서 울 대 학 교
SEOUL NATIONAL UNIVERSITY

Reconstructing locomotion in VR from WIP (Walking-In-Place) motion : an IMU-based, inside-out approach

Author:

JiGang KIM

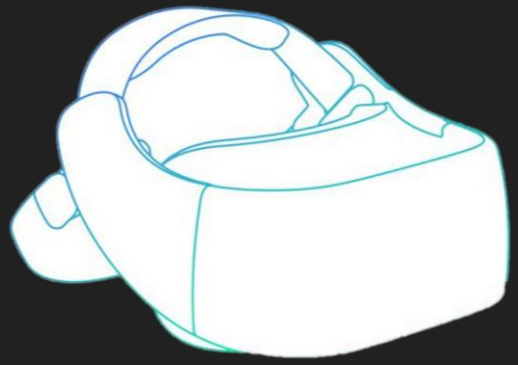
Supervisor:

Prof. Frank C. PARK

서울대학교 SEOUL NATIONAL UNIVERSITY

Motivation

- *Develop a low-cost (IMU), natural interface (WIP) for navigating Virtual Environments (VE)*
  - *WIP - navigate unlimited virtual space within the limits of finite physical space*
  - *IMU – track foot kinematics (position, velocity, attitude) using accelerometer and gyroscope*
- *Synthesize a personalized natural motion from WIP with gait tracking results of user's normal walking.*
- *Performance Criterion :*
  - *Latency : rapid transition between stationary and moving state*
  - *Smoothness : no sudden jerks in the frame*
  - *Precision : sensitivity/accuracy of motion*
  - *Speed & Efficiency : little effort needed to complete a task*

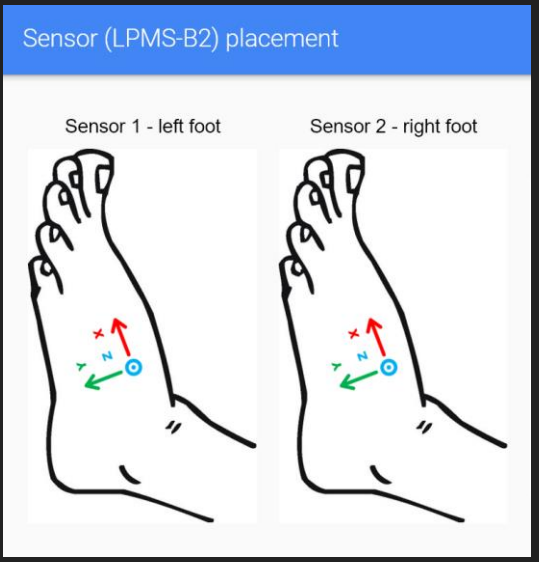


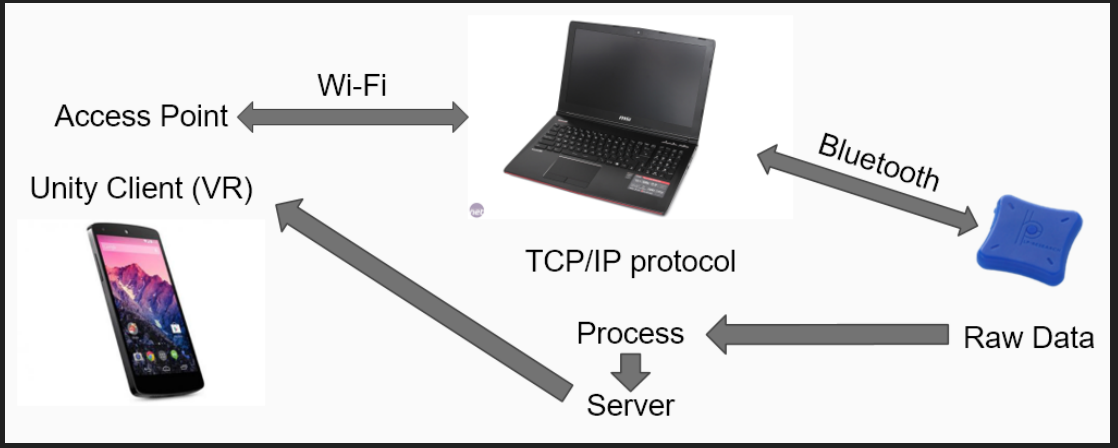
서울대학교 SEOUL NATIONAL UNIVERSITY

System Overview

- *Process:*
  - *calibrate, kita (offline version of 'calibrate') : obtain gait parameters (Kitagawa, 2016)*
  - *run, playback (offline version of 'run') : track WIP motion and generate locomotion*
- *Language:*
  - *C# (server & unity client), C++ (processing client)*
- *Platform & IDE:*
  - *Windows 10 & Visual Studio 2015, Unity 5.6.1f1*
  - *Android 4.4 KitKat or above*

  (requires Google Cardboard)
- *Communication:*
  - *TCP/IP socket communication (server)*
  - *Bluetooth (LPMS-B2 IMU sensor)*





서울대학교 SEOUL NATIONAL UNIVERSITY

Results