

Personal Details

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Title of Project : Kinect Based Module Development

Duration of the internship : 26 May 2014 to 10 July 2014

Summary of your contribution to the project :

My contribution to the project **Kinect Based Module Development** involves the design of the following 12 experiments :

- E1_Depth_Tracking_on_screen
- E2_Depth_Tracking_on_firebird
- E3_Camera_fundamentals
- E4_Skeleton_Tracking_Fundamentals
- E5_Skeleton_Tracking_firebird_left_right
- E6_Skeleton_Tracking_firebird_front_back
- E7_Skeleton_Tracking_angle_between_joints
- E9_Skeleton_Tracking_Complete
- E10_Voice_Recognition_firebird
- E12_Depth_Tracking_on_screen_linux
- E13_Depth_Tracking_on_firebird_linux
- E14_Tilt_Demo_linux

This was complemented with documentation supported by chapters 1, 3 and a part of 4 in the kinect manual. The final stage was completed with video demonstrations for the experiments designed.

My contribution to the project **Programming Firebird V on Linux** involves :

- Installation of Avrdude and other necessary software.
- Compilation of a .c file for Avr platform.
- Generation of .hex file for Avr platform.
- Loading the .hex file on Atmega2560 using Avrdude.

This was supported with documentation of the same in chapter 1 in the manual corresponding to the project.

Project Status Report

Objective of the work : I chose the kinect project to get an insight into the kinect sensor and realising that interfacing of kinect to the firebird was a potential combination with multiple possible applications in a wide domain.

Scope of the work :

Kinect Based Module Development -

- Installation of Kinect driver and softwares, on Windows and Linux.
- Creating Video tutorials and documentation for the same.
- Interfacing the Kinect sensor with FB V - Windows and Linux.
- Creating Video tutorials and documentation for the same.

- Designing and implementing a few basic experiments using FB V and Kinect.
- Creating Video tutorials and documentation for the same.

Programming Firebird V on linux -

- Write and compile C program for AVR based FB V robot on Linux.
- Compile to generate .hex file.
- Create Video tutorial explaining the process.
- Load .hex file on robot using bootloader/AVRdude programmer from linux.
- Create Video tutorial explaining the process.
- Repeat the above steps for ARM based robot.

Results and Discussion : The completion of the project (Kinect based module development) provides an interface between the kinect sensor and the Firebird V robot with experiments ranging from easy to advanced level to give a basic understanding of programming and obtaining the data from the sensor. The major obstacles faced in the project was the unavailability of working literature for the current versions of the used softwares. Most of the literature and online support codes were for the older versions and many of the inbuilt functions no longer had any support in the latest version. However, one has to continuously keep track of the latest versions of the softwares and their supported functions for the kinect sensor. Any break in progress would result in loss of continuity and people working in future may have to begin from scratch to understand the supported functions. Hence, continuous work on this project is necessary.

The completion of the project (Programming Firebird V on linux) provides a platform for future work on Firebird V on the linux platform along with the flexibility of understanding the underlying terminal codes for compiling a source code, generating an executable file and loading the same on Firebird V robot.

Bugs (Kinect Based Module Development) :

- Skeleton tracking at times in not Continuous.
- Tracking a seated skeleton requires a definite posture.

Bugs (Programming FB V on linux) :

- brltty bug in 64 bit machines.
- Explicit installation of libusb and libudev Libraries.
- Absence of the 3 math libraries.

Future Work : The current versions of the software on linux (libfreenect) doesnot support skeleton tracking and the audio templates available are not reliable and unpredictable. Hence, it would be an interesting propect to design codes once the support is available in future versions of libfreenect.

Bibliography

- [1] <http://www.microsoft.com/en-in/download/details.aspx?id=40278>
- [2] http://openkinect.org/wiki/Getting_Started
- [3] <http://www.visualstudio.com/en-us/products/visual-studio-express-vs.aspx>
- [4] http://learning.codasign.com/index.php?title=Skeleton_Tracking_with_the_Kinect
- [5] <https://www.youtube.com/watch?v=AwIlr98YZgk#t=31&hd=1>
- [6] <http://members.ee.net/brey/Serial.pdf>
- [7] <http://www.dotnetfunda.com/articles/show/2069/how-to-track-skeleton-joins-using-kinect>
- [8] <http://channel9.msdn.com/coding4fun/kinect/Tracking-skeleton-joins-code-sample>
- [9] <http://social.msdn.microsoft.com/Forums/en-US/3f73ac86-9793-4586-9eb3-3cf2aa55fc77/c-write-kinect-joint-positions-xyz-to-txt-file?forum=kinectsdk>
- [10] <http://stackoverflow.com/questions/14204902/record-audio-with-kinect>
- [11] <http://channel9.msdn.com/coding4fun/kinect/Introduction-to-Kinect-Speech-Recognition>
- [12] <http://www.ladyada.net/learn/avr/setup-unix.html>
- [13] <http://kamilskowron.pl/en/avr/ubuntu-avr-and-c-programming-microcontrollers-on-linuxatmega8/>
- [14] <http://ftp.gnu.org/gnu/binutils/>
- [15] <http://savannah.nongnu.org/projects/avr-libc/>
- [16] <http://download.savannah.gnu.org/releases/avrdude/>