LP-RESEARCH Introduction

I. Who We Are

Zhuohua Lin (China),
Co-founder,
PhD f. Waseda大学

Klaus Petersen (Germany),
Co-founder,
PhD f. Waseda大学

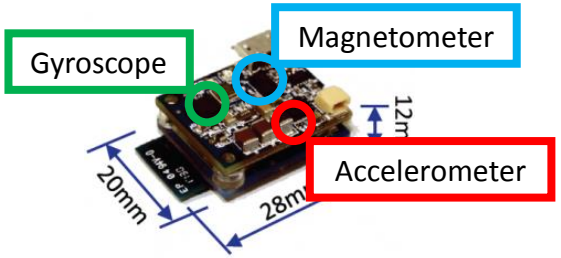
Huei Ee Yap (Malaysia),
Chief developer,
PhD f. Waseda大学

株式会社LP-RESEARCH
Headquartered in Tokyo
and Guangzhou, China

II. What We Do

Hardware design and production
Focus: Motion sensors

LP-RESEARCH
Engineering
knowledge

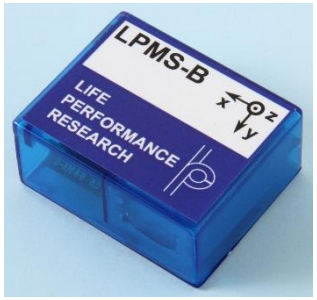


Sensor fusion algorithm development

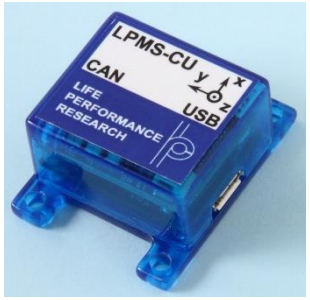
Multi-platform application development

Inertial Measurement Units / Algorithms

I. LP-research Motion Sensor (LPMS) Hardware Design



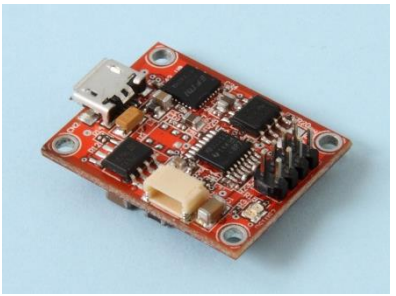
LPMS-B



LPMS-CU

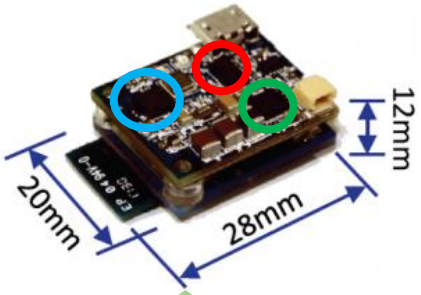
LPMS-CUR

LPMS-USBAL



LPMS-CURS

II. Real-time, On-Device Sensor Fusion Algorithm



Gyroscope

Accelerometer

Magnetometer

LP Filter

Orientation

Lin. acceleration

Height

Hard and soft iron magnetic field correction

Misalignment correction

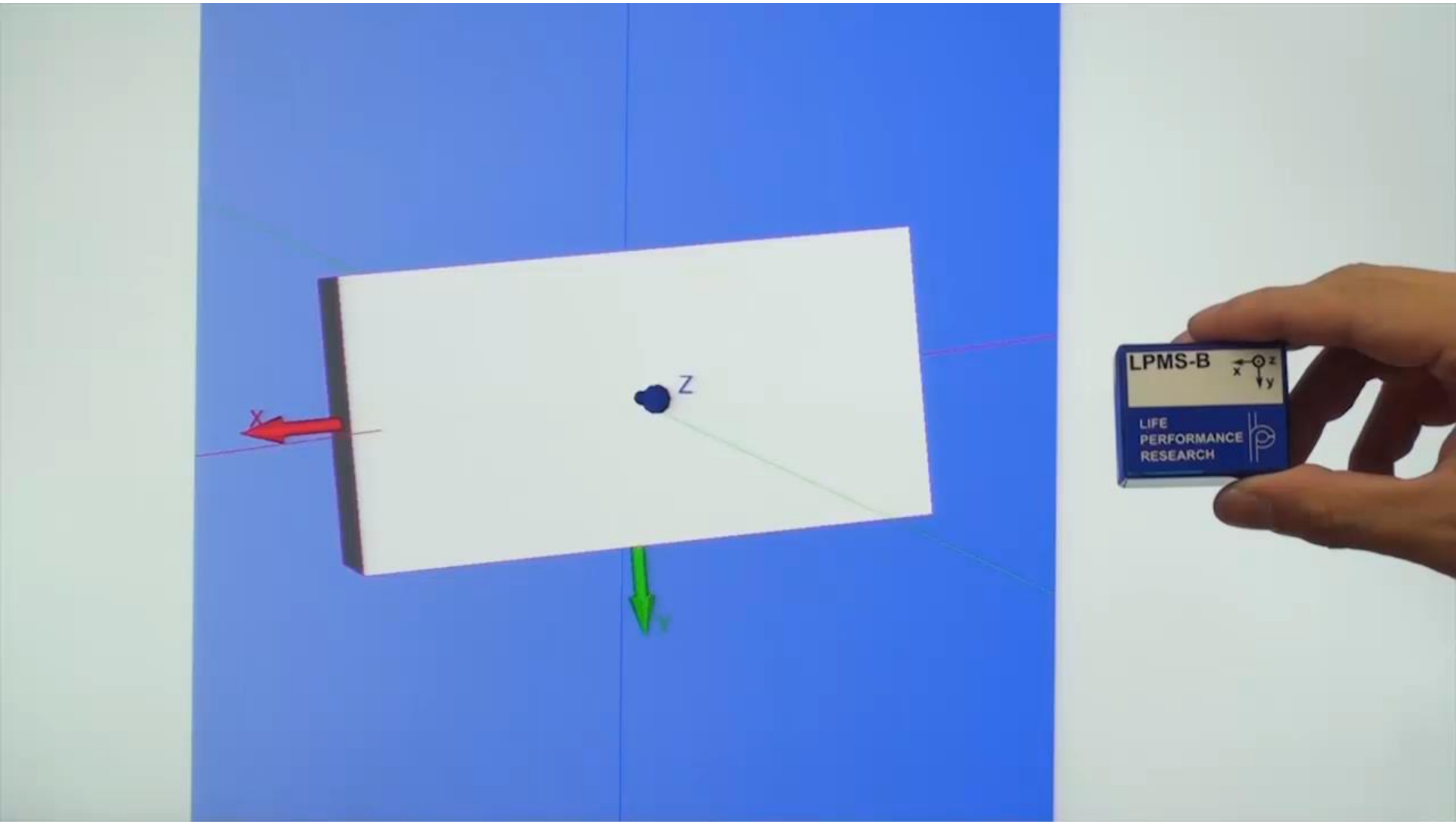
Online gyroscope bias and temperature stabilization

Linear acceleration noise compensation

Magnetic noise rejection

LIFE
PERFORMANCE
RESEARCH

Simple 3D Cube Video



Motion Sensor Applications 1

Golf Swing Analysis

NEED: Swing information for more effective training

Motion data

- Posture
- Swing curve
- Posture data

User evaluation on smartphone

Development Partner:

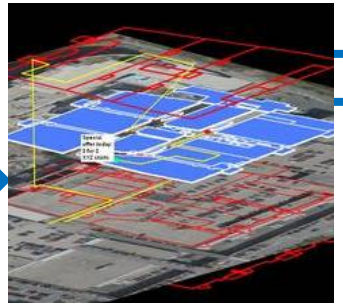
Science & Motion Sports

Science & Motion Sports, Germany

Indoor Navigation

Firefighters

Gait analysis



Environment map

- Team position
- Mission control

NEED: Location of firemen / police teams inside building (no GPS reception)

Development Partner:

AIONAV, Austria / Switzerland

Motion Sensor Applications 2

Payload Heave Motion Tracking

NEED: Stability of payload must be guaranteed under all sea conditions

Off-shore installation

Acceleration measurement

Heave motion frequency / amplitude

Crane adjustment

Development Partner:

Scottload LOAD MEASUREMENT SPECIALISTS

Scottload, England

EV Drive Control

NEED: Vehicle controller system must know car dynamics to steer correctly

Electric vehicle

Orientation / speed measurement

Vehicle inclination, stability

Vehicle stability control

Development Partner:

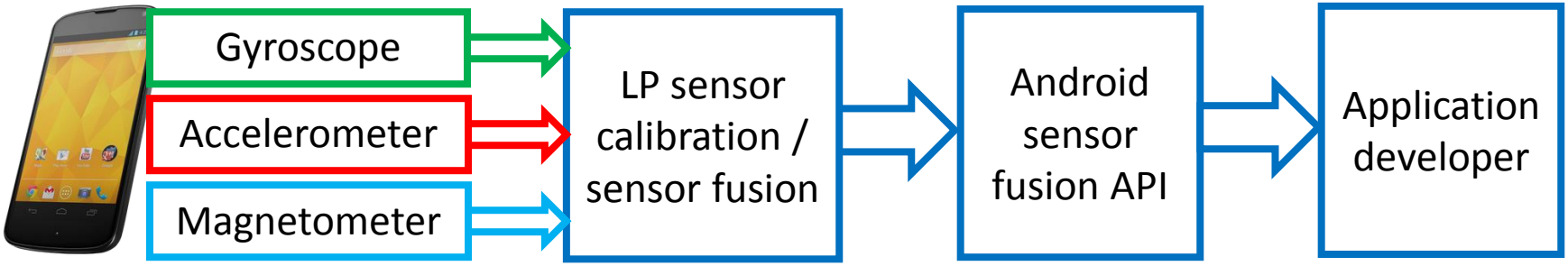
BorgWarner

Borgwarner, Sweden

Motion Sensor Applications 3

Motion Sensing Middleware for Android

NEED: Motion sensing essential for competitive smartphone product



Smartphone

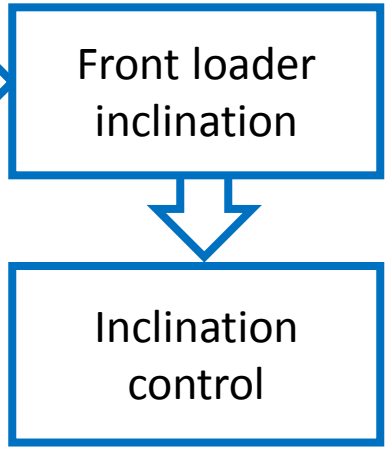
Development Partner: Panasonic

Front Loader Control

NEED: For exact adjustment of the front loader, inclination feedback is required

Front loader

Gyroscope + accelerometer sensor fusion



Development Partner:

Alo AB, Sweden

World's leading manufacturer for front loaders

Motion Sensor Applications 4

Virtual Reality 3D Glasses

VR Goggles

Kalman filter sensor fusion

Head orientation

Image adjustment

Development Partner:

Canon, Japan

NEED: Orientation of head must be tracked to display realistic image

Full-body Motion Capture

NEED: Full human body motion must be tracked for sports evaluation

Dancer with sensor-suit

Motion measurement via Bluetooth

3D human model joint / link orientation

Character animation

Development Partner:

Lemonade Labs, Japan

LIFE
PERFORMANCE
RESEARCH

Augmented Reality Video

LIFE PERFORMANCE RESEARCH

Gait Tracking Video

LIFE PERFORMANCE RESEARCH

Full-Body Motion Capture Video