Partnership for International Research and Education
A Global Living Laboratory for Cyberinfrastructure Application Enablement

Bilateral Integration of EnTiMid & Social Network Outlets

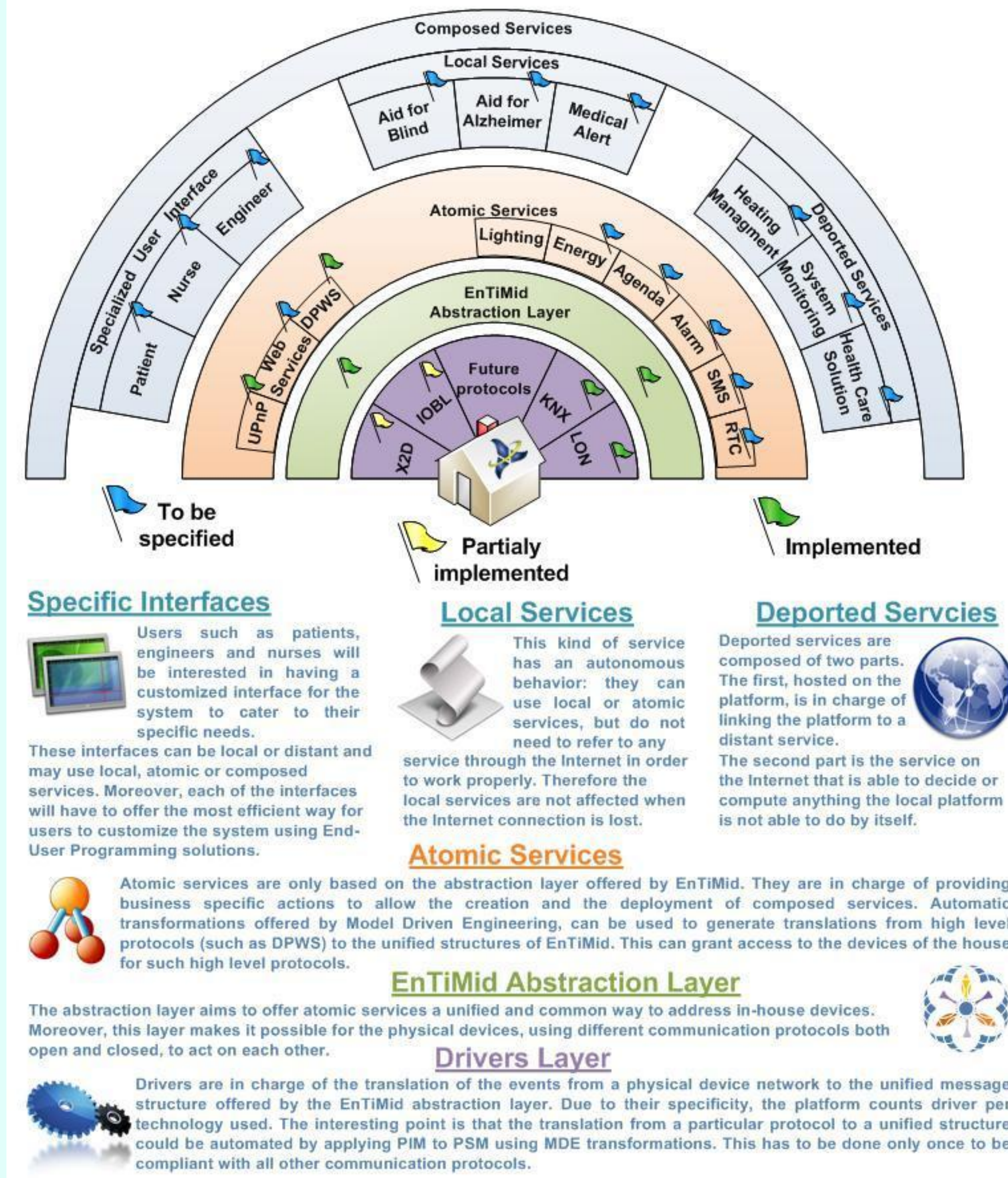**Student:** Luciano Araujo, MS, Florida Atlantic University
Research Advisor: Oge Marques, PhD, Florida Atlantic University
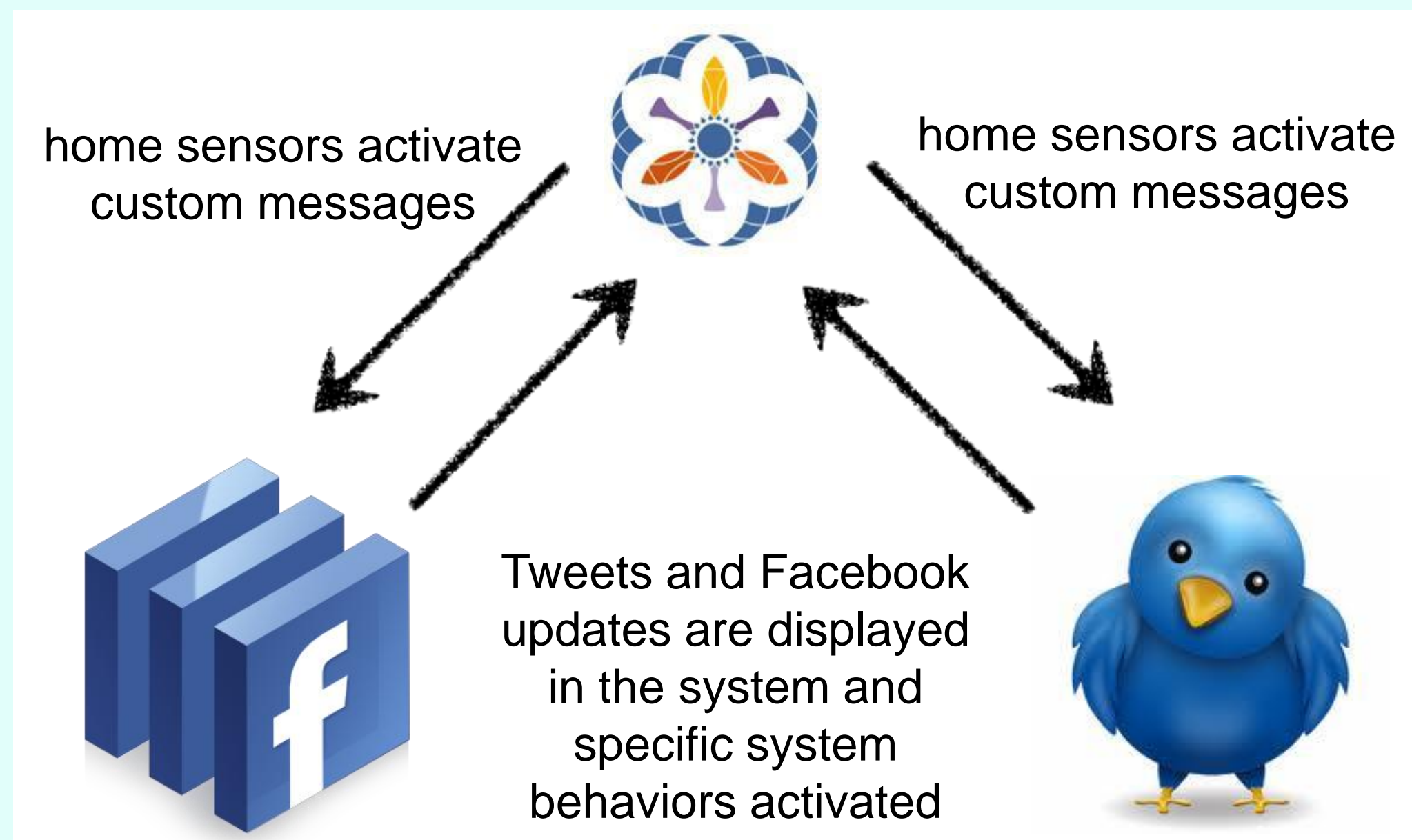**CI-PIRE Partner Advisor:** Jean-Mark Jezequel, PhD, Universite de Rennes 1, INRIA

NSF National Science Foundation

I. Research Overview and Outcome

What is EnTiMid?

EnTiMid
A service-based middleware for home appliances

Specific Interfaces
Users such as patients, engineers and nurses will be interested in having a customized interface for the system to cater to their specific needs.
These interfaces can be local or distant and may use local, atomic or composed services. Moreover, each of the interfaces will have to offer the most efficient way for users to customize the system using End-User Programming solutions.

Local Services
This kind of service has an autonomous behavior: they can use local or atomic services, but do not need to refer to any service through the Internet in order to work properly. Therefore the local services are not affected when the Internet connection is lost.

Deported Servcies
Deported services are composed of two parts. The first, hosted on the platform, is in charge of linking the platform to a distant service.
The second part is the service on the Internet that is able to decide or compute anything the local platform is not able to do by itself.

Atomic Services
Atomic services are only based on the abstraction layer offered by EnTiMid. They are in charge of providing business specific actions to allow the creation and the deployment of composed services. Automatic transformations offered by Model Driven Engineering, can be used to generate translations from high level protocols (such as DPWS) to the unified structures of EnTiMid. This can grant access to the devices of the house for such high level protocols.

EnTiMid Abstraction Layer
The abstraction layer aims to offer atomic services a unified and common way to address in-house devices. Moreover, this layer makes it possible for the physical devices, using different communication protocols both open and closed, to act on each other.

Drivers Layer
Drivers are in charge of the translation of the events from a physical device network to the unified message structure offered by the EnTiMid abstraction layer. Due to their specificity, the platform counts driver per technology used. The interesting point is that the translation from a particular protocol to a unified structure could be automated by applying PIM to PSM using MDE transformations. This has to be done only once to be compliant with all other communication protocols.

Work Performed

With increasing adoption of social networks as a communication avenue, comes the demand for applications to integrate and leverage the viral proliferation and extremely convenient information delivery mechanisms. The goal of this project was to connect EnTiMid to social networks such as Tweeter, MSN, Facebook, etc. using generative approaches (based on Kermeta) for their auto configuration. They were established to be both ways: from the home sensors to the social networks to publish events (such as health or mood status), as well as from the social networks to home actuators (voice messages translating some tweet or Facebook wall post).

home sensors activate custom messages — home sensors activate custom messages

Tweets and Facebook updates are displayed in the system and specific system behaviors activated

Research Roadmap
The research work was executed in the following manner:
1. A comprehensive study of the system's features and limitations (including the underlying technology, Kermeta) was done to assist in the integration planning and design.
2. Integration with social media outlets was designed and architected to fulfill requirements.
3. Actual development in Java was performed to deliver the integration to Facebook and Twitter APIs.
4. Testing and quality control was conducted to assure the successful execution of the integration.

Results & Impact

Industrials, associations and public institutions of the metropolis of Rennes, are working together on EnTiMid to allow dependent people to stay at home without assistance as long as possible. The technologies used in each house vary, however with the abstraction layer over all these devices and technologies, EnTiMid forms a multi-facet middleware. Such application when connected to some of the most popular social networks in the world can leverage the benefits of connectivity and social awareness to the elder, handicapped, and sick people alike.

Real World Scenarios

An elder person receives a visit from a nurse at home. Through EnTiMid this event triggers a Facebook update which lets all of the elder person's connections (family members and friends) know that a nurse is currently at the house.
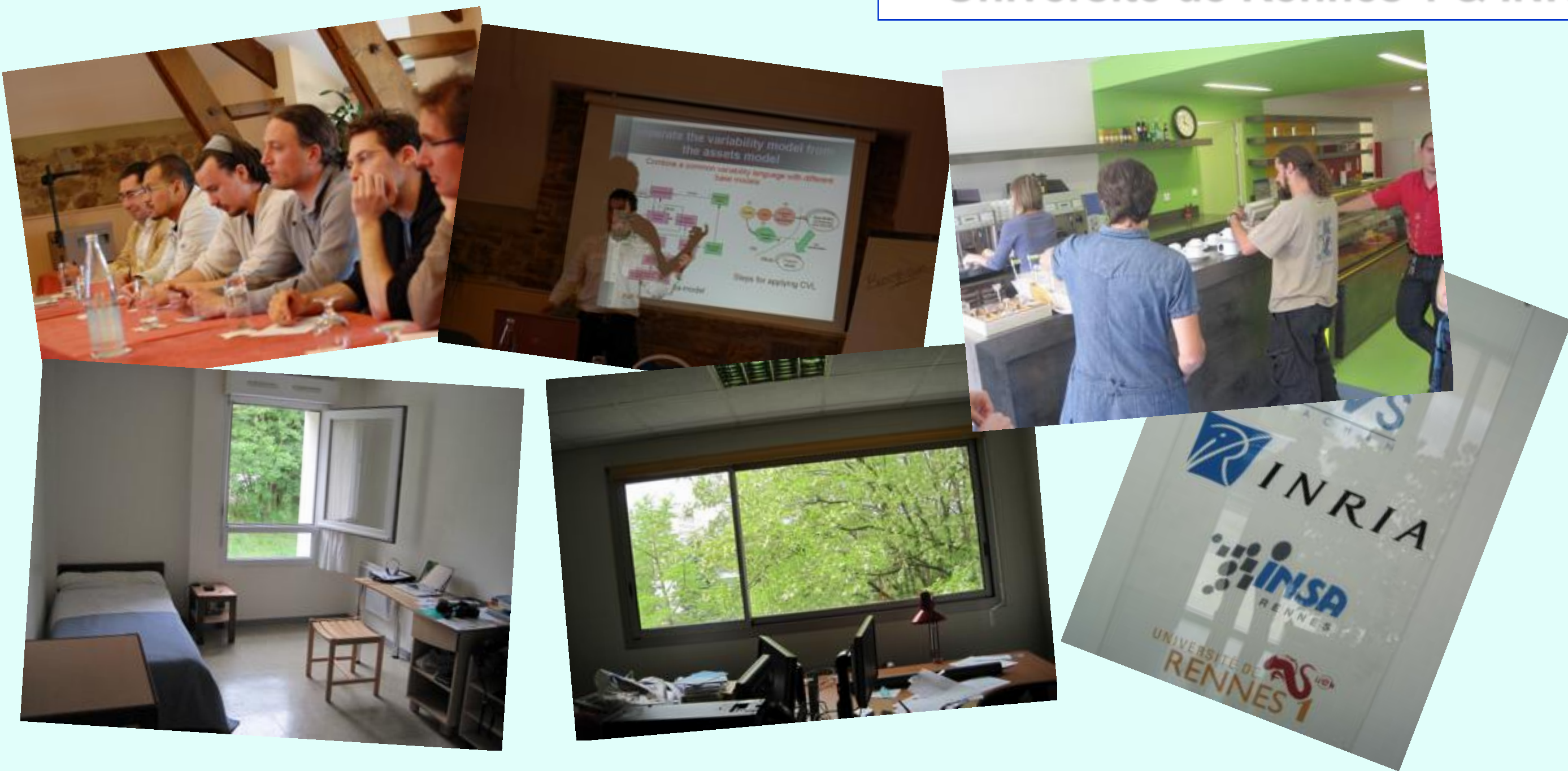
The EnTiMid system can have a listener linked to a Twitter account which enables every incoming tweet to be intercepted and ran though a text to speech engine and played in the house.

Career Impact

During my stay at INRIA Rennes, I had the opportunity to meet and interact with top engineers and researches from all over the world. This led me to begin a collaboration effort with two other researchers to build a software system with heavy commercial appeal. The system is currently at the prototype stage and financial funding for full development is being arranged.

II. International Experience

Universite de Rennes 1 & INRIA

Perhaps one of the things that impressed me the most during this experience were the installations of the INRIA research center at the Universite de Rennes 1. The building is environmentally friendly with plenty of sunlight and intelligent sensors to save energy. The facility houses around three hundred Researches, Engineers, Faculty members, and Masters and PhD students from all over the world. The building also has numerous meeting rooms and an auditorium as well as a very well equipped cafeteria lounge to promote a social scene among students. My studio was located within a short walk from the building right across from the university. With plenty of space, sunlight and an efficiency kitchen, my housing arrangement made my stay very convenient and pleasant.

City of Rennes, France

The small but active city of Rennes is the capital of Bretagne and it is located 190 miles west of Paris. This city provides the perfect setting to experience the French culture at its finest. Rennes has a state of the art transportation system, vibrant music and art festivals, a wide variety of bars and restaurants, and a large population of students. The city has two main college campuses, Universite de Rennes 1 and 2, as well as other smaller specialty universities such as Agro Campus which focuses on Agriculture. During the long summer days, one can take a bus to either the north coast or the Atlantic coast to enjoy a day at the beach. Rennes has a small airport and a TGV station which makes it very convenient to travel around France and Europe while stationed in this charming French gem.

Travels Around France

| Tour Eifell | Wine Region of Bordeaux | Place de la Bourse, Bordeaux | Sunflowers, SW France | La Plage, Nice | Arch de Triumph, Paris |

III. Acknowledgement