

# **Topik Tugas Akhir Cyber-physical System & Robotic Semester Genap 2018**

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Berikut adalah penawaran topik Tugas akhir untuk semester Ganjil 2018-2019. Bagi Mahasiswa yang berminat untuk mengambil topik TA tersebut diharapkan telah lulus / sedang mengambil MK IoT, serta telah lulus MK Mikrokontroller.

## ***IoT for Spatial and Environment***

### **1 Spatial Interpolation of Wind Speed and Direction (Open,1 orang)**

Objective: to develop spatial wind sensitive interpolation integrated with air pollution map. Weather station kit is provided.

Methods: Spatial interpolation, Wind Rose model

### **2 GEMPA: Geophone-based Earthquake Monitoring, Processing, and Analysis (Open, 1 orang)**

Objective: to develop real time Geophone-based seismic sensor complemented with Accelerometer to analyze seismic and earthquake activity.

Methods: Geophone and accelerometer for seismic signal processing

### **3 Multi-sensor Landslide Detection and Warning System (Open, 1 orang)**

Objective: to develop real time landslide multi sensor using Accelerometer to analyze land activity and generate warning system.

Methods: multi-sensor data fusion, accelerometer signal processing

## **4 Camera as Weather Sensor (Open, 1 orang)**

Objective: to develop real time camera application to classify weather condition, such as Foggy, Heavy rain, and dusty.

Methods: Video processing and classification using OpenCV on Raspberry Pi

### *Cyber-Physical System for Smart Home*

## **5 EEG-based Home Appliance Controlled (Open, 1 orang)**

Objective: to develop real time EEG-based application to control home appliance, such as dimmer based on sleeping-state of EEG signal.

Methods: EEG Signal Processing, feedback control using EEG.

### *Cyber-Physical System for Health Rehabilitation & Bio-kinematics system*

## **6 Foot Plantar Analysis using Multi Piezo Sensor (Open, 1 orang)**

Objective: to develop a heatmap-based interpolation data of foot plantar pressure and analyze the the foot kinematic during movement.

Methods: Piezo signal processing, Interpolation technique.

## **7 Application to analyze Foot Plantar Measurement combined with Gait measurement during walking (Open, 1 orang)**

Objective: to develop an application to integrate foot plantar heatmap interpolation data with gait signal data during movement / walking. The application will detect the abnormality or potential injuries based on foot pressure and gait signal analysis.

Methods: Gait signal processing, piezo signal processing, Python based application .

## **8 3D Gait Tracking (Open, 1 orang)**

Objective: to develop **real time 3D gait tracking** based on IMU sensor fusion and analyze the kinematic abnormality.

Methods: Gait signal Processing, 3D analysis of kinematic of IMU using Quaternion Geometry.

## **9 Step counting: an improvement algorithm based on IMU (Open, 1 orang)**

Objective: to develop IMU based hardware and redesign and develop application of step counting algorithm based on IMU hardware.

Methods: Gait signal Processing, Step counting algorithm.

## ***Cyber-Physical System for Intelligent Transportation System***

## **10 Multi-target Object Tracking**

Objective: to develop real time multi vehicle tracking in several weather condition (fog on heavy rain condition). IP Camera is provided.

Methods: Multiple Object Tracking with OpenCV on Raspberry Pi

## **11 Multi Camera Network with object occlusion (Open, 1 orang)**

Objective: to develop real time vehicle surveillance system with object occlusion detection using multi-camera network. IP Camera is Provided.

Methods: Single Object Tracking, Camera Network with OpenCV on Raspberry Pi

## **12 Multi-target Multi Camera Object Tracking**

Objective: to develop real time multiple vehicle and non vehicle object tracking on highway using multi-camera network. IP Camera is Provided.

Methods: Multiple Object Tracking with OpenCV on Raspberry Pi , multi-camera network

## **13 On-board Vehicle Road Wetness Detection**

Objective: to develop real time on-board road wetness detection combined with OBD II Sensor board. OBD II sensor board will be provided.

Methods: Multi sensor data fusion, OBD II protocol.

## *Cyber-Physical System for Intelligent and Embedded Robotics*

### **14 TelkoMover: Telkom University Six Wheel Mobile Rover**

Objective: to develop a six wheel mobile robot rover with basic motion controller and trajectory tracking. This rover is will be used to explore unusual outdoor track with unusual wheel locomotion.

Methods: Microcontroller, mobile robot control