

BUILDING AN  
AFFECT-SENSITIVE  
PEDAGOGICAL AGENT

ANDALLAZA | JIMENEZ

# EMBODIED CONVERSATIONAL AGENT

Computer interfaces capable of interacting with human users in a manner similar to typical face-to-face conversation

(Cassel et al.)

# INTELLIGENT TUTORING SYSTEM

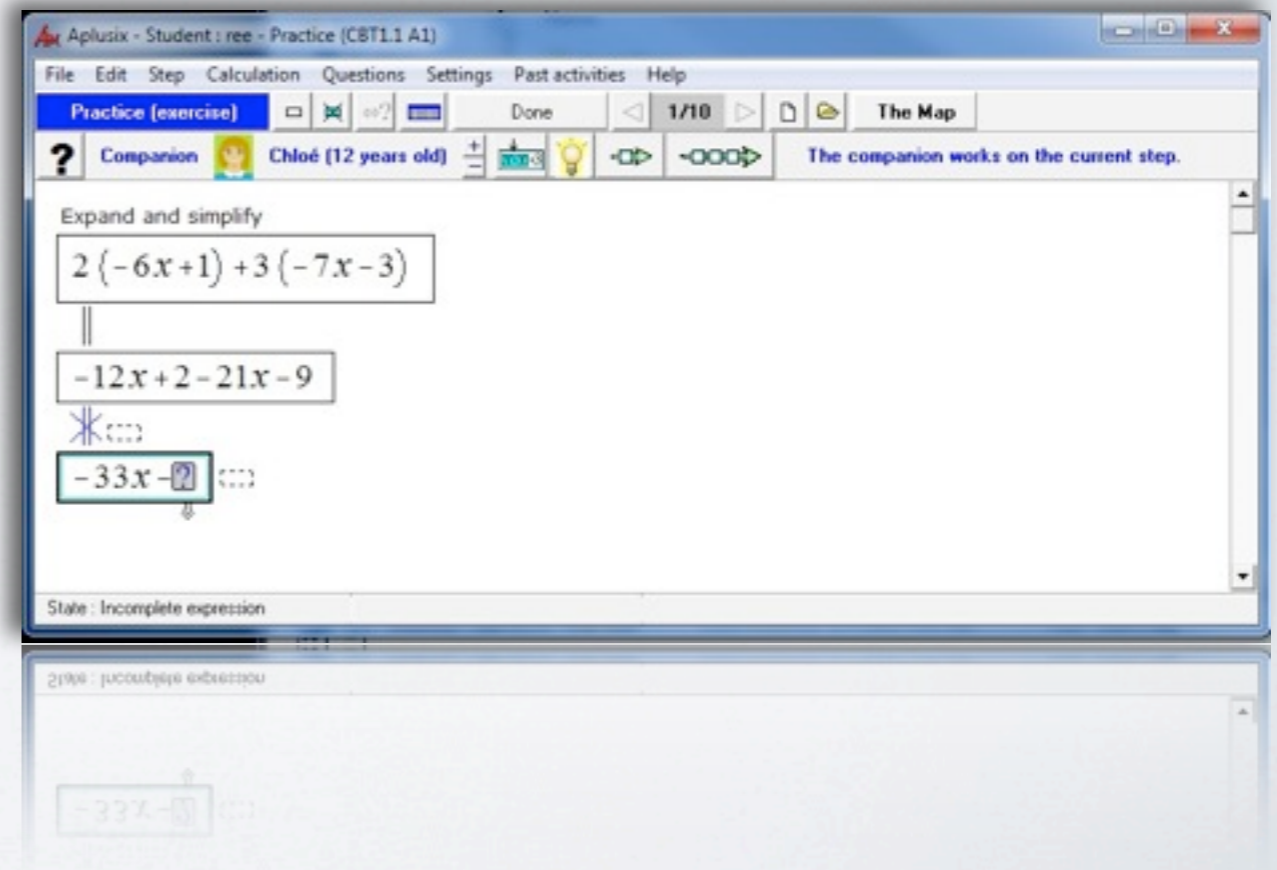
A computer program that makes use of artificial intelligence to provide learners with individualized instruction

# APLUSIX

- An ITS that aims to teach learners arithmetic and algebra
- Text editor allows students to solve items step-by-step

# APLUSIX

- An ITS that aims to teach learners arithmetic and algebra
- Text editor allows students to solve items step-by-step



The screenshot displays the Aplusix software interface. The window title is "Aplusix - Student : ree - Practice (CBT1.1 A1)". The menu bar includes "File", "Edit", "Step", "Calculation", "Questions", "Settings", "Past activities", and "Help". The toolbar contains icons for "Practice (exercise)", "Done", "1/10", and "The Map". A "Companion" section shows a user profile for "Chloé (12 years old)" and a message: "The companion works on the current step." The main workspace contains the instruction "Expand and simplify" followed by the expression  $2(-6x+1) + 3(-7x-3)$ . Below this, the intermediate result  $-12x+2-21x-9$  is shown, followed by a multiplication symbol and the final result  $-33x-7$ . The status bar at the bottom indicates "State : Incomplete expression".

# OBJECTIVES

- To have a significant influence in enhancing the learning experience of students when using an ITS such as Aplusix
- To determine what considerations will be needed in order to design, implement, develop, and test a motivational agent that can interact with the student on a real time basis

# SIGNIFICANCE

- To contribute to machine emotional learning and apply it in the creation of an ECA to work with an environment such as Aplusix
- To pursue and integrate tools such as interface design, probabilistic learning, artificial intelligence reasoning and others in designing an affective agent

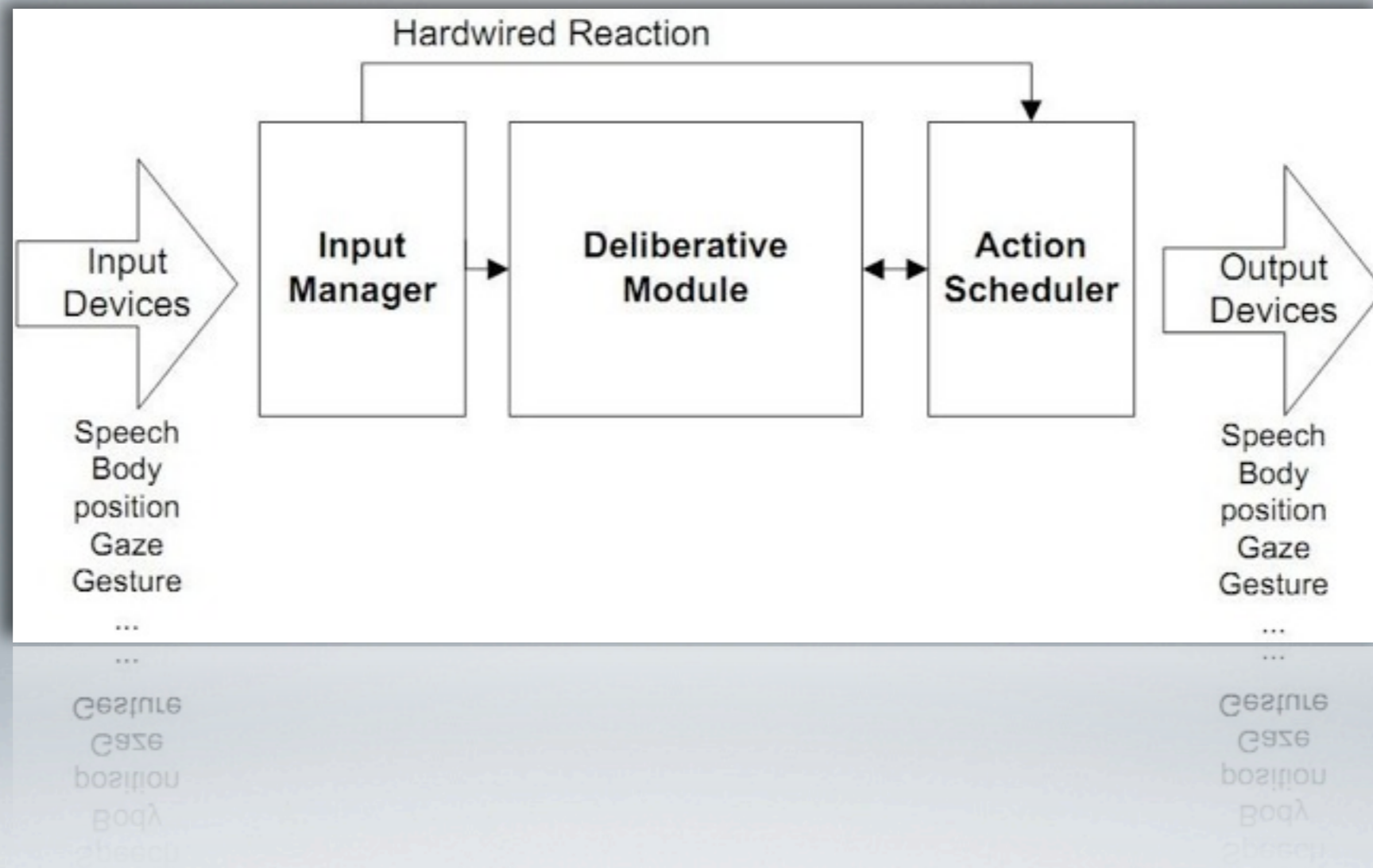
# PREVIOUS WORK WITH APLUSIX

- Affect and Learning (Lagud)
  - Relation of learning models to the affective profiles of students
- Detection of Off-task Behavior (Bate)
  - Creation of models that determine when a student goes off-task
- ECA Design (Lim)
  - Pilot study of creating the agent
  - “Wizard-of-Oz” mechanism



# METHODOLOGY

ECA ARCHITECTURE



# ECA ARCHITECTURE

# INPUT MANAGER

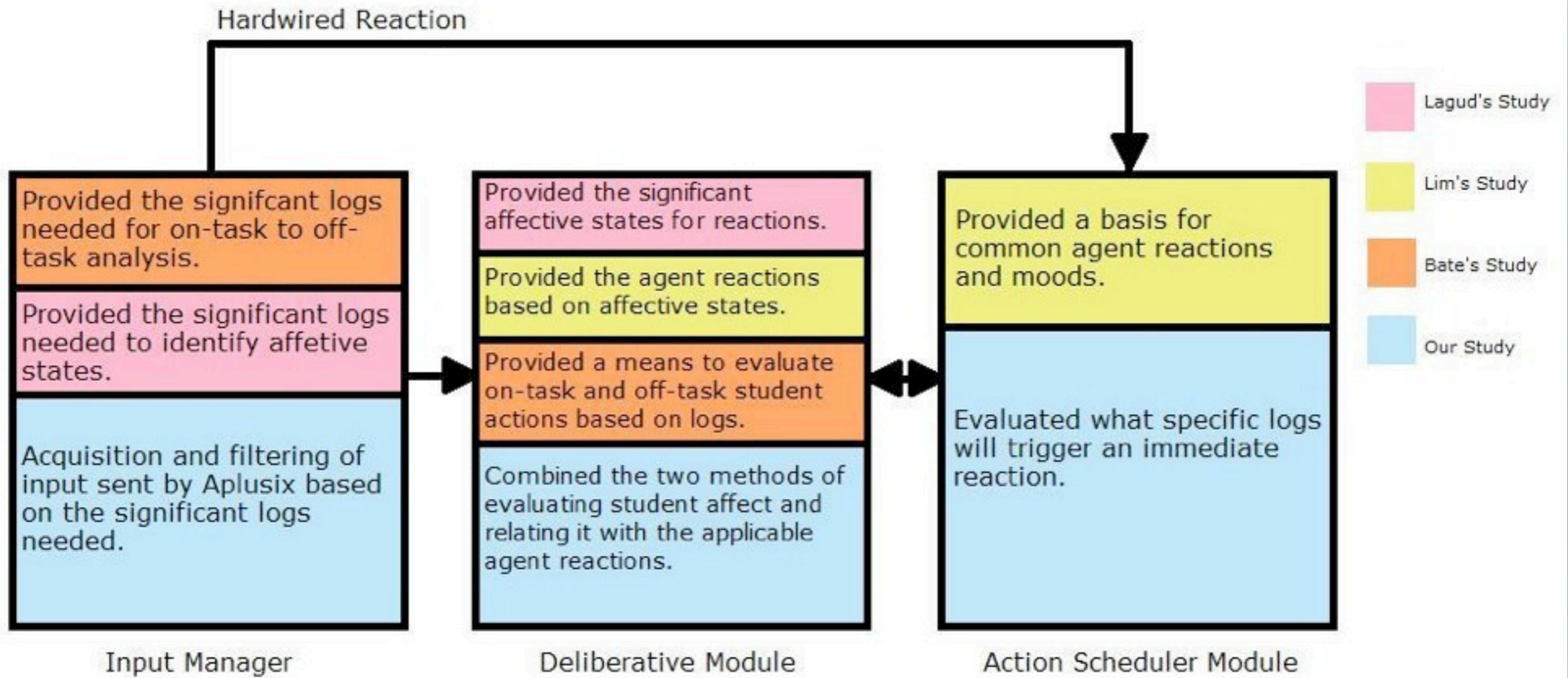
- Acquires input from all devices connected to the agent
- Converts input into forms that can be used by the other modules
- Our agent: Aplusix through text logs

# DELIBERATIVE MODULE AND HARDWIRED REACTION

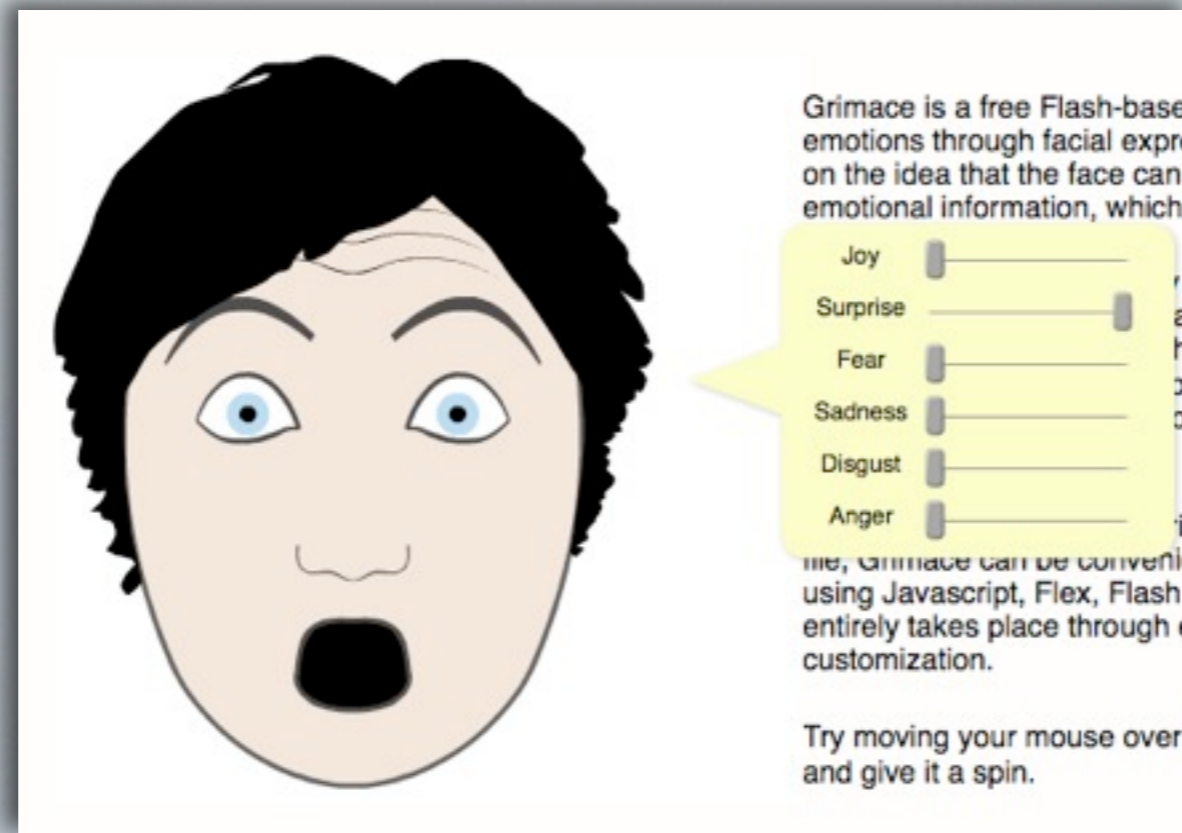
- The logical portion of the agent
- Answers the WHAT's of the agent
- DM vs. HR
  - DM: prolonged analysis; more input before response
  - HR: immediate response; responds per action done
- Our agent: Student models

# ACTION SCHEDULER

- Motor controller of the agent
- Coordinates the responses of the agent to make it synchronous
  - Text, face, actions, voice, etc.
- Answers the HOW's of the agent
- Our agent: Agent Face, Script, and Voice Clips

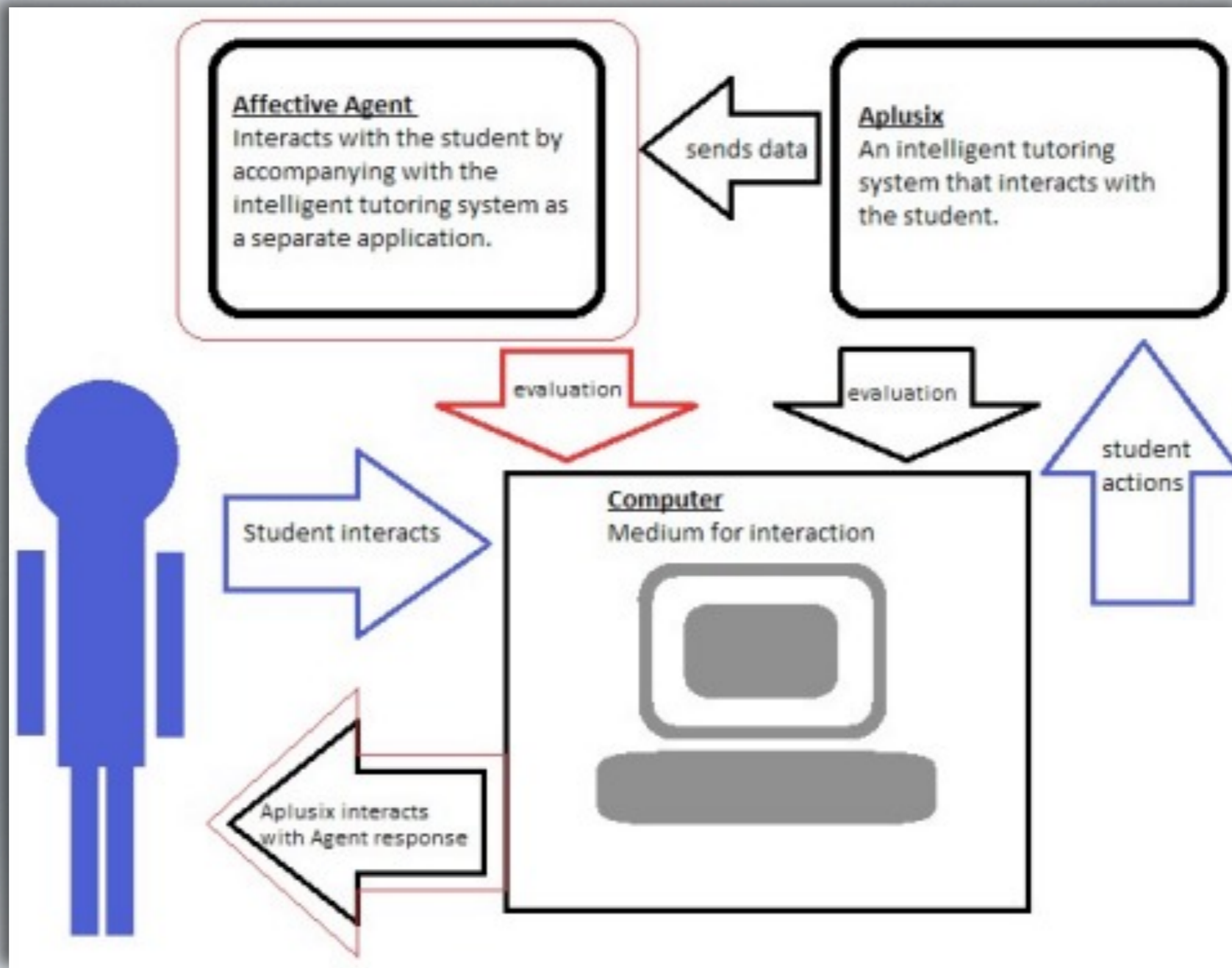


# ECA ARCHITECTURE



# METHODOLOGY

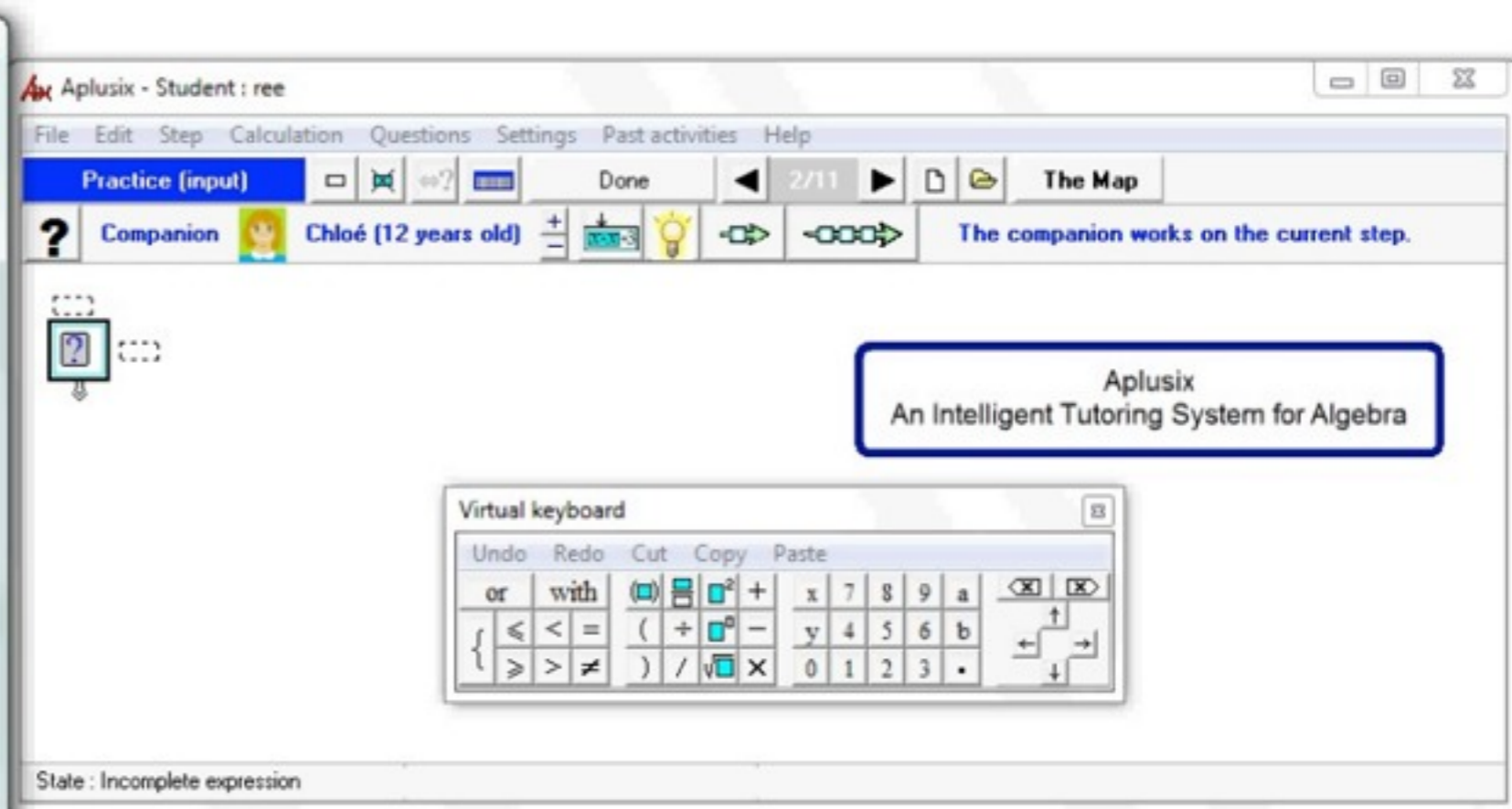
## DESIGN OF THE PROTOTYPE



# HOW THE AGENT WORKS



# Intelligent Tutoring System



Embodied Conversational Agent

# RESULTS

## ECA IMPLEMENTATION

# RESULTS: ECA IMPLEMENTATION

- ECA Implementation
  - Input Manager
    - Only takes in input from Aplusix
    - Per-action sending of logs
  - Hardwired Reactions
    - Instant reactions from the agent
      - Quitting the program
      - Solved to Not Solved State

ECA IMPLEMENTATION: LOGS

16;0.4;5;0;1;-36x+4-27x-15;0;(3 0 1 demiere);rien;V1;N1;;A-A1

ECA IMPLEMENTATION: LOGS

16;0.4;5;0;1;-36x+4-27x-15;0;(3 0 1 demiere);rien;V1;N1;;A-A1

Data	Description
1	Step number
2	Action duration
3	Action done
6	Current expression
11	Resolution state
12	Problem type/level

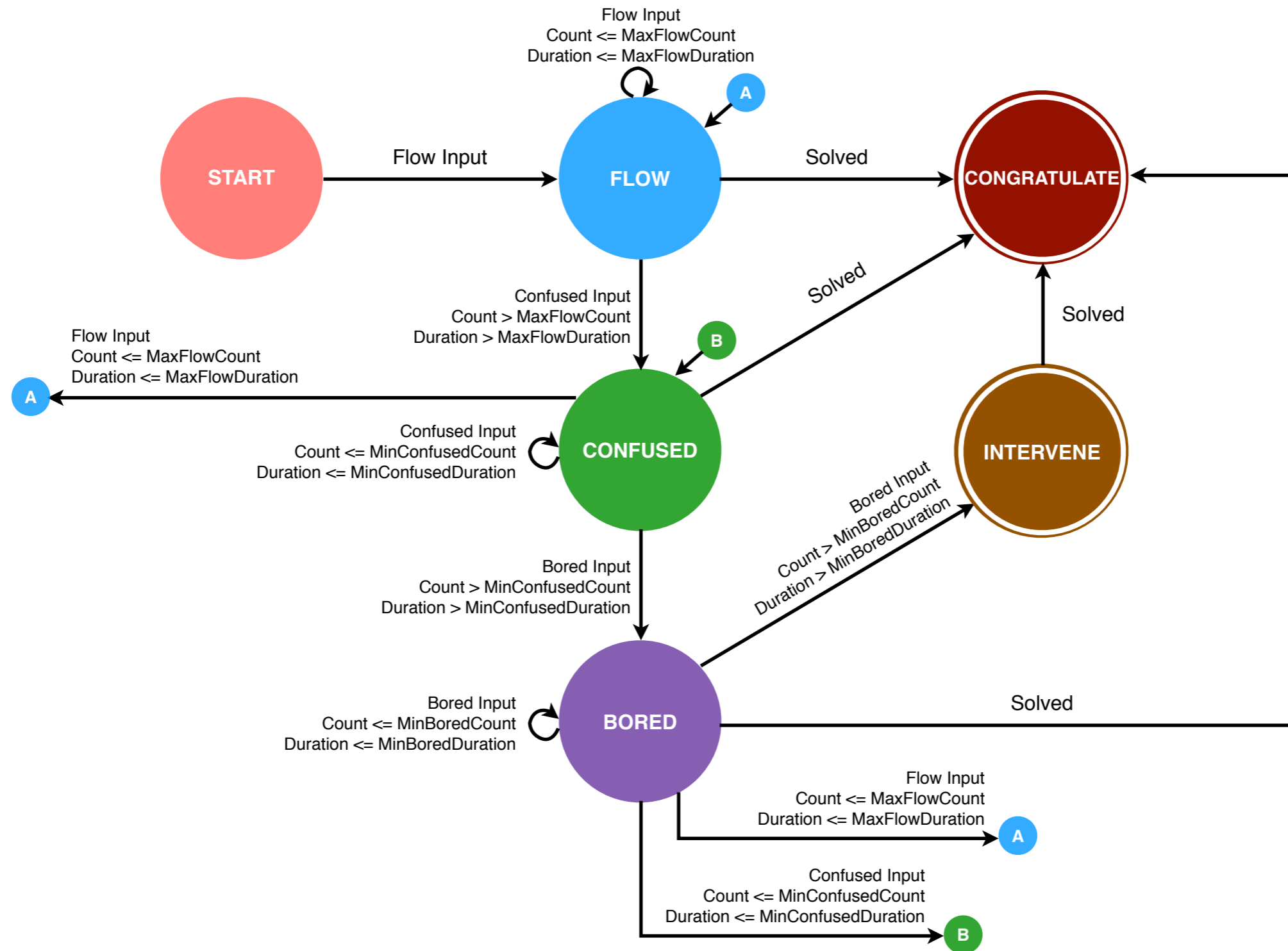
15	Problem type/level
11	Resolution state

# ECA IMPLEMENTATION: LOGS

# RESULTS:

## ECA IMPLEMENTATION

- ECA Implementation
  - Deliberative Module
    - Student models
    - Evaluation according to Bored, Confused, or Flow
    - Evaluation of test level speed and comprehension
    - Generation of logs appropriate for the evaluation
  - Action Scheduler
    - Program Interface
    - Determines when to show the responses depending on which module it receives data from



# STATE ARCHITECTURE



Agent Script	
Code	Script
0	""
1	"That was fast! Good Job!"
2	"Keep Going."
3	"Good Job!"
4	"You're almost there."
5	"I can see you worked hard. Good Job!"
6	"You can do it."
7	"Don't give up just yet."
8	"Don't quit. You have to try and finish every question."
9	"Just focus on the problem."
10	"Just keep going."
11	"You already had the correct answer."

11	..You already had the correct answer..
10	..Just keep going..
9	..Just focus on the problem..
8	..Don't quit. You have to try and finish every question..

# SCRIPT

DEMONSTRATION