power of the ADK e.g. : sharing internet connection via USB, update the BeagleBoard sw. through USB. The project will be useful for the people that do not have a DVI capable monitor or a DVI-Cape for their boards and want to use an external display. Another use case is for those who have boards running in remote places that log(locally, no internet connection) data and they want to check the state of the device and on the fly send the logs to some server using the internet connection from the Android Device.

During this project I will use a wide range of technologies: for the 1^{st} part of the project I will be needed to recompile the kernel and contribute with some modifications in order to behave as expected. For the ADK communication path between the board and the Android device I will use C programming to rewrite the ADK-libusb actual implementation to suit my needs. A Java app that will download the required kernel + fs will be done and will work on the Android device to provide them ready when they are sent to the board. Regarding the DisplayLink output I need to overwrite the FrameBuffer input to be the one I get from ADK over USB and to capture the touches and send them back to the BeagleBoard to be processed.

What is the timeline for development of your project? The Summer of Code work perios is about 11 weeks long; tell us what you will be working on each week.

28^{th} May - 4^{th} Jun. • **Getting familiarized with the BeagleBoard system, codebase and exploring possibilities how the goal of the project can be achieved.**

5^{th} Jun. - 11^{th} Jun. •**Rewrite ADK-libusb to suit my needs.**

12^{th} Jun. - 18^{th} Jun. •**Test the code.**

19^{th} Jun. - 25^{th} Jun. •**Implement ADK downloader + MMC Kernel.**

25^{th} Jun. - 3^{rd} Jul. •**Test the code.**

4^{th} Jul. - 11^{th} Jul. •**Implement Android app to provice download service for kernel, fs and test it.**

12^{th} Jul. - 19^{th} Jul. •**Put togheter all booting procedure from Android device.**

20^{th} Jul. - 27^{th} Jul. •**Test the code.**

28^{th} Jul. - 4^{th} Aug. •**Read more about DisplayLink and how to use it.**

5^{th} Aug. - 12^{th} Aug. •**Overwrite FrameBuffer for the Android device to output the data received by ADK.**

13^{th} Aug. - 20^{th} Aug. •**Test the code.**

21^{st} Aug. - 28^{th} Aug. •**Implement touch capture daemon and send the touches back to the BeagleBoard.**

29^{th} Aug. - 5^{th} Sep. •**Test the code.**

6^{th} Sep. - 13^{th} Sep. •**Implement board daemon that listens for touches over ADK and translates them to clicks.**

14^{th} Sep. - 23^{rd} Sep. • **Final testing, documentation, packaging and submitting the full work.**

Convince us, in 5-15 sentences, that you will be able to successfully complete your project in the timeline you have described.

I have made contact with the embedded scene 3 years ago, when I bought my first RoBoard. Since then I have developed several projects that make use of such devices and find myself fascinated of the power of such tiny boards and how they can influence our lives. I consider myself as an experienced Linux user and C/C++ developer because I started learning them during my 1^{st} year of high-school and since then I am using them constantly. Regarding Java I have build several apps for some school projects but the most important one is an app that interacts with a MySql server and retrieves/stores data and presents them in a nice UI. Because I have a strong affiliation to robotics me and with the help of my father built a rover which was supposed to be a test device for Google Lunar-X program but ended in a strong personal project. The core of the rover is RB-110, a robotics embedded computer and 3 Arduinos that ensure the communication with the sensors and motors. I have build this robot to be controlled from simple devices that have a web browser with JavaScript support. More projects of mine can be seen on my portfolio page VDev.ro.

Progress:

I intend to publish the progress on my own website, so other people can see how the project is going and how it gets to a final form.

Deliverables:

A fully boot system from a Android device which later will be used for video output and touch input.

Do you have other obligations from late May to early Aug. ?

I have my final exams starting from 17 May until 2nd of Jun. when I arrive back home and can start working for the project. But apart from that I have no other obligations and would be available from my GSoC work.

3 You and the community

If your project is successfully completed, what will its impact be on the BeagleBoard.org community. Consider who will use it and how it will save them effort.

•The project will be very helpful for those who want to use Android devices as monitors if they do not have boards with DVI output or a DVI-Cape to supply connection with a monitor. Another use case is to update the software on the Beagle from the phone using its internet connection over ADK.

What will you do if you get stuck on your project and your mentor isn't around?

I am a very versatile programmer and during development of my various projects I stumbled upon issues that did not have answers directly on community forums and this thought me how to be creative and overcome the specific problems.