
# Work Progress Report

Project Period: 2015/02/16 ∼ 2015/08/18

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Title

## Developing an experimental platform for Human Robot Interaction based on human motions

# 1 2015/04/01-2015/04/05

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/01 | • Fixed Experimot studio startup problem.<br>• Scheduler design. Written core classes that will compose the Context of the scheduler. | - |
| 2015/04/02 | • Schedule core classes design<br>• Localization reference frame problem debugging | |
| 2015/04/03 | • Localization reference frame problem fix<br>• Testing | - |

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/04 | • Bug fixes in the localization | • The camera frame considered by ALVAR was (x-right, y-down and z-forward). However for KINECT it was (x-right, y-up and z-forward). So basically I had to invert the y-axis position values after computing the Torso pose.<br>• *TODO*: Weighted pose estimation depending on the marker detection confidence. |

## 2 2015/04/06-2015/04/12

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/06 | • Lab meeting<br>• Application bootstrapper - Modified XML schema to support node parameters. In the process of supplying the node parameters as a command line arguments to the individual nodes during startup. | - |
| 2015/04/07 | • Application bootstrapper support - Extended the xml config file to support global and local parameters. global Parameter overriding, support the new configuration information in the individual nodes.<br>• Testing the supported nodes. | |

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/08 | • Node startup enable/disable support<br>• Integration of Gesture recognition and Skeleton tracking and supported start up of this node from configuration information.<br>• Application context information management support. Auto subscription of all the published messages. Under test | - |
| 2015/04/09 | • Migration from clrzmq to NetMQ .NET library for ZeroMQ<br>• Parameter server and Context synchronization from all publishing nodes - Multi-threading support<br>• UI update of current pose from the context | |

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/10 | • Tried serializing the kinect body to cross check with the raw buffer size<br>• Kalman filter implementation started<br>• Fixed bugs in the localization module and testing | - Walking on the floor mat was not good. So will test once again on the room 452 next week |
| 2015/04/11 | • Target Drives Means (TDM) Framework client python script development - To make the localization data available to the TDM framework | |
| 2015/04/12 | • Target Drives Means (TDM) Framework client python script development & Testing - Works fine<br>• Will organize a meeting with Mr.Vincent Berenz next week and prepare for the initial integration test for the scenario of Nao robot walking to and fro between two locations. | |

## 3 2015/04/13-2015/04/19

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/13 | • Lab meeting<br>• Python client preparation for Mr.Vincent Berenz to access localization information from my platform<br>• Bug Fix: Refreshing the simulation window when no Kinect body is detected<br>• In order to enhance the pose estimate, I plan to consider the depth information of the detected markers as well. To do this, I started integrating the PCL Grabber with Localization module. | - |

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/14 | • Made a python client sample plotting the pose of the robot on the plane using matplotlib<br>• Meeting with Mr. Vincent Berenz about the TDM framework. We agree d to develop a description of the world to communicate information between Experimot and TDM<br>• Continue implementation of Marker pose improvement taking into account of the kinect information.<br>• Median filter implementation | |
| 2015/04/15 | • Kinect data integration for improved pose estimation | • Point cloud organization caused lot of issues and creating problems by crashing the application. Found the source causing the problem and fixed the issue. However the Pose estimation using kinect is still not successful. |

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/16 | • Modified the point cloud generation using MapColorFrameToCameraSpace method of coordinate mapper. The Pose estimation is not stable and sometime the depth information is noisy and it give INFINITY for the depth value which crashes the localization module<br>• Started with the presentation<br>• Tried three.js to be used as the 3D viewer of the web site (trying the possibility of providing the web based monitor for human robot interaction) | |
| 2015/04/17 | • Three.js robot loading verified. Refactoring the project structure<br>• Motion/Behavior modules registration mechanism implementation<br>• Made sample python script for calling the behavior installed in the robot<br>• Python node parameter retrieval support - ongoing | - |

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/18 | • Python node parameter retrieval support - complete<br>• Fixed the bugs in the robot behavior registration | |
| 2015/04/19 | • Prepare mid-term presentation | |

# 4 2015/04/20-2015/04/26

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/20 | • Mid-term presentation<br>• Prepare Ubuntu-64 bit virtual machine. Bios option : Enabling Intex VT-x virtualization<br>• Checked the ZMQ client in Ubuntu machine while the server is running in window machine<br>• Prepare Naoqi sdk and Choregraphe in Ubuntu virtual machine<br>• Begin to Embed web server | - |
| 2015/04/21 | • Try to improve localization<br>• Behavior module modification<br>• Gesture trigger message added and communication link is established with the server<br>• Gesture trigger to behavior execution cycle is tested :) | |

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/22 | • Studio Ghibli Demo preparation<br>• Embedded webserver setup using Nancy web framework and check the Nao asset loading. Works fine. | • Nao fell down when I was setting up demo. The Nao cpu is getting heated up quickly and shuts down for safety. Have to check if there is some problems with cooling system |
| 2015/04/23 | • Web server integration - Jquery ui<br>• TDM module from Vincent integration test.<br>– A router has to be used to connect the robot with the host computer<br>– The virtual machine network setting has to be set as NAT<br>– With these settings, the virtual machine was able to connect to the host and also to the robot. The module working has been verified. However there are some ambiguities in the way data has been decoded at TDM side. | • Nao shut down once due to over heating. |

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/24 | • Continued with web integration<br>• World description : Human management, Gesture associated with each human management. | |
| 2015/04/25 | • Simulation of the robot in the web renderer. Works decently well | |
| 2015/04/26 | • Tried integrating JointJS for modeling of the scenario but without success. | |

# 5 2015/04/27-2015/04/30

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/27 | • Read papers on improvement of marker pose. Particle filter approach implementation check<br>• Made modification of localization to just send (x,y,heading) to the TDM client<br>• Tried making Playback tool with new approach but still not successful | - |
| 2015/04/28 | • Fixed bugs in the Kinect Playback tool - Now works perfectly without losing frames.<br>• Particle filter implementation using BFL (Bayesian Filter Library). Experiencing problem in getting it running successfully. | |
| 2015/04/29 | • Localization particle filter test.<br>• TDM module walking test not successful.<br>• Helped Katsumata with setting up the Datalogger acquisition | • The way the coordinate values are interpreted in TDM is still unclear. |

| Date | Content | Problems/Remarks |
|---|---|---|
| 2015/04/30 | • Stanford Natural Language Processing Integration successful. Still have to think how to use it.<br>• Added required messaging proto files for motion recognition and robot behavior (schema change)<br>• Human pose computation and implementation. Plane composed of torso, shoulder left and right is considered to compose the torso frame. | |