



# Integrated auto-ID technology for multidisciplinary undergrad. studies

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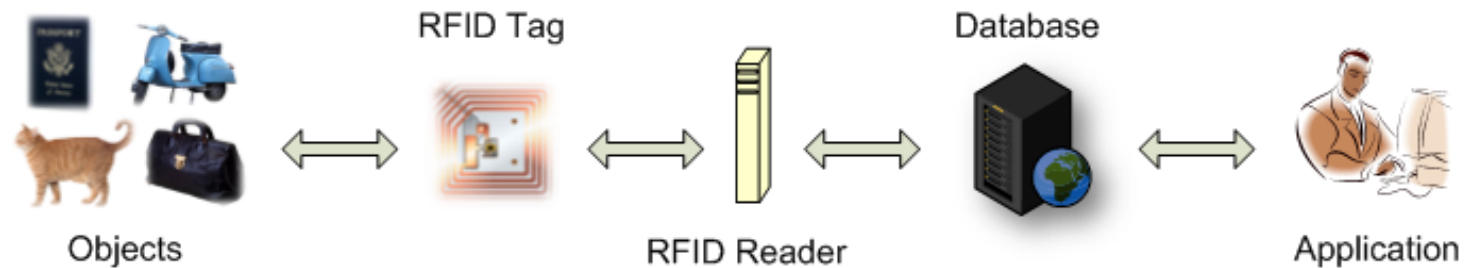
# IATMUS

- Integrated auto-ID technology for multidisciplinary undergraduate studies (IATMUS)
- CCLI phase 1 (exploratory)
- PhD student is Nabil Lehlou (**BSCS**)
- Expires Jan 31, 2009
- <http://uark.edu/ua/iatmus>

# Motivation

- Laboratories are important to student learning
- Large student groups do not have access to high tech equipment
- Knowledge gap between academic education and industrial practice
- For example take the technology of radio frequency identification (RFID)
- Provide an online, remote controlled RFID lab

# RFID technology

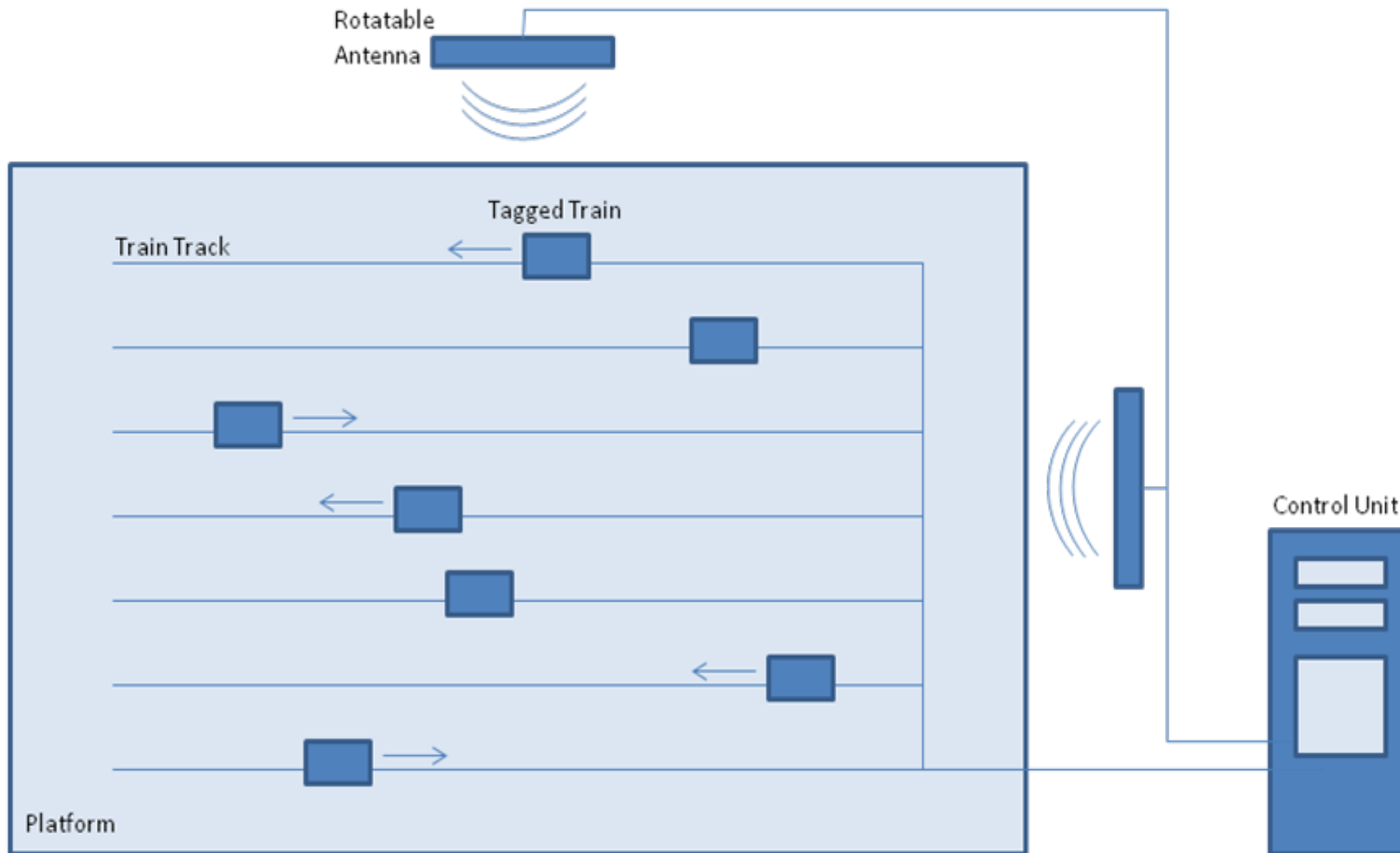


Tags can be read at a distance and carry a relatively large amount of information

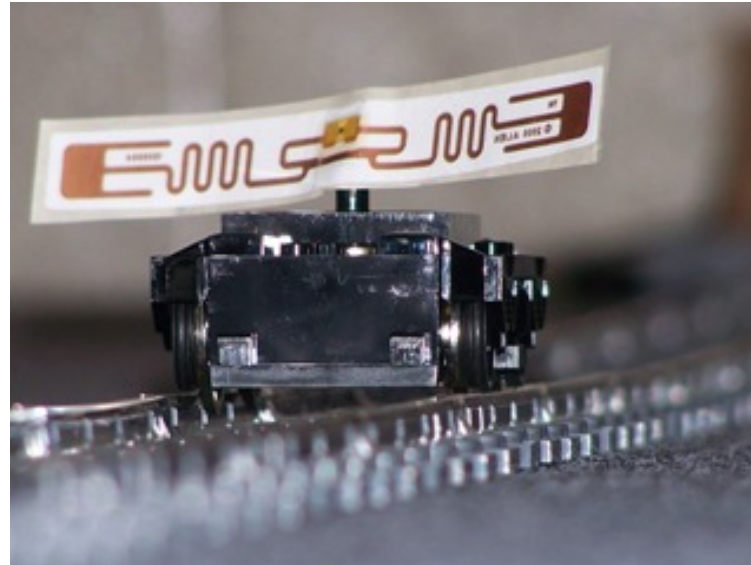
# Objectives

- Build a new learning environment
  - Remotely accessible (webpage)
  - Enhanced by teaching modules (*e.g.* Statistics)
  - Linked to a testing system (hands on experience)
- RFID testing system
  - Controllable hardware (moving devices)
  - Controllable software (RFID readers, databases)
  - High level of automation (programmable)

# Laboratory setup



# Setup continued



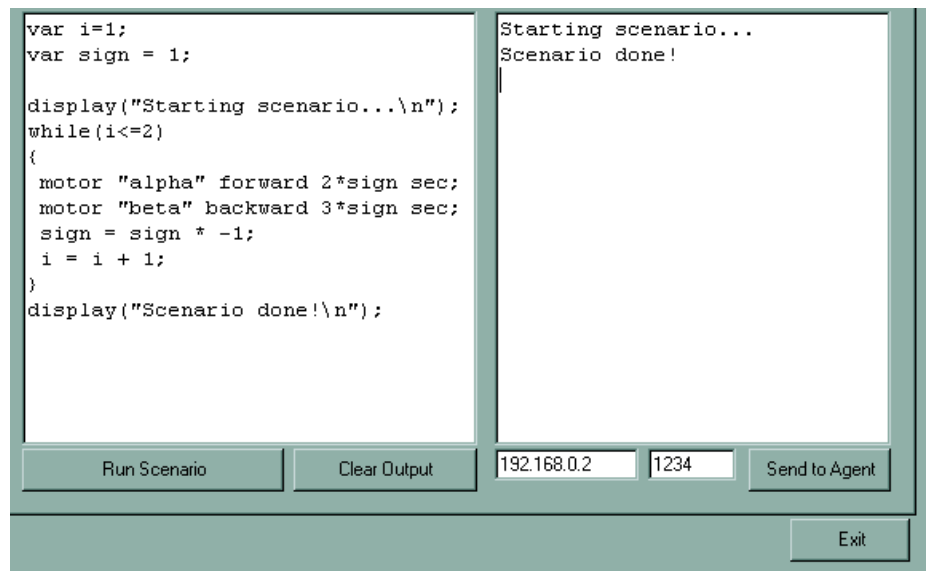
- 16 lanes separated by one foot on each side
- 16 tagged (LEGO) engines linked to controller

# Online access



# New programming language (NBL)

- Executes scenarios of hardware commands
- Performs computational tasks
- Eases system debugging



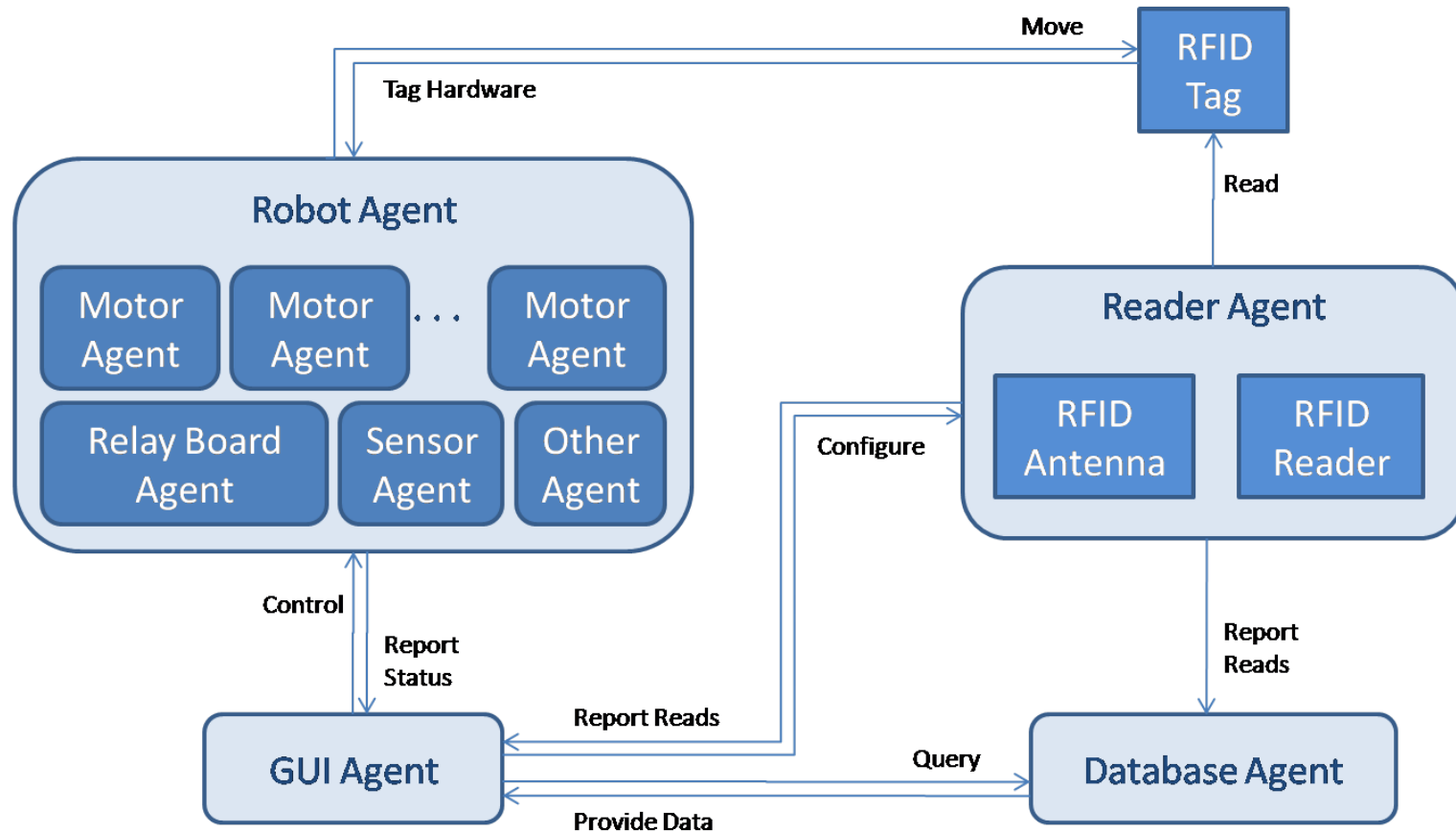
# Everything is alive

- EIA is an agent based architecture
- Every object is wrapped with computational processes called agents
- Each agent is connected to a network called the 'internet of things'
- Agents exchange messages over this network in order to communicate

# EIA leads to

- Decentralized system of agents → flexibility → **less expensive renovation**
- Common language among agents → **standard communication**
- Direct interaction of otherwise independent agents → no need for human interference → **automation**

# RFID system architecture



# Applied student benefits

- Identify strengths and limitations of RFID technology in a laboratory environment
- Devise an experimental approach (design)
- Learn data collection, storage, management
- Find good statistical models of results (analysis)
- Understand varied success of system outcomes (*e.g.* angle, distance, tag)

# Added features

- Relevant articles and links
- NBL tutorials
  - Teach what is ‘behind the scenes,’ and
  - Train more sophisticated users
- Browse results, analysis and discussion added by previous users
- User should leave a mark → dynamic evidence of a growing ‘community of scholars (NSF)’

# ASEE Annual Conference proceedings

- Integrated auto-ID technology for multidisciplinary undergraduate studies (Buyurgan *et al.* 2008)
- An EIA approach to support a laboratory learning environment (Lehlou *et al.* 2008)

# Statement and disclaimer

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