IMMUNeT

COST Innovators Grant IG15104

Industrial Machine Monitoring Unplugged Network (IMMUNet)

Minutes

Final CIG Team and Scientific Meeting

Microsoft Teams (*online*)

12-13 April 2021

Day 1: April 12th

9.15 – 9.30: Chiara Buratti presented the agenda, which was approved.

9.30 – 10.30: Status of the technical development

UoLille: They managed to set up a small network including G1, G2 and some tags. They already identified some data aggregation strategy to be implemented. The implementation phase will start soon.

INSA: They reported some problems with the setup of the communication: they managed only to associate tags to the gateways, but not to lunch any data transmission. INSA researchers will contact UNIBO researchers to understand how to fix the problem and start with energy consumption measurements.

CTTC: they managed to implement a C code of the proposed coding scheme. The code implementation has been compared with a mathlab implementation and results are perfectly matching. The code will be shared with UNIBO for evaluation of the possible integration into the IMMUNet system.

10.30 – 11.00: Break

11.00 – 13.00: Status of dissemination activities and discussion with Embit from business and technical perspectives – UNIBO

Chiara Buratti reported about the participation to the webinar organized by CRIT at the end of March, where UNIBO researchers presented the IMMUNet system. The webinar was attended by 11 companies, most of which were in the field of automation.

After the webinar, UNIBO submitted to the company a questionnaire to gather advice on the IMMUNet system, but unfortunately no replies have been received yet. The questionnaire is available at the following link: https://docs.google.com/forms/d/e/1FAIpQLScbgQkHbrTuXnsuHvNNJvaLwO_eSToNn_R8ACa3YipvQL1m7A/viewform?usp=sf_link

Roberto Verdone reported about the discussion with Fabio Bonizzi, CEO of Embit. The main points emerged are the following:

1. Embit is interested into moving in the direction of industrial IoT

2. Embit is interested in our idea and consortium, but in order to invest, they need the following:

    a. Understand our business plan – they are waiting for the business plan we are editing for COST, to evaluate the feasibility of a collaboration. Therefore, IMMUNet should move on with the BP editing assuming an HW will be identified and will participate to the start up.

    b. Be sure we will proceed with the startup creation, meaning that we will find some people to hire.

3. Embit was interested into attracting the attention of Semtech, but recently they decided, in line with the LoRa Alliance, not to invest on LoRaWAN at 2.4 GHz.

Requirements: you have built a system for GD – the system is rather complex and thought for a specific company.

Roberto Verdone will take the following actions:

AP1: BI-REX association of 45 companies, most of them in the field of automation. They have a showroom with different automation machines of different kind, types (3D printers, etc.) and they are available to host us for an IMMUNet PoC. The PoC could be paid by BI-REX in terms of HW. Three different business model can be foreseen: 1) BI-REX pays IMMUNet for the HW, we mount the system in the showroom and some company sees it and contacts us; 2) BI-REX enters into the business model of IMMUNet and takes shares; 3) BI-REX pays our system to sell it to automation companies in Emilia Romagna. These points will be part of the discussion. The task will end in June.

Lille: they are going to have a student starting in May 10, who can try to set up a PoC to show to BI-REX that the system is working.

AP2: Contact different companies (possibly those of BI-REX) to have feedback about their application requirements. Task closed in June.

Chiara Buratti reported about the technical discussion with Embit engineers. After two meetings and different presentations performed by UNIBO to Embit the following comments have been received. They see the possibility to put on the market a product ready to be installed (no customization needed), however the different modifications should be applied:

- The Immunet system should be simplified in order to make it simpler and with a more general purpose. Embit is wondering about the following: 1) IMMUNet has been created for a single company, but what about the requirements of other companies? 2) The system should be simple enough to allow customers to understand it and use it easily; if functionalities are too complex to be explained, the risk is that customers give up.

- Actions: AP1 above will allow to understand the needs of companies. It should be also useful to understand if the Network Update function is really needed to other companies: is it true that all companies in the automation machine field need to mount and dismount pieces of the machine frequently?

- The architecture should be simplified: they are interested in one GW managing the different tags via direct links (star topology with one cluster)

- They are not interested into wireless power transfer, and EH in general

- They require to implement a channel selection strategy during the association phase (no manual setting of the channels to be used)

- Compliancy with LoRaWAN needed – It is not clear if this requirement is still in the list (due to news about Semtech). However, UNIBO proposed to mount on tags on top of the SX1280 two protocols stack: LoRaWAN and LoRaIN and let them work in a time division fashion.

The following comments were provided by partners:

Konstantin Mikhaylov:

- Minimum set of functionalities that should work perfectly
- Association: it can be done via NFC
- Enabling FW update – do we want other interfaces, like NFC?
- Ok to have two protocols, not to be used at the same time at the beginning, but rather to reprogram devices over the air

Laurent Clavier: Eliminate functionalities is useless and it is a pity. If a functionality is not useful, it will be simply not used by the customer.

Konstantin Mikhaylov: Agrees on the fact that industry does not believe in WPT.

13.00 – 14.00: Lunch

14.00 – 15.30: Adj. Prof. Petri Ahokangas from Oulu Business School

(https://www.oulu.fi/oulubusinessschool/personnel/ahokangas-petri)

Chiara Buratti presented the IMMUNet systema and main aspects of the business plan.

Prof. Petri Ahokangas provided the following comments:

1. Check the Lean Canvas model, do not just focus on the Business Canvas. An example can be found here: https://www.startupgeeks.it/lean-model-canvas/

2. Create a Pitch (one for investors and one for customers):

   a. Problem statement

   b. Solution that we propose

   c. Competitive advantages provided in a quantified way (e.g. costs, reliability, energy consumption, everything should be quantified w.r.t. competitors). Why should the customer not use the edge/cloud 5G?

   d. Market to be addressed: 1) end users; 2) automation machine producers; 3) company doing maintenance services for automation machine.

   e. Check if the solution works - PoC

3. Our solution does not allow to put data measured on the cloud: most of the company do have different factories and they want the data (digital twin) to be shared among the different factories: consider the possibility to reach the cloud. This will be checked with the potential customers.

15.30 – 18.00: IMMUNet what's next? Startup Yes or Not – UniBo

The discussion about the startup creation initiated during the previous meeting was continued as follows:

1. Who would be on board among the IMMUNet partners?

   All partners are still potentially interested in taking part in the startup.

2. Resources needed to setup the startup.

   At the beginning it will be necessary to hire two full-time people:

   - One engineer, involved in the FW/SW development
   - One person (could be an engineer or not) in charge of management issues, managing the staff and the projects, together with the relationship / contact with the customers. This person should be the CEO.

   It has been discussed about the possibility to hire a software engineer, especially if we will decide that the IT system integration will be fundamental.

3. Shares / Funds:
- **CNIT** confirms the possibility to provide some funds (15 K euros possibly)
- **INSA**: INSA cannot invest on the company, but Guillaume can dedicate some time to the startup personally. Also the possibility to participate through another Institution will be investigated.
- **CTTC**: potential interest in participating as Institution, but not clear if CTTC can invest in this moment
- **UNIBO**: it is not very common that UNIBO shares with the company, but this is something that will be checked.
- **Konstantin Mikhaylov**: confirmed the interest to put some effort in the startup. The possibility that Uo-Oulu will invest on it will be checked.
- **Laurent Clavier**: one day per week to act as an expert for the startup. The possibility to have UoLille on board is still to be checked.

As for the HW partner a share in the range 35-55% will be defined, then depending on the amount of money the company will invest in the startup, the precise shares will be defined. In addition, IoT will be required to the HW partner to:
- Put a minimum of 50 000 euros to enter into the startup
- Sustain the costs for the HW design / redesign (in case of customization), together with the identification of components
- Sustain production line costs – to be checked in case the production implies many devices and the company must do it in outsourcing
- Design the cases of the devices

The following costs will be sustained by the entire startup:
- Cost of HW components
- Cost of certification

4. It has been decided to proceed with the PoC first, possibly via BI-REX, and then move on with the startup.
5. Select the name of the startup: UNIBO will start this task
6. Select a logo: UNIBO will work on it

11.30 – 12.30- Business Plan: Chapter 5 on "Financial Projection" – First draft discussion proposal and discussion – UoOulu

Konstantin Mikhaylov presented the Chapter and the costs proposed for the delivery project. A preliminary cost breakdown was proposed.

Carles Anton suggested to add a table with incomes and costs. The template will be provided.

Konstantin Mikhaylov: will add a preliminary version of the incomes/costs table, in collaboration with Guillaume Villemaud. Once the table is ready, we will decide whether to keep it in Chapter 5 or move it to Chapter 6.

Konstantin Mikhaylov: better clarified the renting and service provisioning in section 5.3.4.

Conclusions: we will mainly focus on the following products, which are delivery project and Integration/customization project. These two products will be detailed and relative costs and pricing will be provided. As for the additional products/services, which are R&D project and test case, licensing/sale of SW/IPRs and renting of equipment or service provisioning, less details will be given.

12.00- 13.00: Business Plan: Chapter 6 on "Roadmap and impact of money and time" – First draft discussion – INSA

Guillaume Villemaud presented the Chapter content.

The following comments/decisions have been taken:

- A list of planned operational steps to move form lab to market will be discussed in the next meeting, after the feedback from BI-REX and potential customers.
- It was decided to remove the risk analysis from this Chapter and to leave in Chapter 4.
- Sections 6.4 and 6.5 will be edited after the next meeting, after the feedback from BI-REX and potential customers.

13.00 – 14.30: Lunch

14.30 – 16.00: Pascal Poty, Belgium, Business Model

Chiara Buratti presented the project and the following comments have been gathered:

1. Value Proposition. These are the main points to focus on:
   a. Cheapest than 5G solutions (5G private network may have a cost of approx. 80.000 euros)
   b. Flexibility
   c. Low energy consumption
   d. Simplicity
2. Value proposition: think about focusing on time-to-use and data. Our solution to do focus on data currently
3. Customers: the suggestion is to focus more on automation machine end users rather than producers, since the latter are less prone to innovation
4. Integration is fundamental, the rule on integrators will be of outmost importance in future TLC systems. The suggestion is to add a key partner dealing with the integration activities, considering both, integration of HW and FW and integration with the IT system of the customers.
5. Main concerns: 1) Find clients via pilots; 2) Demonstrate the solution works. To fix these two issues, we have to setup some PoCs (possibly more than one), to show the system works and to attract customers.

Pascal Poty promised to let us know if there is the possibility to get access to some part of Gartner reports. In

addition, he will check the possibility to find a premise, where we can setup a PoC.

Konstantin Mikhaylov comments:

1. As far as the data is concerned, we should check with the customers if they are interested into a system that just provided row data, or if they would need also an application processing them (e.g., for predictive maintenance purposes).
2. UoOulu has access to Frost and Sullivan reports, so he will check if some useful reports are available and can be shared within IMMUNet.

16.00 – 16.30: Wrap up: Next steps and AOB – UNIBO

It was decided to have the next meeting on **June 14-15, 2021**.

This is the list of action points to be completed before the next meeting:

- UNIBO: proposes a frequency/SF strategy to be implemented during the initial association phase
- INSA: checks malfunctioning of the system and proceeds with energy consumption measurements, possibly including the new features (data aggregation and coding) to be added into the Business Plan / Pitch
- CTTC: shares the coding code with UNIBO
- Lille: works on data aggregation and on the setup of a small PoC in Lille
- UNIBO: contacts BI-REX
- UNIBO: contacts potential customers
- UoOulu: works on the second version of Chapter 5, including the table proposed by Carles (to be done in collaboration with INSA)
- INSA: works on the second version of Chapter 6
- UNIBO: starts discussion about the name and logo of the company

Objectives of the next meeting:

- Review the business plan according to advice gathered from potential customers
- Definition of the PoC
- Quantification of figures of merit of the pitch (costs, energy consumption, reliability, etc.)

16.30 – Close of the meeting