Design and Implementation of an Integrated System for Optimizing Bait Sprays Against Dacus Oleae by Using Embedded Devices and ICT Technologies

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Contents

Introduction

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The Problem

The **on-time/valid** dacus population estimation and the **ensurance** of proper bait spraying application.

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- Is also the biggest extra virgin olive-oil exporter,
- Annual national gross incomes, exceed 1.6 billion €

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Olive oil Production Enemy

Dacus - *Bactrocera oleae* - causes enormous damages to olive-oil production (more than 30%) to all countries in the Mediterranean basin.

Protection Against Dacus Oleae Today

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- Weekly-based monitoring of dacus population by authorized personnel

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- Weekly-based monitoring of dacus population by authorized personnel
- Bait sprays drawbacks:
  1. Incorrect sprayed quantity
  2. Spraying of a rather larger - than required - tree area
  3. Chemical burden of the wider ecosystem
  4. Inadequate safety and/or protection measures

The Proposed Solution

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- Development of a web-based application offering real-time respresentation, monitoring and decision making

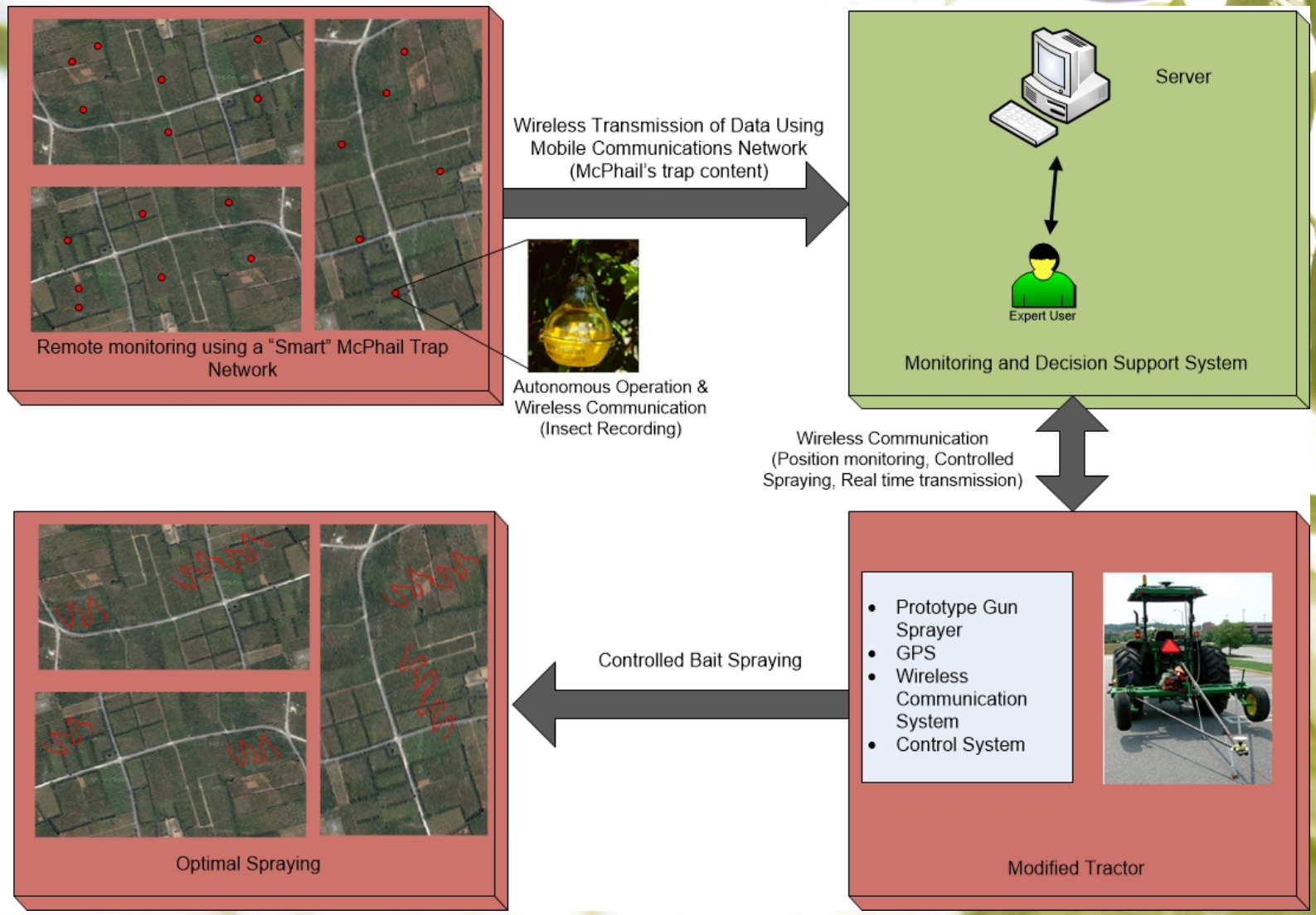

Figure: Schematic representation of the prosposed solution.

The Research Team

- TEI of Crete
- N.AG.RE.F
- Tecnical University of Crete
- Denver University

Expected Results

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The effectiveness of the proposed system will be assessed by:

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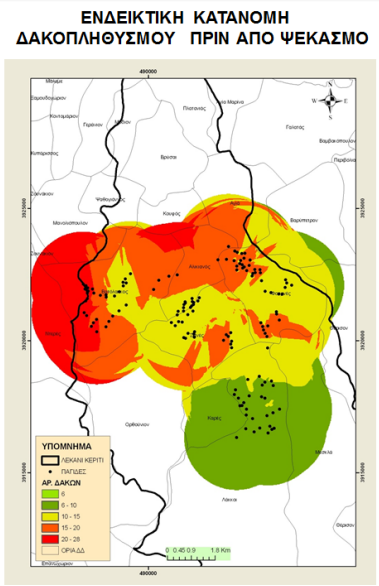
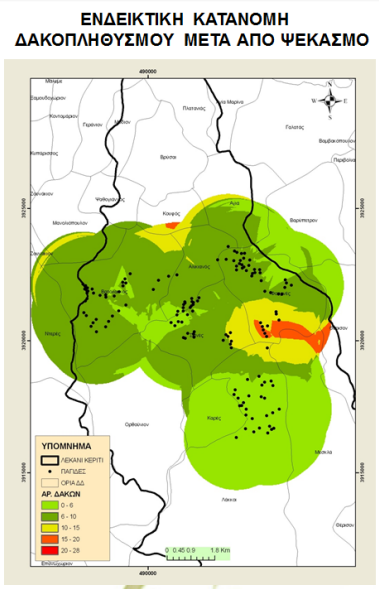
Evaluation of the Proposed System

The effectiveness of the proposed system will be assessed by:

- Monitoring of both the dacus population and the crop
- Olive-oil qualitative analysis in terms of:
  - Acidity
  - Superoxides
  - K232
  - K270, according to 2568/1991 E.C. regulation
  - Total phainols

Papafilippaki *et al.* 2007
Dacus population representation on digital maps:





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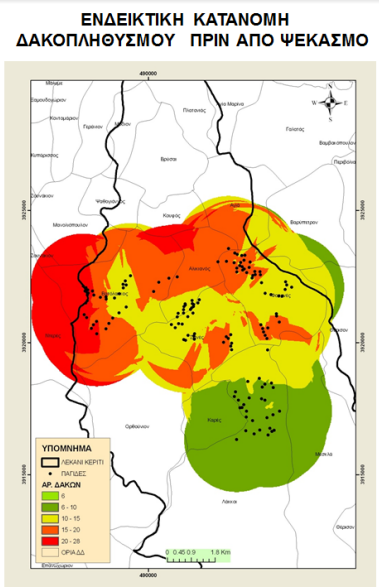
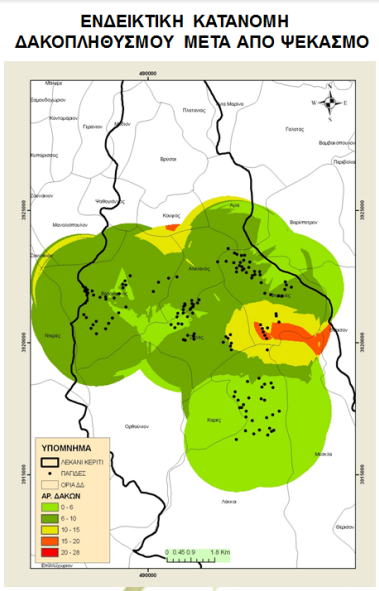
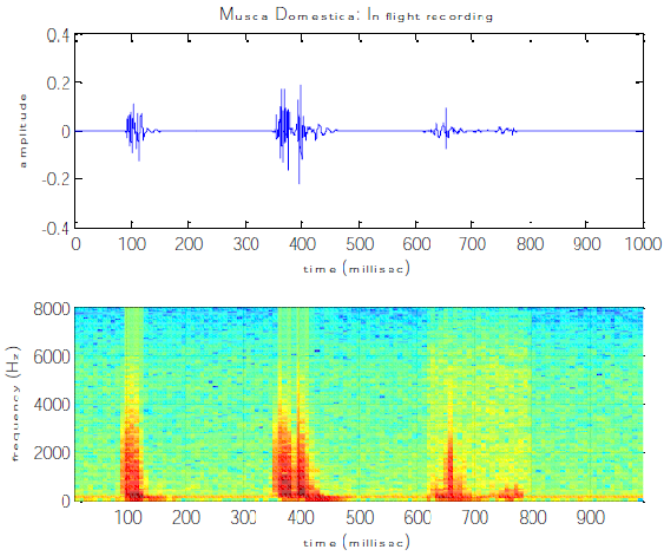
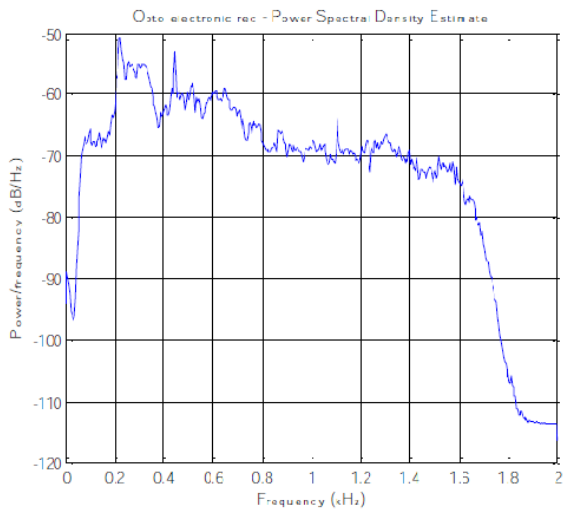




Potamitis *et al.* 2014
Dacus recognition via spectral methods:





The Smart McPhail Trap

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PCB Camera


GSM

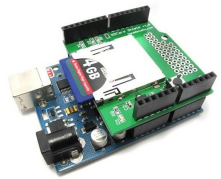

SD Card


FTP Server

The Smart McPhail Trap

PCB Camera

GSM



SD Card

FTP Server

Micro-Controller

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Created by Paint X

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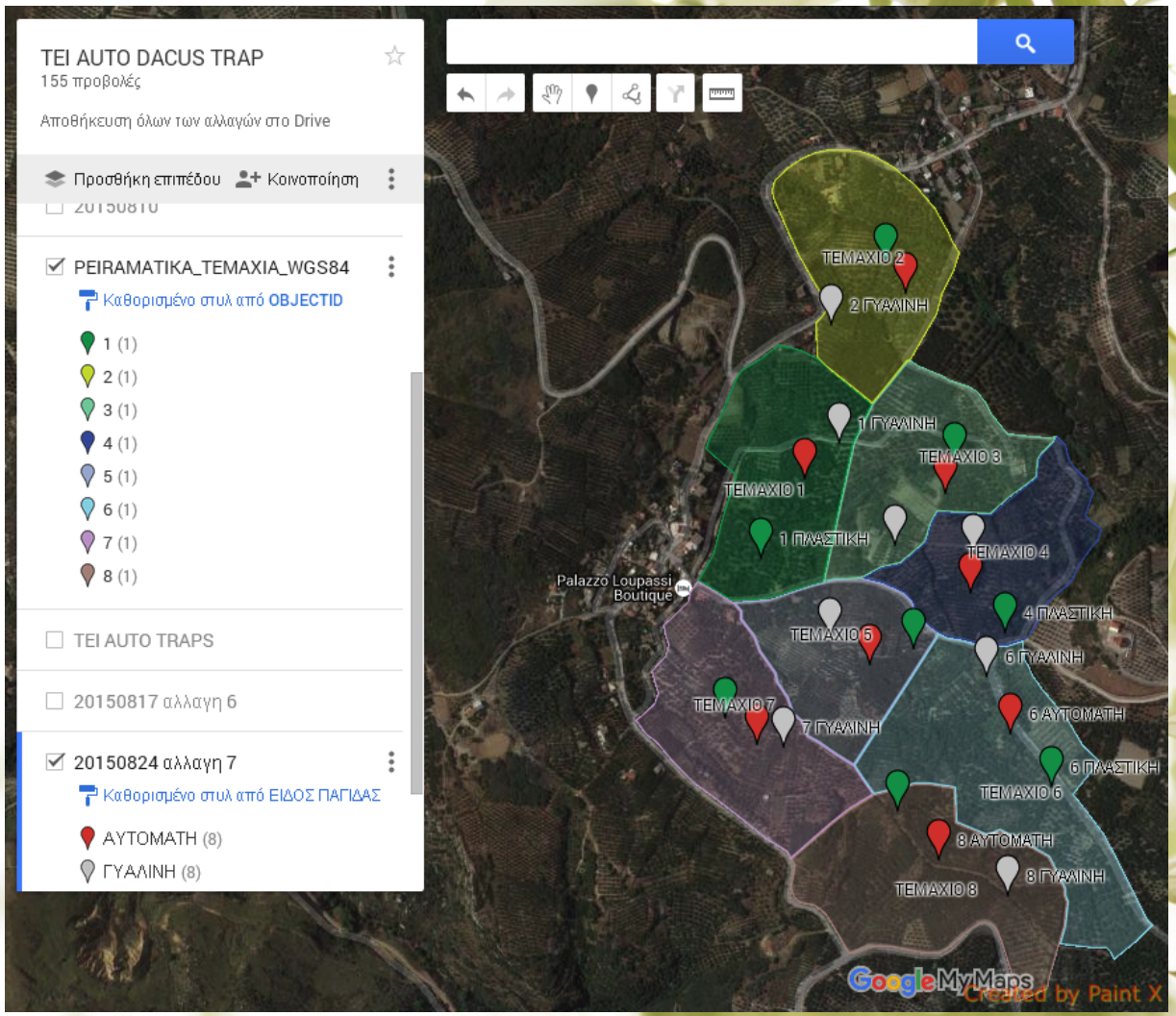
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Αποθήκευση όλων των αλλαγών στο Drive
Προσθήκη επιπέδου
Κοινοποίηση
PEIRAMATIKA_TEMAXIA_WGS84
Καθορισμένο στυλ από OBJECTID
1 (1)
2 (1)
3 (1)
4 (1)
5 (1)
6 (1)
7 (1)
8 (1)
TEI AUTO TRAPS
20150817 αλλαγη 6
20150824 αλλαγη 7
Καθορισμένο στυλ από ΕΙΔΟΣ ΠΑΓΙΔΑΣ
ΑΥΤΟΜΑΤΗ (8)
ΓΥΑΛΙΝΗ (8)
ΤΕΜΑΧΙΟ 2
2 ΓΥΑΛΙΝΗ
1 ΓΥΑΛΙΝΗ
ΤΕΜΑΧΙΟ 3
ΤΕΜΑΧΙΟ 1
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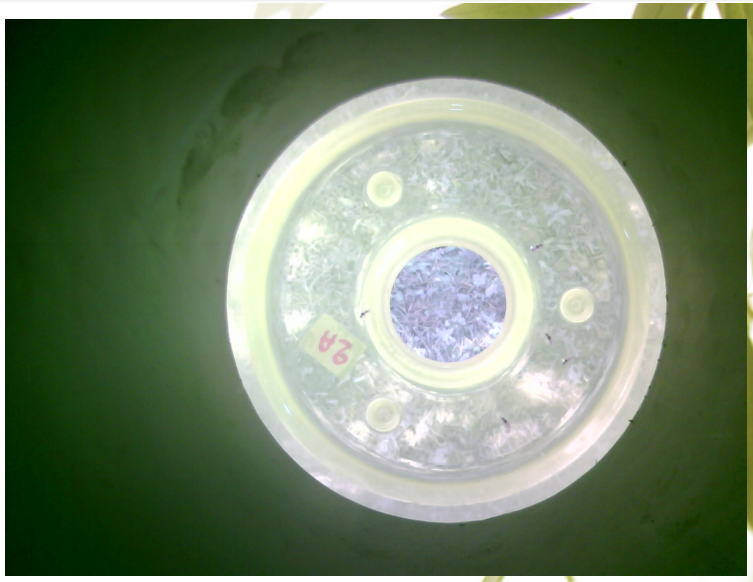
ΤΕΜΑΧΙΟ 4
Palazzo Loupassi Boutique
4 ΠΛΑΣΤΙΚΗ
ΤΕΜΑΧΙΟ 5
6 ΓΥΑΛΙΝΗ
ΤΕΜΑΧΙΟ 7
7 ΓΥΑΛΙΝΗ
6 ΑΥΤΟΜΑΤΗ
6 ΠΛΑΣΤΙΚΗ
ΤΕΜΑΧΙΟ 6
8 ΑΥΤΟΜΑΤΗ
8 ΓΥΑΛΙΝΗ
ΤΕΜΑΧΙΟ 8
Google MyMaps
Created by Paint X


4A


4A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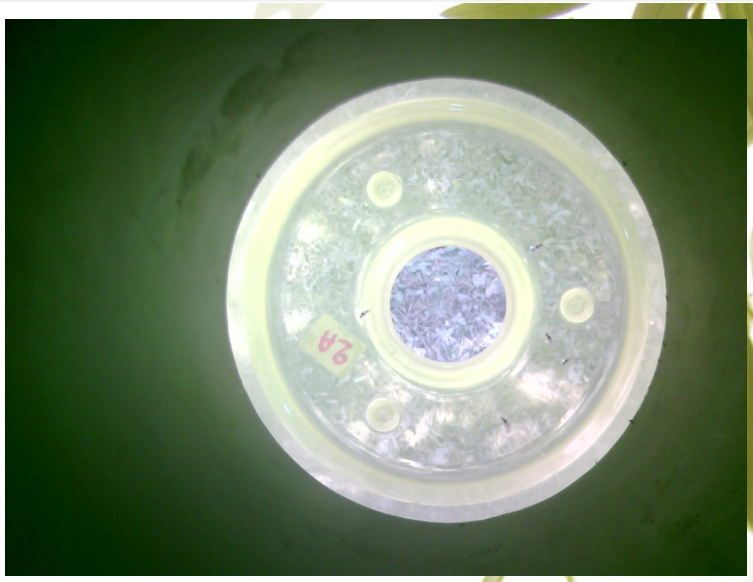
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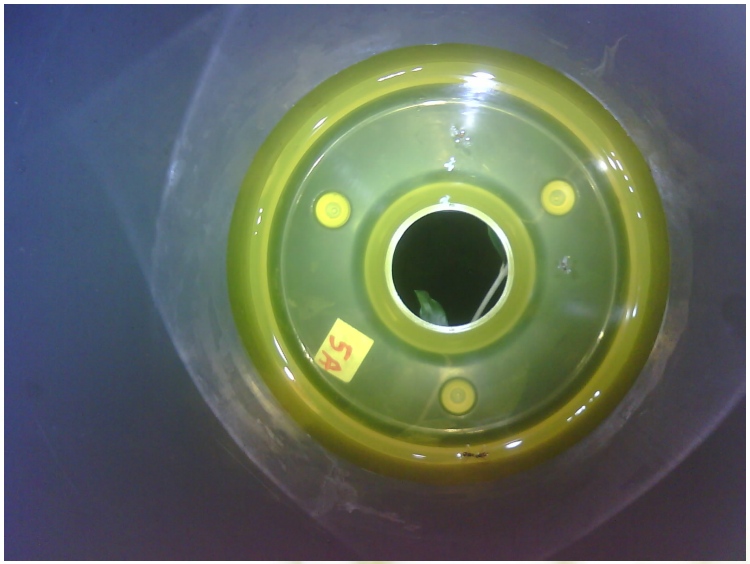
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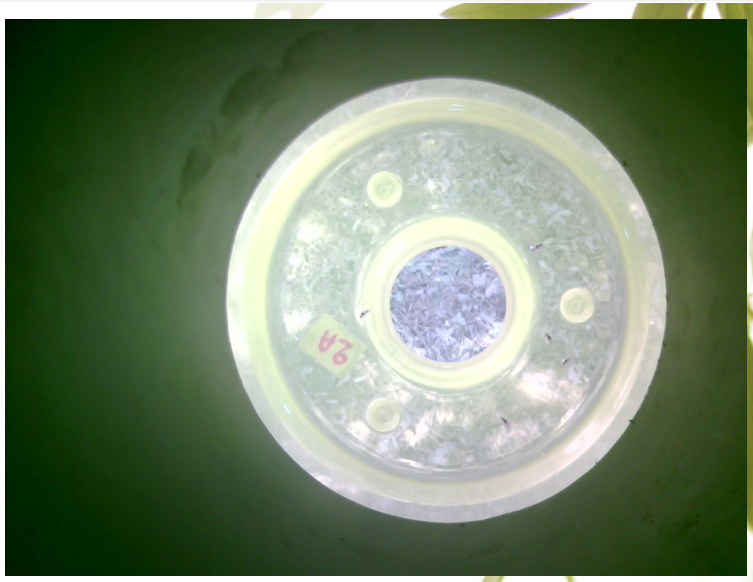
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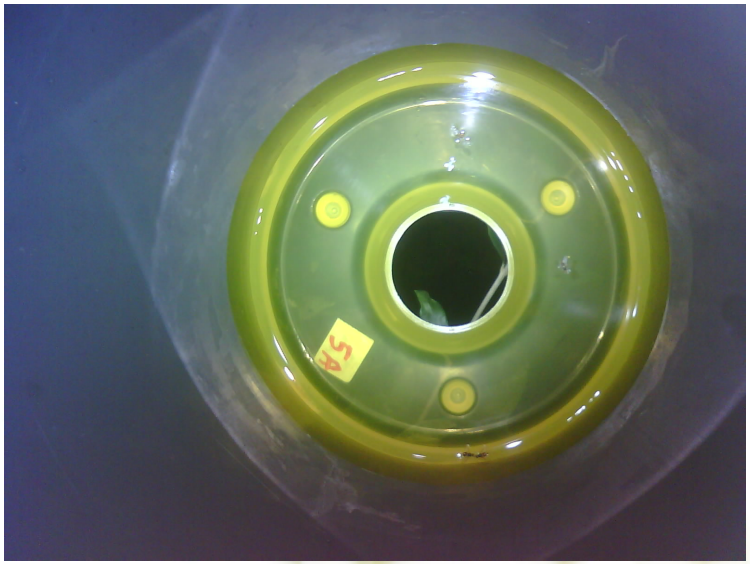
5A


3A

The Spraying System

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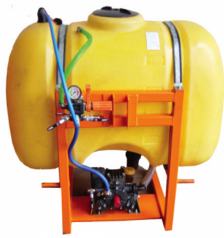

The Spraying System

Switch

Electro-Valve

Flow-meter

Tank

Pump

Pressure-Controller

Injector

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Micro-Controller


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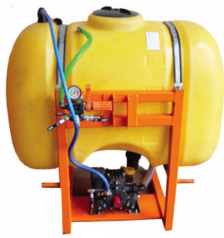
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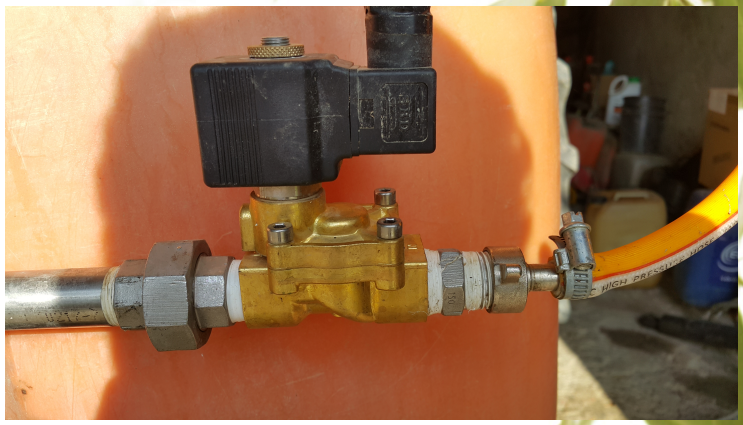

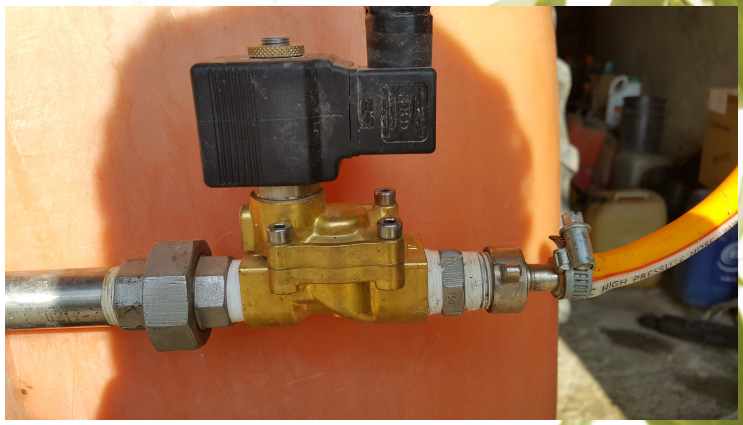

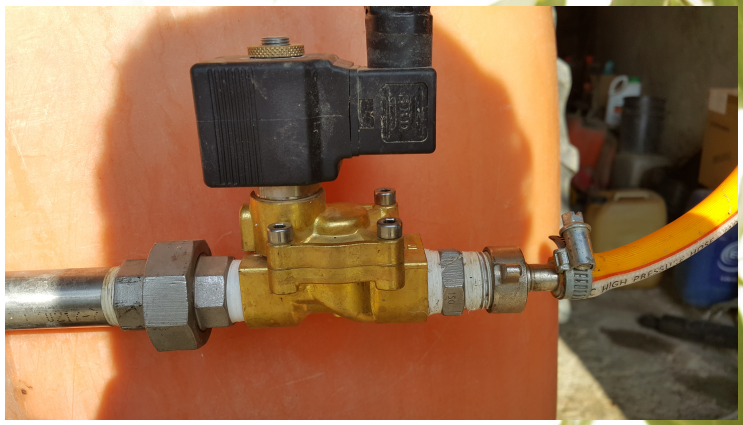

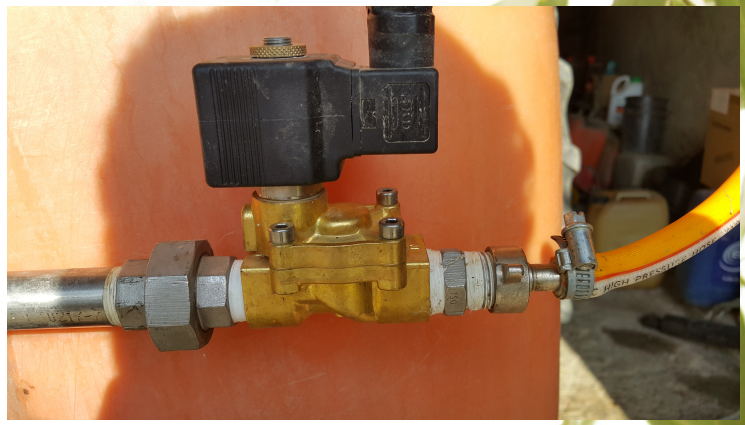

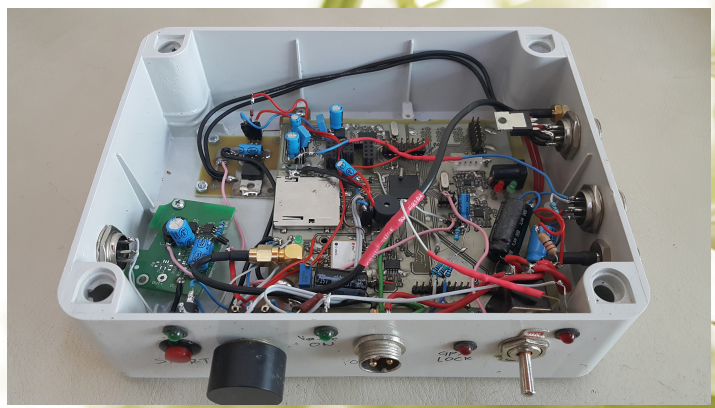

The Web Platform

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Its main advantage is the on-line representation of all the available information on a properly modified digital map:

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http://edakos.chania.teicrete.gr

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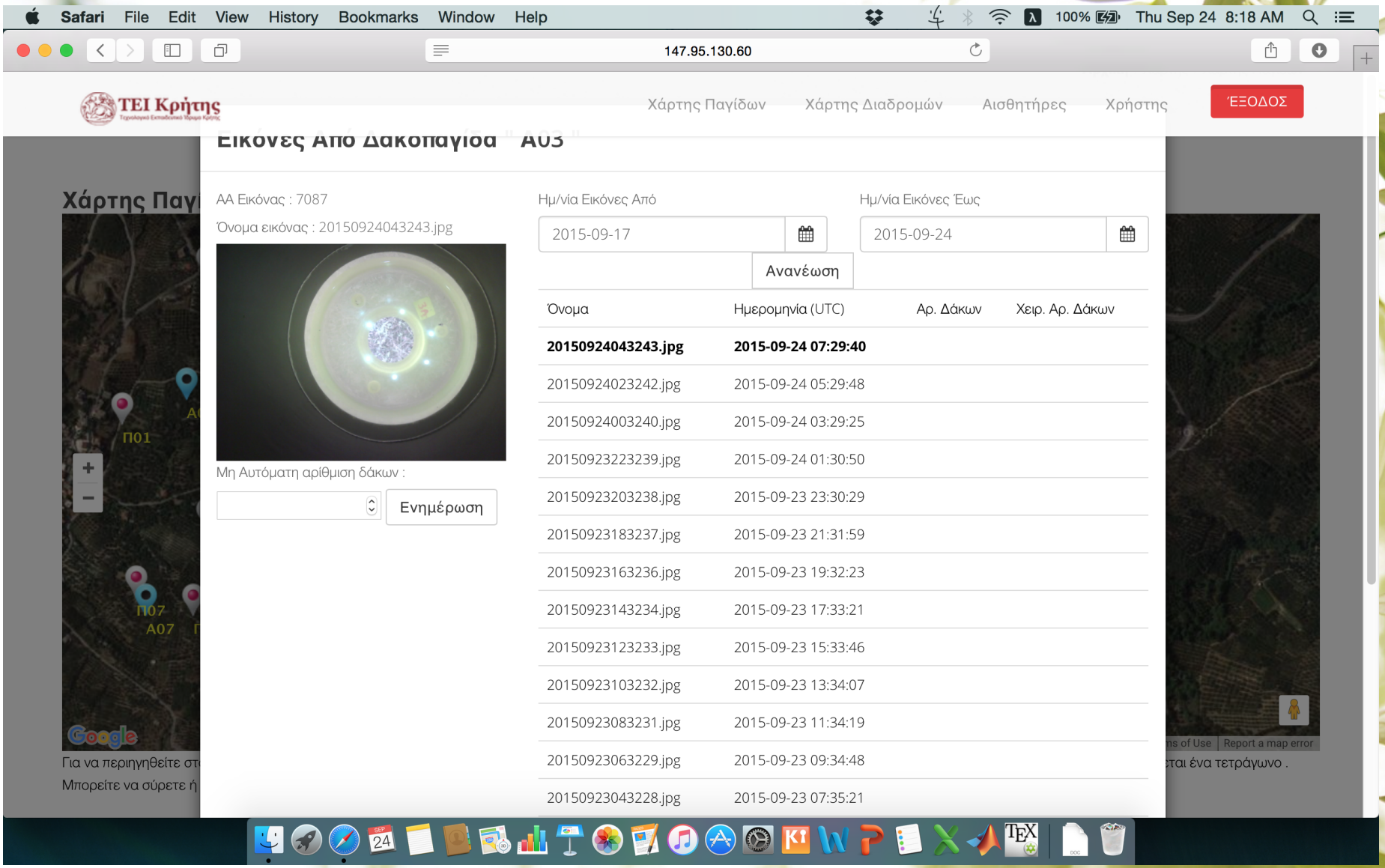
- McPhail content images
- Spraying details

http://edakos.chania.teicrete.gr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Χάρτης Διαδρομών
Αισθητήρες
Χρήστης
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2015-09-17
Ημ/νία Εικόνες Έως
2015-09-24
Ανανέωση
Όνομα
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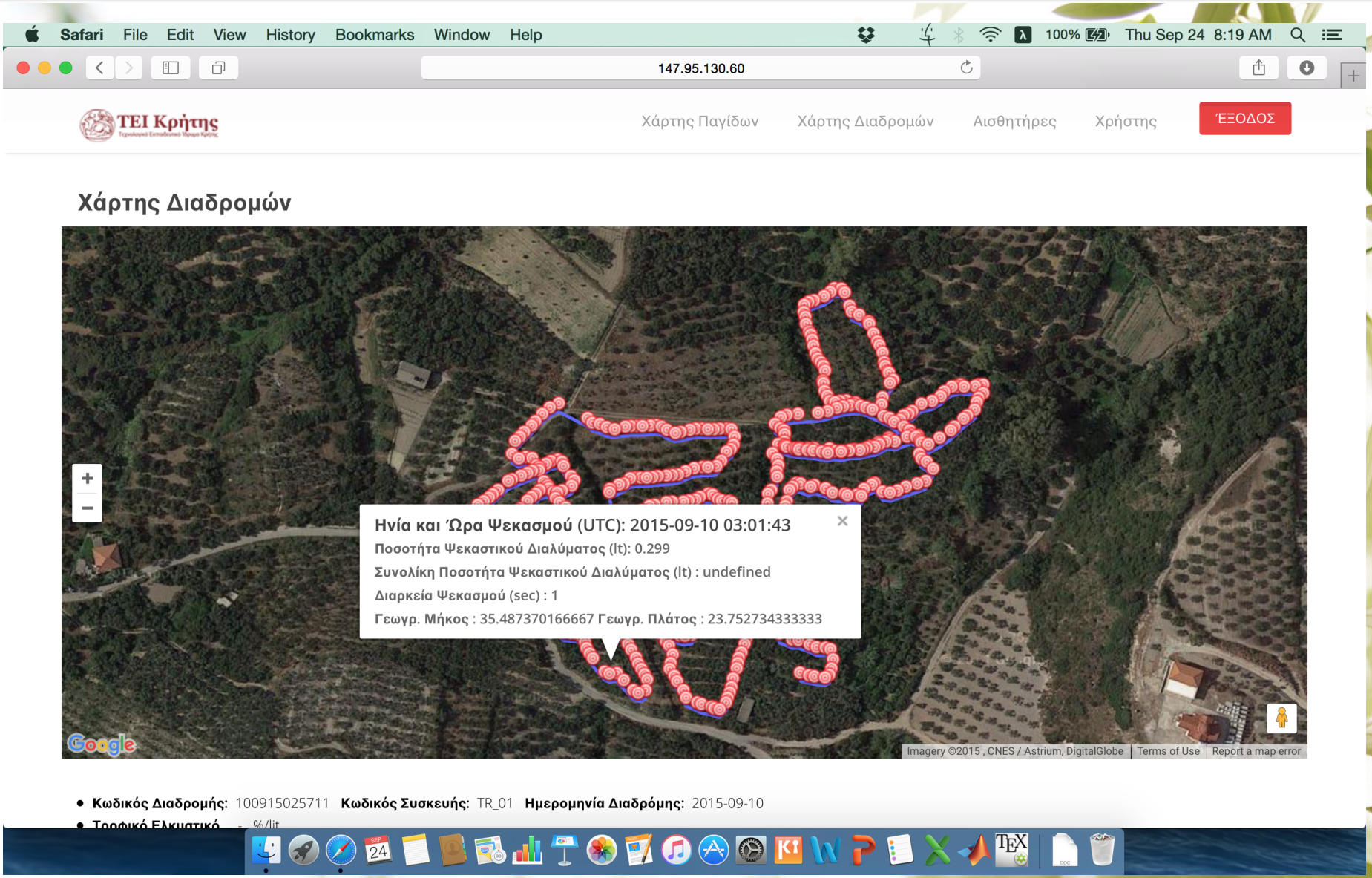
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Αισθητήρες
Χρήστης
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Conclusions

Concluding Remarks

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- Project results are expected to formulate the basis for studying various technological problems related with precision agriculture
- The developed know-how and expertise will be also used for educational purposes and to any interested operator.

Selected Publications

Selected Publications

- Fouskitakis *et al.* Development of an Integrated System for the Optimization of Bait Sprays Against Dacus via Modern Automation Techniques, *16th National Entomological Conference*, 20-23 October, Heraklion, Crete, Greece, 2015.

- Fouskitakis *et al.* Design and Implementation of an Integrated System for Optimizing Bait Sprays Against Dacus Oleae by Using Embedded Devices and ICT Technologies, *International Symposium on Ambient Intelligence and Embedded Systems*, 24 - 26 September, Oostende, Belgium, 2015.

- Rigakis *et al.* Design and Developement of an Embedded Sytem for the Implementation of a Novel McPhail Trap, *International Symposium on Ambient Intelligence and Embedded Systems*, 24 - 26 September, Oostende, Belgium, 2015.

Future Research & Actions

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- Development of a mobile application for smartphones
- System certification & promotion

Acknowledgements

The Research team would like to thank:

- The European Union and Greece for funding

European Union
European Social Fund

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MINISTRY OF EDUCATION & RELIGIOUS AFFAIRS
MANAGING AUTHORITY

NSRF 2007-2013
programme for development
EUROPEAN SOCIAL FUND

Co-financed by Greece and the European Union

Ειδικός Λογαριασμός Ε.Λ.Κ.Ε.
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BASF
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vodafone

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- Mr. Andreas Kouletakis, Physisist - Olive-tree grower

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MANAGING AUTHORITY

NSRF 2007-2013
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Thank you very much for your attention !