

**ICT Virtual Organization of ASEAN Institutes and NICT
ASEAN IVO Forum 2016
Call for Presentations**

Submission and Registration Form

Please enter the relevant information in the fields below, giving an appropriate explanation when necessary. You may add supplemental pages and supporting data. If necessary, you may be asked to provide additional documents.

I. Title—Title of presentation:

IoT-based Pulmonary Tuberculosis Diagnostics System

II. Author(s)—Full name (First name family name):

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(If you are already planning a project, please include the names of all team members)

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(If you are already planning a project, please include the institutions of all team members)

IV. Topic selection:

Smart Society – smart community – E-Healthcare

(Select one from the topics listed in "Call for Presentations")

IV. Abstract:

(Describe the purpose, background, objectives, content, plans for connected projects, expected results/outcomes, etc.)

According to World Health Organization (WHO) report, two million deaths worldwide are due to tuberculosis every year [1]. About one million new cases of lung cancer have been detected annually [2]. WHO 2015 reported that there were 9.6 million new TB cases in 2014 with 58% were in South-East Asia and Western Pacific regions [3]. Indonesia, Myanmar, Cambodia, Philippines, Thailand and Vietnam were considered as high-burden countries by WHO [3]. Tuberculosis hinders socio-economic development; 75% of people with tuberculosis are in the economically productive age group of 15–54 years. Ninety-five percent of all cases and 99% of fatal cases occur in developing countries [4]. The majority of the cases occur due to unhygienic and poor living condition. In 1980s Malaysia was considered almost Tuberculosis free, however, due to its less stringent screening in the early stage of imported laborer from neighboring country saw the tuberculosis comeback. Even though Malaysia has an excellent healthcare system for detecting, treating, monitoring and preventing tuberculosis, the disease still exists and further aggravated by resistance to the anti-TB drug and immune prong disease such as HIV. Tuberculosis is a preventable and curable disease, whereby the bacteria are commonly spread airborne through coughing and sputum. Tuberculosis patient needs to undergo the treatment completely, and the close kin that is in contact with the patient need to be screen and monitored for a period. Many tuberculosis patients absconded the treatment midway, due to the lengthy treatment and inadequate monitoring. Other factors contribute to the delay in diagnosis disease are patient health seeking behavior, healthcare centers with inadequate infrastructure and equipment, insufficient resources and information systems (mostly paper-based), lack of documentation system, and lack of human resources as part of a multidisciplinary Tuberculosis team.

To solve the problem such problem, the introduction of the IoT-based Pulmonary Tuberculosis Diagnostics System via mobile applications will provide a quick screening system and easy monitoring for the tuberculosis patients by the healthcare personnel. Due to the availability of powerful smartphones, the last few years, mobile phones have been successfully used in the diagnosis of tuberculosis [5-6]. Wireless technology has evolved so much and so fast that allows transmission of medical images such as X-ray images through the mobile phone [7]. Further, the digital photographs of the chest X-rays obtained via cell phone are comparable to plain film chest X-rays [8]. Mobile technologies have the potential to reduce the burden of tuberculosis by providing mobile computing and communication techniques and devices for better diagnosis, treatment, and prevention [9].

In this study, we first have to create a large-scale database of pulmonary tuberculosis with different aspects of TB manifestation that spans few countries in the ASEAN region. The images must be correctly and well annotated and publicly available among the participating organization in this project. At the moment, we are not aware of any public database from ASEAN. The challenge in creating the database will be in determine the types of TB manifestations that should be the focus and how to use these manifestations to annotate each X-ray images. Secondly, in developing a dedicated annotation software and database management software package for reviewing chest radiography, locating relevant

contents, annotate them, and extract the annotated contents for research, teaching, and training purposes.

The research activity involving machine learning will then be divided into two categories: (1) computer-aided screening and scoring algorithms using chest radiographic features for the TB diagnosis, and (2) X-ray image categorization on the organ and pathology level.

The outcomes from this study will be (i) large database consists of tuberculosis data and well annotate X-ray images from ASEAN countries, and (ii) an effective and efficient computational model for Tuberculosis manifestation categorization.

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