



## *Poster Abstracts*

In the Silver Anniversary year of FLAIRS, in an effort to promote discussion of emerging ideas and work in order to encourage and help guide researchers, especially new researchers, the program committee added the poster abstract submission category. This allows researchers to present a full poster in the conference poster session and receive that critical, work-shaping feedback that helps guide good work into great work. Abstracts of those posters appear here, which we hope to see fully developed into future FLAIRS papers.

## FLAIRS Poster Abstracts

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Malek Mouhoub, Samira Sadaoui, Crystal Batts, C. J. Taylor, Elva Jones,  
Rebecca Caldwell, Chutima Boonthum-Denecke, Hasani Burns, Samantha Allen,  
Chutima Boonthum-Denecke, Kyle R. Cheney, Scotty D. Craig, Xiangen Hu, Vahid Jalali,  
David Leake, Fazel Keshtkar, David Hatfield, Jin Wang, Zhiqiang Cai, Arthur Graesser,  
Katherine Lang, James Allen, Ingyu Lee, Joe Teng, Niels Pinkwart, Barbara Hammer,  
Keith Shubeck, Scotty. D. Craig, Xiangen Hu, Usef Faghihi, Marian Levy,  
Robert Koch, Warren Stanton, Kyle Thompson, Licia Moses, Chutima Boonthum-Denecke,  
Quan Tang, Jin Wang, Haiying Li, Xiangen Hu, Bulent Tastan, David Chang,  
Gita Sukthankar, Curley Williams, Cheryl Swanie,  
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### **Activity States Framework for Studying Context and Communication Process in Web-Mediated Collaboration Setting**

*Nik Naila Binti Abdullah (MIMOS Berhad)  
and Samuel Mendes (University of Montpellier II)*

In our work, we want to understand how context influences communication process during Web-mediated collaboration. Thus we have explored these notions - conceptualization, and contextualization from situated cognition, and psychic reflection from activity theory into a framework of analysis called the Activity States Framework (ASF). In this paper we introduce ASF and our understanding of the notions from the modeling of ASF. The main idea of ASF is based on the notion of conceptualization - ‘What I am Doing Now’ of a person acting in a setting. Based on this idea, we study the relation between contextualization and psychic reflection. Contextualization is described as the product of an “active state”, whereby past experiences are compared to information situated to context. Psychic reflection is the transformation between an object (an objective) and a subject (person) in the subject’s pursue of a goal mediated by artifacts. From this relation, we hypothesize that a subject’s actions, and object will influence how the subject communicates influenced by the ‘level of engagement’ (activity states) in his pursue of his object. In ASF, object is defined as conception and subject as reference to conception. We have used the hypothesis to implement the ASF – analyzing 300 lines of collaborative chat dialogs. We have found that the notion of object de-

notes the near-start of when a transformation is about to take place in a subject at that moment. Meanwhile the notion of subject is the relationship to the object - the product of within-and transformation.

### **Online Shopping Under Qualitative and Quantitative Preferences**

*Eisa Alanazi, Bandar Mohammed, Malek Mouhoub,  
Samira Sadaoui (University of Regina)*

Many internet shoppers find it challenging to select the appropriate features when purchasing a new product online. For instance, there are many specifications they may wish to choose from when purchasing a desktop computer, camera, laptop, etc. Indeed, the majority of online corporations do not offer clients the capability of selecting their choices and preferences when purchasing a new product. In other words, several shopping web sites constrain the clients’ ability to between a number of options and do not necessarily offer alternatives which meet their expectations, or needs. This can be frustrating and upsetting for clients as it gives them the impression their preferences are not being taken into consideration.

In this paper, we propose a new shopping system that enables customers to express what they want when buying a product online. More precisely, the users are given the ability to provide their requirements and desires in a friendly and interactive way. The system will then provide a list of suggestions meeting the users’ requirements and maximizing their desires. Requirements and desires are managed in a unique model, respectively as a set of hard constraints and preferences where these latter can be quantitative (numerical) or qualitative (ordinal). The branch and

bound method is then applied in order to provide the users with a list of best outcomes.

### **iRobot Create Navigation with Mapping Interpretation Explored Through Smart Camera Networks**

*Crystal Batts (Winston-Salem University), C. J. Taylor (University of Pennsylvania), Elva Jones (Winston-Salem University), Rebecca Caldwell (Winston-Salem University), and Chutima Boonthum-Denecke (Hampton University)*

This poster describes our approach of tackling the most common problem when dealing with robotics, localization, the ability for a robot to know its current position relative to its environment and any of its previous positions. The idea is to create a system that would be used to automatically localize both the cameras and the robot relative to any characterized reference points. This project is built off of past work that used optical signaling techniques to localize a set of smart camera modules. The iRobot Create's odometry will be used to measure precise positions of the robot in relation to the positions of the smart camera network. The smart camera modules have the ability to localize itself and send back their positions relative to one another. Once their positions and distances from one another are known it is easier to find the position of the robot relative to the positions of the smart camera modules.

### **Blackout: Guidance for Household Emergencies**

*Hasani Burns, Samantha Allen, Chutima Boonthum-Denecke (Hampton University)*

The robot, nicknamed "Blackout," was created in order to be an emergency robot with the goal of assisting one in any number of household emergencies. Though limited in resources, we have produced a robot with the ability of providing assistance in small, but vital ways to a young child home alone, a senior citizen, or even one with a disability. Our presentation will focus on, why Blackout can be essential to our society, how far we've gotten in the time we've had, and where we possibly plan to take this robot in the future, including further implementations, and necessary augmentations to make "Blackout" greater.

### **Lessons Learned from a Three Year After-School Program Using ALEKS to Teach Sixth Graders Mathematics**

*Kyle R. Cheney, Scotty D. Craig, Xiangen Hu (University of Memphis)*

This project incorporated a web-based artificially intelligent program (ALEKS) into an after-school tutoring pro-

gram on mathematics. The program was open to sixth grade students in a rural west Tennessee school district. Students were randomly assigned to, one of two conditions (teacher- led and ALEKS) to assess the effectiveness of the program. The sessions were two hours, twice a week, and divided into 20 minutes segments so that the students received three twenty minute instructional sessions separated by two 20 minute breaks during which snacks were provided (the first twenty minute break) and games were played (the second twenty minute break). There were 10 minutes allowed before and after the program for set-up and dismissal. In the ALEKS condition, students interact with the program, which assigns problems appropriate for their current knowledge space by using Knowledge Space Theory. In the teacher led condition, the teachers used a scaffolded approach to teaching, slowly decreasing their involvement throughout the session. As with all new after-school programs, maintaining retention of students enrolled in the program, encouraging teacher and administrative involvement, increasing community awareness, and implementing effective recruitment practices were all threats to the viability of this program. Over the course of this three-year project, we have been able to successfully tackle these threats by creating a structured incentive program and fostering a strong relationship among the teachers, administration, and community.

### **Increasing Response Flexibility in Conversational Case-Based Reasoning**

*Vahid Jalali, David Leake (Indiana University)*

Conversational case-based reasoning (CCBR) is an interactive form of case-based reasoning in which the system presents users with questions whose answers incrementally guide case retrieval. CCBR systems often ask about atomic features. However, in some domains, users may wish to provide multiple pieces of information in response to a single question. For example, in a cell phone recommendation domain, rather than the system successively asking if the user wants a phone supporting IM, MMS, and SMS, it might be more efficient for a user to simply provide a list. However, existing question selection methods are not designed for handling questions with composite answers. This poster presents a method for handling composite responses in CCBR dialogs, with the goal of retrieving the desired case(s) with a short sequence of questions. It handles composite features by increasing the level of abstraction at which each question is asked and selecting questions by a new adaptation of information gain for composite features. It compares results for three scenarios: (1) Atomic Selection, in which the user only selects a single component for a (possibly multi-component) feature at each step, (2) Decomposed, in which multi-component fea-

tures of a domain are decomposed into atomic features, which the user can provide through a series of questions, and (3) Composite Selection, in which the user can select multiple components for a feature in one step, and our question selection method for composite features is applied to question selection. Experiments showed that composite selection achieved 54%, and 15% improvements over the decomposed approach, and 24% and 17% improvements over the atomic approach in our test domains.

### **The Components of the Intelligent Virtual Mentoring and Assessment in Computer Education Games for e-Learning**

*Fazel Keshtkar (University of Memphis), David Hatfield (University of Wisconsin), Jin Wang (University of Memphis), Zhiqiang Cai (University of Memphis), Arthur Graesser, (University of Memphis)*

AutoSuggester is an intelligent module that decides when AutoMentor generates a message in the Mentor View window and the content of what to say. As technical point of view, AutoSuggester works as a plug-in with the main application in AutoMentor system in the Land Science Game. The aim of AutoSuggester is to help human mentor to monitor players in chat rooms, and gives suggestions if necessary. AS decides when AutoMentor generates a message and decides what to say. AutoSuggester can be categorized in the following modules, that it watches over: (a) the multiple threads of conversation among the players and mentor in the group (i.e., sequences of categorized speech acts), (b) the actions and decisions of players and mentor in the interaction history, (c) the game phase and current state of relevant parameters specified in the frameboard, and (d) the status of the epistemic network analysis (ENA). When particular features, data patterns, or state parameters accrue in this information blackboard, then AutoSuggester generates a message in Suggestion List, by selecting the appropriate message from a categorized set of alternative messages. We designed and developed a computational architectures and add complexity as needed.

In this poster we demonstrate the Autosuggester Architecture Diagram, Goals, the current status of the AutoSuggester, Modules that have been developed and implemented so far, technical constraints, such as the speed of computation, and the future work and direction toward AutoSuggester design and implementation.

### **AID: An Intelligent Dialogue System for Interviews**

*Katherine Lang, James Allen (University of Rochester)*

Most programs used to collect data via interviews, e.g. a program to collect local food usage information for food

aid/relief programs, which are available to the public and not off-the-shelf tend to utilize ridged state-based systems with predefined responses for information collection. However, these systems lack the flexibility that is necessary for interviews containing open-ended questions such as "Why do you prefer one market over the others?" that cannot be simply separated into a finite number of categories or exact phrases. The Artificially Intelligent Interview Dialogue (AID) system is a guidance system that will assist interviewers not familiar with the reasoning behind the interview in successfully collecting consistent and accurate information in the field. AID's dialogue manager utilizes a finite-state automaton and extends the framework for better flexibility. These extensions include logical form matching to interpret utterances provided by the robust parser and the incorporation mixed-initiative dialogue. Semantic parsing adds flexibility to the system including the use of semantic rules, which the dialogue manager can use to cover a broad selection of answers. Interestingly, our state-based dialogue control is far more flexible than McTear's classification predicts. Moreover, our variant of the TRIPS parser can handle partial parses and extra information, unlike McTear's state-based NLDSS. Finally, AID strives for a conversational feel to put less pressure on the user to know exactly what he/she should say to collect the interview data, including the familiar AIM chat window as the GUI so the user can interact with the program more naturally.

### **Risk Oriented Intrusion Detection Classifier**

*Ingyu Lee, Joe Teng (Troy University)*

With the popularity of the Internet, network security is becoming increasingly important. Many studies have been done in Intrusion Detection Systems (IDS) using data mining and machine learning technologies. However, traditional studies have been focused on correctly predicting intrusions without considering the frequency and impact of attacks. In reality, some attacks are more frequent and cause more damage to systems than others. Therefore, a classifier in an Intrusion Detection System should better detect some attacks which are not frequent but are more serious than others, which are more frequent but less harmful. In this paper, we explore a risk oriented intrusion detection classifier that considers frequency and impact.

### **Towards Learning Feedback in Intelligent Tutoring Systems by Clustering Spaces of Student Solutions**

*Niels Pinkwart (Clausthal University of Technology), Barbara Hammer (University of Bielefeld)*

Since about 1990, intelligent tutoring systems (ITS) have

been getting more and more popular. Designing an ITS usually requires precise models of the underlying domain as well as of how a human tutor would respond to student mistakes. As such, the applicability of ITSs is typically restricted to well-defined domains where such formalization is possible and large scale applications where development costs do not play a significant role. For ill-defined domains, human tutors still by far outperform the performance of ITSs, or the latter are not applicable at all. This poster proposes a novel ITS approach which extends the applicability of ITS systems to ill-defined domains by means of machine learning techniques which can autonomously infer structures and feedback options from given data (e.g., student solutions). The proposed approach uses prototype-based methods and recent developments for general non-vectorial data structures, extended in a way that they allow to simultaneously structure solution spaces, learn metrics for structures, align student solutions with clusters of other solutions, and infer appropriate feedback based thereon. The adaptation mechanisms are designed to work in fully unsupervised scenarios or settings with only partial feedback to take into account the requirements for ITSs in ill-defined domains where an automated assessment of student solutions is rarely possible. A first validation of the approach was conducted using a dataset from the domain of programming. The results show that clusters of structurally similar solutions could be detected, and that an automated provision of student feedback based on this clustering seems feasible.

### **Incorporating Natural Language Tutoring Into a Virtual World for Emergency Response Training**

*Keith Shubeck, Scotty. D. Craig, Xiangen Hu, Usef Faghihi, Marian Levy, Robert Koch (University of Memphis)*

Virtual Civilian Aeromedical Evacuation Sustainment Training (V-CAEST), is a Department of Defense funded project that aims to improve communication between civilian and military personnel during emergency situations. The V-CAEST team at the University of Memphis is developing a robust training system embedded in a virtual world. The V-CAEST system is based on the live action training simulation program, Civilian Aeromedical Evacuation Sustainment (CAEST), and will serve as a virtual implementation of the live action training simulations. V-CAEST incorporates an existing intelligent tutoring system called AutoTutor LITE (Learning in Interactive Training Environments). AutoTutor LITE, a variation of AutoTutor, is a product developed by University of Memphis researchers. Within V-CAEST, AutoTutor LITE acts as a facilitator providing guidance and feedback during the learners' interaction in the virtual world. In order to automati-

cally evaluate student responses, V-CAEST features natural language processing enabled by a Domain Specific Semantic Processing Portal (DSSPP). The DSSPP creates a domain-specific semantic space by taking in a corpus of military and civilian emergency literature. In this poster, we will report the application of AutoTutor LITE and DSSPP in V-CAEST.

### **Swagbot: Audio and Visual Telepresence Using ROS-Bridge, GStreamer and TokBox**

*Warren Stanton, Kyle Thompson, Licia Moses, Chutima Boonthum-Denecke (Hampton University)*

This poster describes the "Swagbot," a virtual waiting service. The Swagbot consists of the iRobot Create, a sturdy platform for holding a drink, and a laptop with built-in camera. The robot is operated by a waiter/waitress from a remote location. The customer interfaces with the Swagbot using the teleconference system or the web. For the teleconference system, the waiter/waitress and customer can interact with each other using sound and video in real-time. The customer can order drinks via a web-interface, that is, no direct communication between waiter/waitress and customer. This project will provide high-end services with low-end maintenance, and it will also allow business owners to reduce the number of waiters/waitresses needed to host a party, which will ultimately decrease cost.

### **An Exploratory Study on the Relationship between Situation Changes and Word Uses**

*Quan Tang, Jin Wang, Haiying Li, Xiangen Hu (University of Memphis)*

Word use relevant to linguistic and psychological features may vary along with the financial situation of a company. This study explores the relationship between linguistic and psychological word use in workplace email and the timeline related to the financial situation of Enron Corporation, an American energy, commodities, and services company. This paper adopted as the dataset 97 thousand emails from Enron's employees before the company collapsed. The 2007 English LIWC program was processed to generate 64 linguistic and psychological word categories. Then, a Principal Component Analysis was performed to extract the major components from the 64 words categories to seek fewer potential representative psychological features. Three principle components were extracted, among which the first component explained about 70% of the variance. This component represented the synthetic and diverse psychological processes, including cognitive, affective, biological, and social processes, and spatial and time relativity. The second component mainly consisted of biological



category, swear words and religious words. The last component just contained the negatively loaded category “you”. Thereafter, the emails were partitioned into four groups based on the timeline of three important events. Results indicated that linguistic and psychological word use have a close relation with ups and downs of the financial state of the company, and all three components show relatively similar patterns. This indicates the psychological word categories processed by LIWC are related to the company’s financial situation, and it is possible to track or predict the important financial variations through the word uses in the employee’s email communication.

### **Learning Motion Prediction Models for Opponent Interception**

*Bulent Tastan, David Chang, Gita Sukthankar  
(University of Central Florida)*

One important aspect of creating intelligent physically-embodied agents for first-person shooter games and simulations is adversarial motion planning: identifying how to move to counter possible actions made by the adversary. When the opponent’s movements are hidden from view, it is useful to incorporate motion prediction into planning to account for the opponent’s movements in occluded regions of the map. In this research, we examine the problem of opponent interception, in which the goal of the agent is to apprehend the opponent in the shortest amount of time. Here, we present an algorithm for motion planning that couples planning and prediction to intercept an enemy on a partially-occluded map. Opponent motion prediction is performed using a particle filter to track current and future candidate hypotheses of the opponent’s location. Yet human players can exhibit considerable variability in their movement preferences and do not uniformly prefer the same routes. To model this variability, we use inverse reinforcement learning to learn a player-specific motion model from sets of example traces. From these examples of a player’s policy preferences, we learn a feature-based reward model for different areas on the map which are used to calculate transition probabilities for the motion model. Since the learned model is feature-based, it can generalize to areas that the player has not yet visited. Our preliminary results indicate that the learned motion model has a higher tracking accuracy and yields better interception outcomes than simpler motion models and prediction methods.

### **No Child Left Behind**

*Curley Williams and Cheryl Swanier (Fort Valley State University), Chutima Boonthum-Denecke (Hampton University)*

The goal of this project was to develop a user interface which allows children with physical limitations, such as cerebral palsy, to interact with an iPad. Unfortunately,

many of the existing applications like Proloquo2go and Accessible Messaging were developed based on a touching-based procedure. This proposed interface is centered on the ideas of comfort, style, and the development of the “Swipe” motion which allows these children to be more active with today’s technology. This process involved a lot of studying of the Arduino board and a lot of coding as well. Many items were found to make the interface more comfortable for children to use. Ultimately, the development of this device could help children worldwide with cerebral palsy or other physical limitations develop physically as well as mentally.

### **Extending a Dynamic Bayes Net Toolkit to Trace Multiple Subskills**

*Yanbo Xu and Jack Mostow (Carnegie Mellon University)*

Dynamic Bayesian Nets (DBNs) provide a powerful representation to (1) model the relationships between students’ evolving knowledge and behavior in a Tutoring System, and (2) infer changes in a student’s hidden knowledge from the student’s observed sequential steps. In 2006, Chang, Beck, Mostow, and Corbett introduced a Matlab tool called BNT-SM, which inputs a concise specification of a DBN and uses the Bayes Net Toolbox (BNT) to generate Matlab code to train and test the DBN. The input DBN specification, expressed in XML, is a fraction of the size of the generated output, thereby sparing researchers considerable coding. However, the DBNs represented by BNT-SM did not model steps that involve multiple subskills. To overcome this limitation, LR-DBN uses logistic regression in DBNs to trace multiple subskills. As reported at EDM2011 by Xu and Mostow, LR-DBN fits student performance data significantly better than previous methods, with only half as many prediction errors on unseen data. Therefore, we have extended BNT-SM to make LR-DBN available to researchers in easy-to-use form (at <http://www.cs.cmu.edu/~listen/BNT-SM>). Compared to implementing a LR-DBN model directly in BNT, implementing it in BNT-SM now requires substantially less user effort and code. For example, the simplest LR-DBN model uses logistic regression in Knowledge Tracing. Implementing it directly in BNT required 86 lines of code. In contrast, implementing it in BNT-SM needs only half as many lines of XML to specify its structure and parameters.