

# STSM Report

- **STSM title** : “Critical Infrastructure Protection (Healthcare) against Cyber Attacks, Privacy Protection”
- **STSM Applicant** : Dr. Madhusanka Liyanage
- **Host** : Dr. Pardeep Kumar
- **Host Institute** : Department of Computer Science, University of Oxford, United Kingdom
- **Period** : 2017-12-15 to 2018-01-15
- **Working group** : WP4 (Malicious human activities)
- **Purpose of the STSM:**

The purpose of this visit is to develop a novel, decentralized record management system to handle Electronic Health Records (EHR) by using blockchain technology

- **Description of the work carried out during the STSM**

I was invited to visit I Department of Computer Science, University of Oxford, United Kingdom by Dr. Pardeep Kumar. On arrival, I had a meeting with Dr. Pardeep Kumar and he explains his research on network and system security. Moreover, he explained briefly about ongoing projects in his research group. Then, I also explained my research experience and discussed the objectives of STSM. Then, I also met Prof. Andrew Martins who is the head of project team where Dr. Pardeep is working. We discussed few idea and he explained the current research work of his team.

The main topic of STSM is “Critical Infrastructure Protection (Healthcare) against Cyber Attacks, Privacy Protection” which is a research topic, which will be addressed under WG4: Malicious human activities in Cost Action CA15127. The main objective is to develop a novel, decentralized record management system to handle Electronic Health Records (EHR) by using blockchain technology with following features

- This system gives patients unchangeable log and easy access to their medical information across provides and health Centre.
- Patient will access the system by using Biometric
- Patient’s EHR are stored in secure database against the Biometric Keys
- Only authorized persons can append the data to EHR
- User Privacy protection even though EHR database is hacked

The target is to finalize the paper and submit it to IEEE Globecom 2018 conference.

Since Dr. Pardeep is working on smart grid domain, we have caked the possibility of using Blockchain based solution for Smart grid domain. I have being reading few related research papers during the visit and discuss the two possible use cases

- Block chain based Smart meters information collecting systems for delay torrent networks
- Payment system for Micro-operators

This work is currently under development. We are planning to finalize both usecases during this year.

In addition, we discuss the possibility of editing a book of IoT. Since I have already edited two books on Software Defined Mobile Networks and 5G Security, I already have good experience on editing book. We have start preparing the proposal during this visit and our plan is to submit the proposal to Wiley Publishes. Since, the proposed topic is closely related to RECODIS project, some of our partners can also contribute as chapter authors.

Moreover, I have discussed and finalized the outline for chapter 1.9 in RECODIS book. We also assigned tasked for each contributing authors and tentative Table of Content as follows

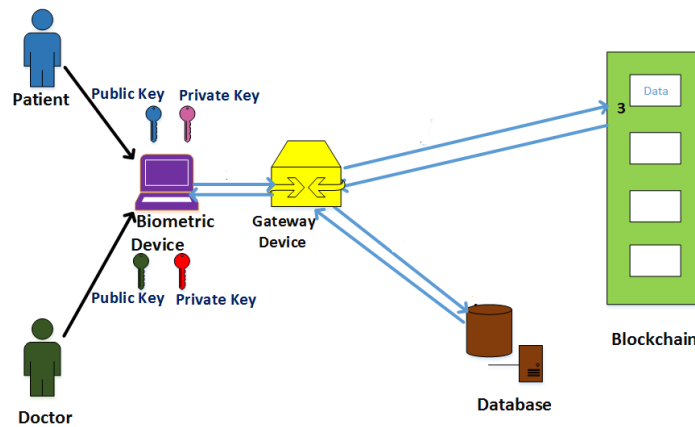
**Title: Securing the communication of IIoT**

- **Introduction to IIoT - Pradeep**
  - IoT
  - Evolution of IoT to IIoT
  - Security issues in IIoT
  - Security Requirements of IIoT
  - Possible mechanism to secure IIoT (IDN and SoftVPLS)
- **IDN (Identity Defined Networking) - Nikita**
  - Introduction to IDN
  - Expected benefits of IDN
  - Challenges in IDN
- **SoftVPLS - Madhusanka**
  - Introduction to Soft-VPLS
  - Expected benefits of Soft-VPLS
  - Challenges in Soft-VPLS
- **Discussion**
- **Conclusion**

Finally, we agreed to submit a workshop proposal of Mobile Edge Computing for 5G World Forum 2018. The 2018 IEEE 1st 5G World Forum (5GWF'18) in Santa Clara, California is a unique event for industry leaders, academics, and decision-making government officials. This event is designed to examine 5G technologies and applications for the benefit of society. Since this one of the biggest IEEE 5G event, we selected this conference to submit our proposal. We have finalize the first draft of the Workshop proposal during the research visit.

- **Description of the main research results obtained:**

During this visit, I have finalized basic system model for proposed solutions.



*Figure 1: Proposed system model*

- **Future collaboration with the Host institution (if applicable):**

Future researcher exchanges from University of Oxford to University of Oulu

- **Foreseen publications/articles resulting from the STSM:**

1. Conference paper for IEEE Globecom 2018 conference
2. Book Chapter: Chapter 1.9 in RECODIS book.
3. Edited book on IoT

**Created by:** Madhusanka Liyanage, Oulu, Finland 20.01.2018