Tool for Sketching Statecharts (TSS)

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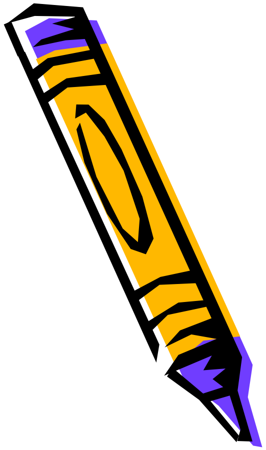
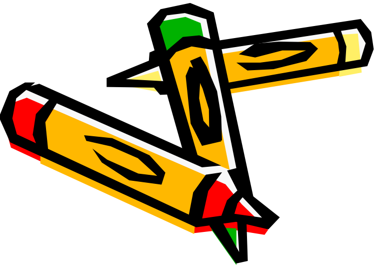
COMP 762B: Modelling and Simulation Based Design

April 4th, 2005



Agenda

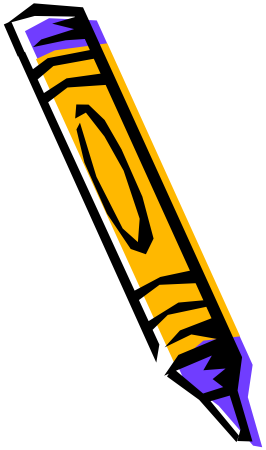
- Implementation Details
- SATIN
- Introduction to Statecharts
- TSS Syntax
- Demo
- Conclusion
- Future work



Implementation Details

- TSS is written in Java using JDK 1.5 and SATIN 2.3[1].
- Can be run on any machine that has JDK 1.4 or higher.
- It can be run using a stylus or a mouse.

[1] Refer to reference [2] for detailed information.



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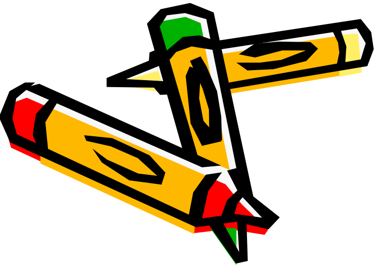
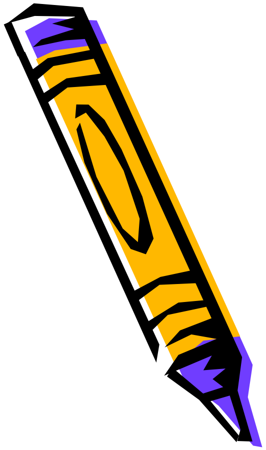
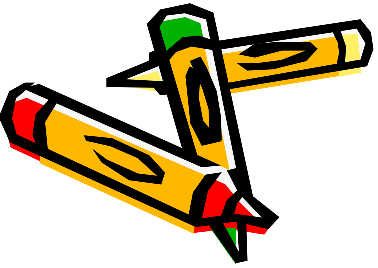




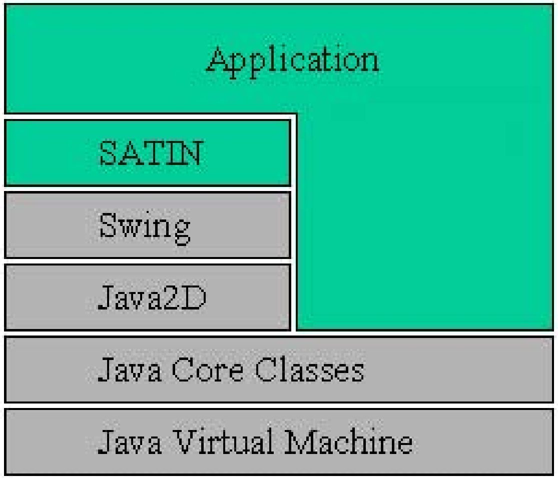
SATIN

- Sketch and Transformational Infrastructure (http://guir.berkeley.edu/projects/satin/)
- An open-source toolkit for developing informal ink-based applications.
- It only supports 2D applications.



SATIN (cont.)

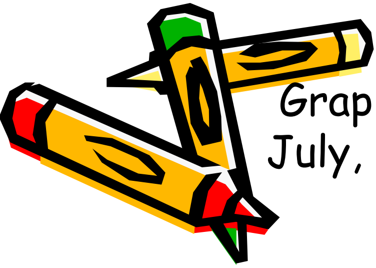
- Built using JDK 1.3.
- SATIN is a layer on top of Swing.



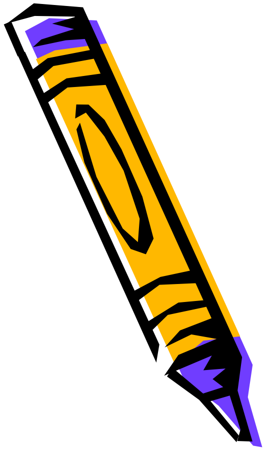
This figure is taken from reference [2].

SATIN (cont.)

- SATIN comes with Quill, which is a tool for designing gestures for pen-based applications.
- SATIN framework comes with Rubine's[1] recognition algorithm, but other recognition algorithm can easily be plugged in.



[1] Dean Rubine. "Specifying Gestures by Examples," Computer Graphics. ACM SIGGRAPH'91 Conference Proceedings. 25(3): pp.329-337, July, 1991.



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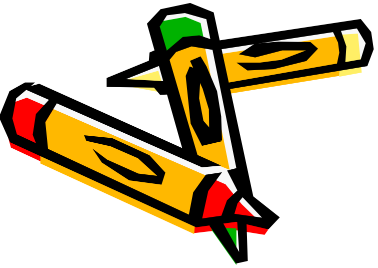
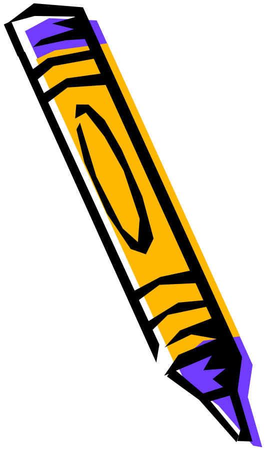
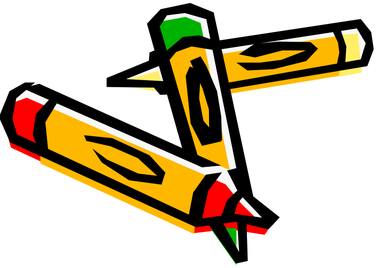
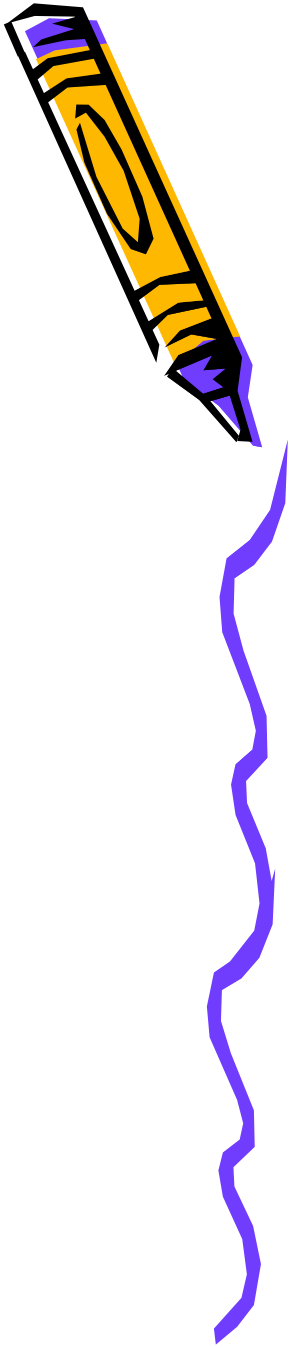


Introduction to Statecharts



- An extension of finite state automata.
- Invented by David Harel in the late 1980s.
- It was adopted by UML for describing reactive behavior.





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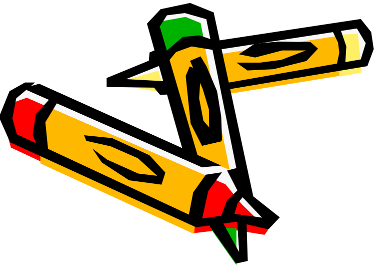
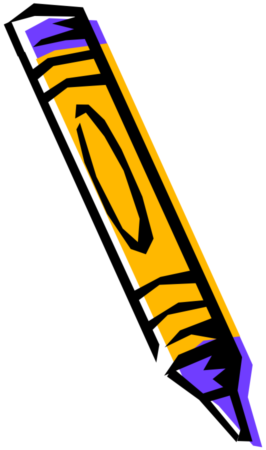
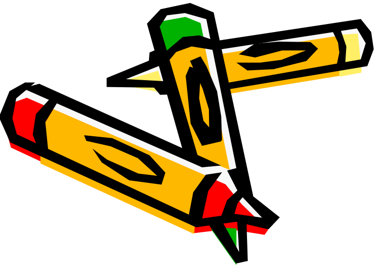


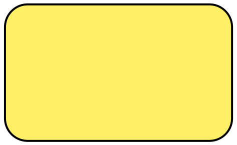
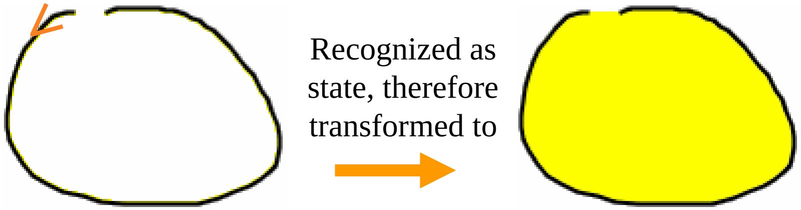
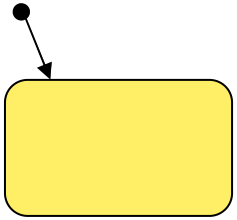
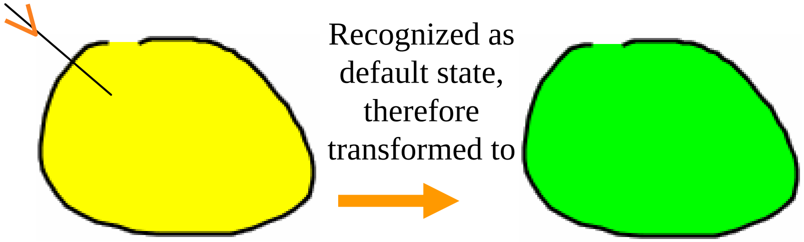


TSS Syntax

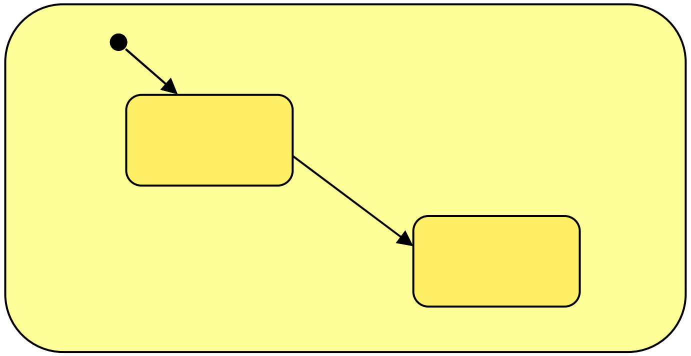
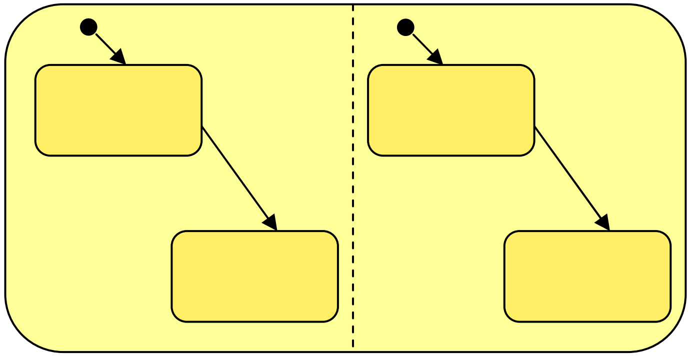
- Statecharts notations
- Supported characters
- Supported commands
- How gestures are interpreted
- Statechart diagram validation



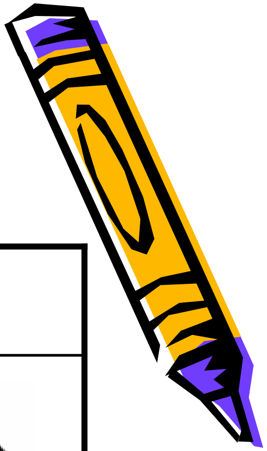
Statecharts' Notations

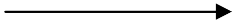
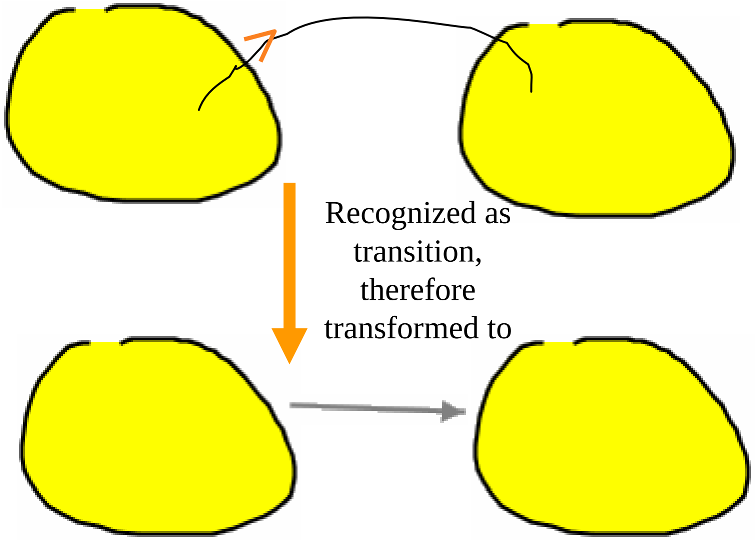
Notation	Harel's	TSS
States		 Recognized as state, therefore transformed to
Default States		 Recognized as default state, therefore transformed to

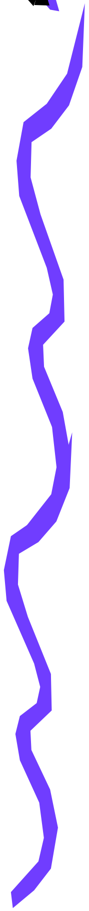
Statecharts' Notations (cont)

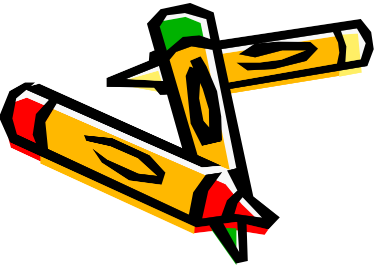
Notation	Harel's	TSS
Composite States		Not supported
Orthogonal States		Not supported

Statecharts' Notations (cont.)

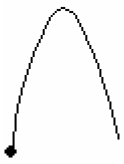
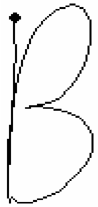
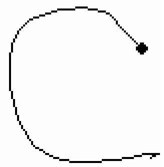


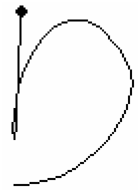
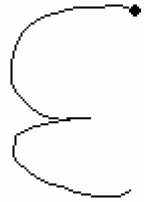
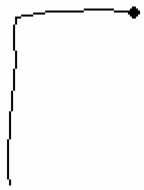
Notation	Harel's	TSS
Transitions		 Recognized as transition, therefore transformed to
Labels	Any characters	a - z, ., /, [, and]



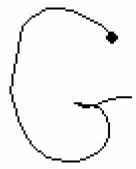
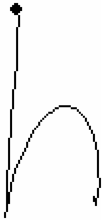
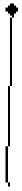


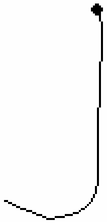
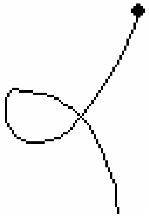
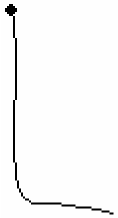
Supported Characters

a	
b	
c	

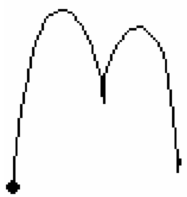
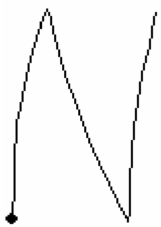
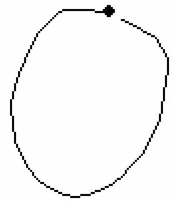
d	
e	
f	

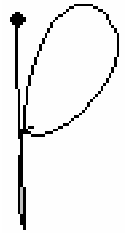
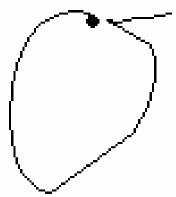
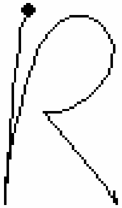
Supported Characters (cont.)

g	
h	
i	

j	
k	
l	

Supported Characters (cont.)

m	
n	
o	

p	
q	
r	

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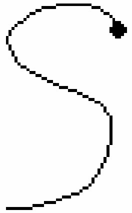
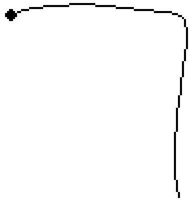
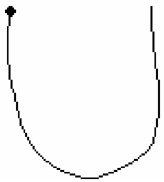
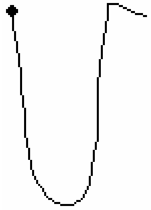
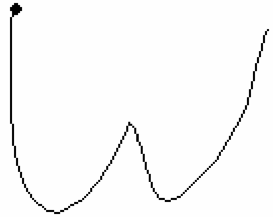
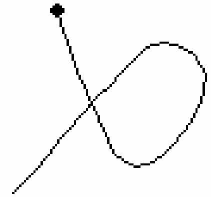
s	
t	
u	

v	
w	
x	

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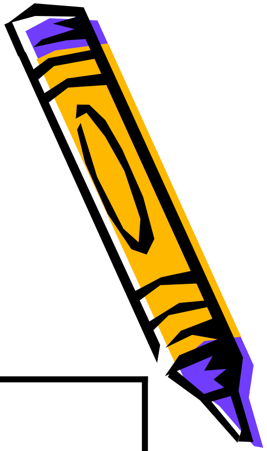
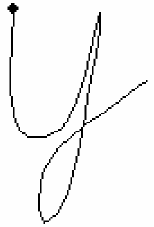
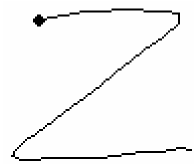


y	
z	
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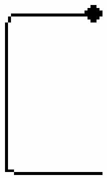
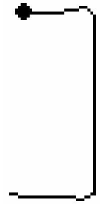
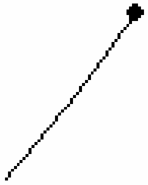
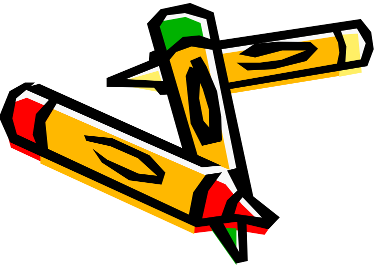
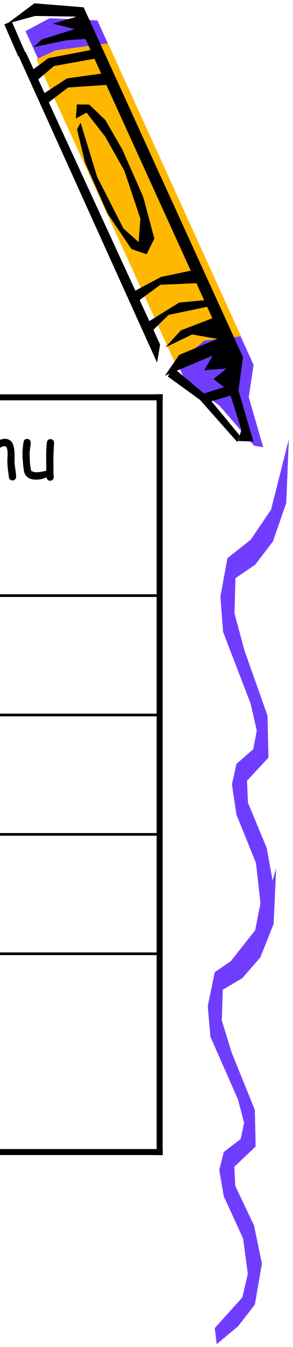
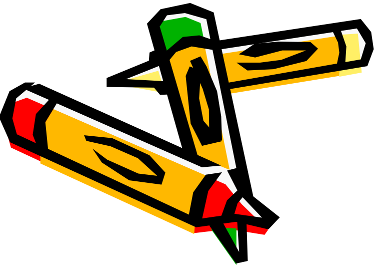
[	
]	
/	



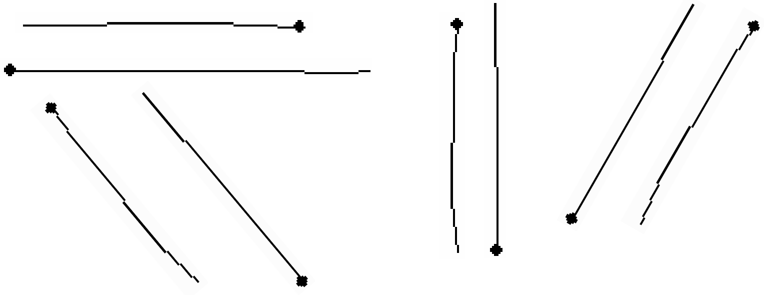
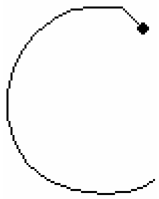


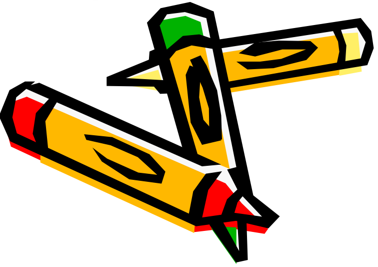
Supported Commands

Command	Gesture	Pie Menu Item
New	None	Yes
Save	None	Yes
Open	None	Yes
Change Color	None	Yes

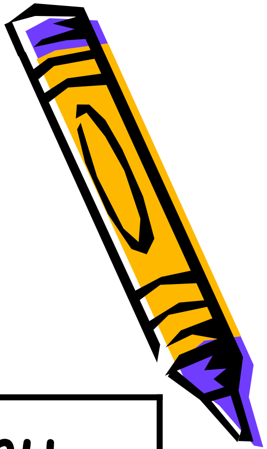


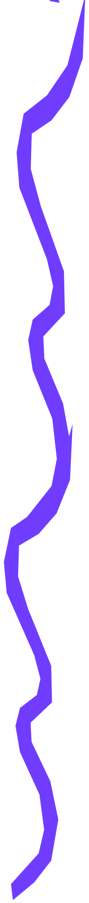
Supported Commands (cont.)

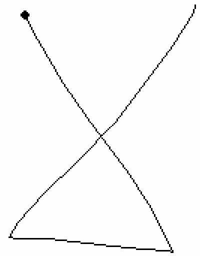
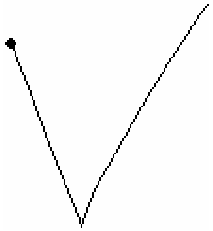
Command	Gesture	Pie Menu Item
Scroll		No
Copy		Yes

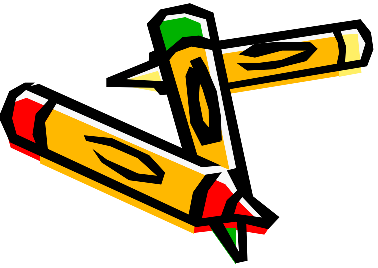


Supported Commands (cont.)

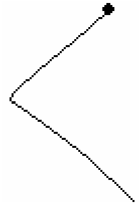
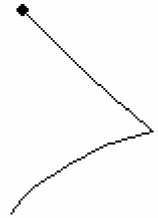




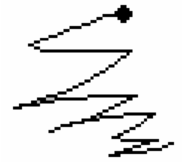
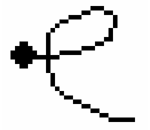
Command	Gesture	Pie Menu Item
Cut		Yes
Paste		Yes



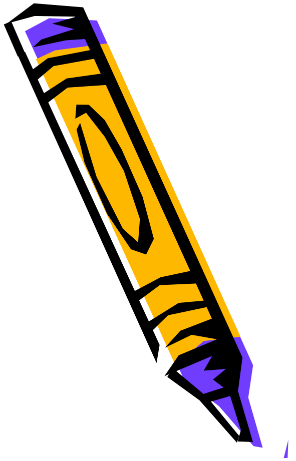
Supported Commands (cont.)

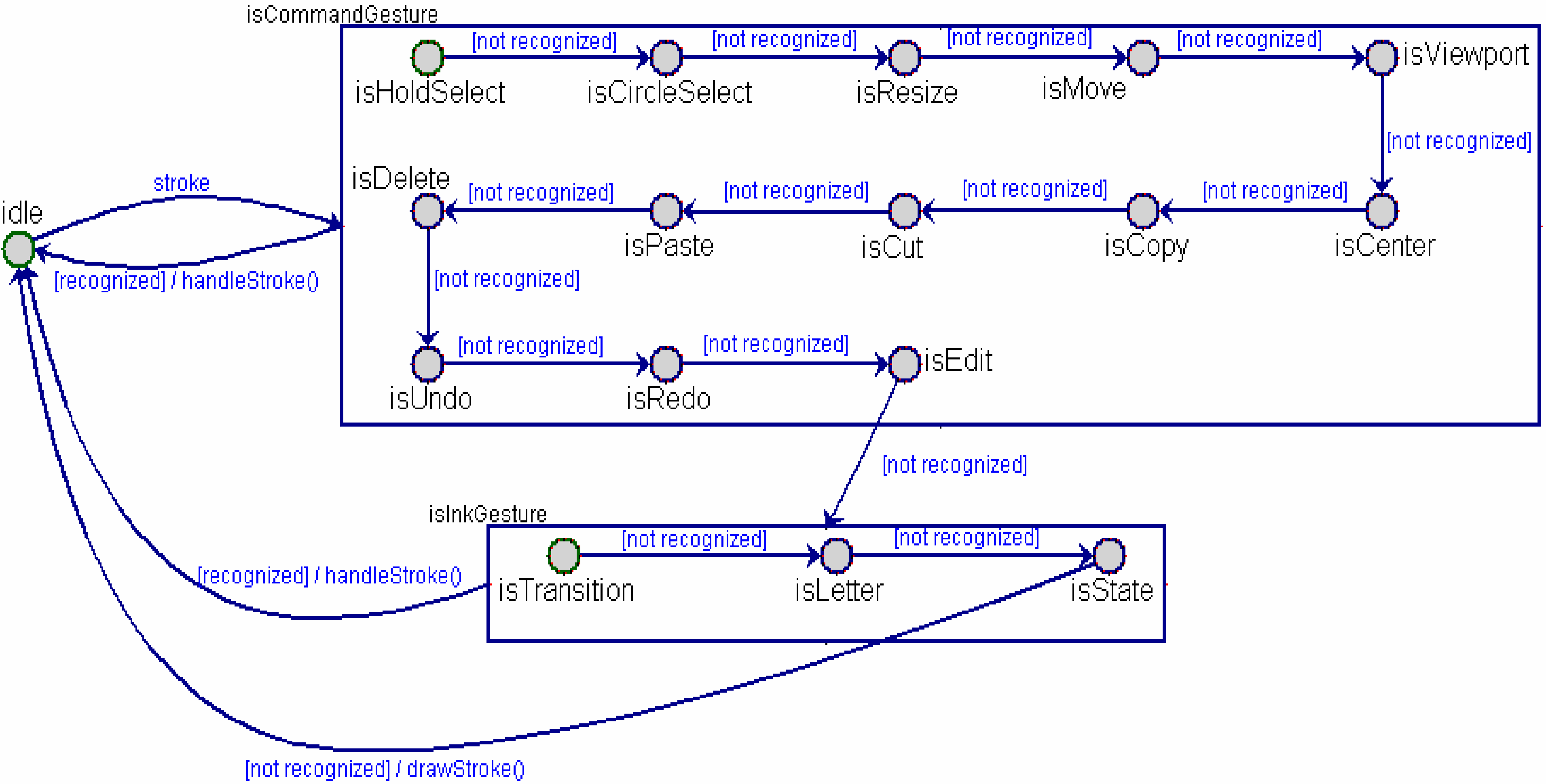
Command	Gesture	Pie Menu Item
Undo		Yes
Redo		Yes

Supported Commands (cont.)

Command	Gesture	Pie Menu Item
Delete		Yes
Edit Labels		No

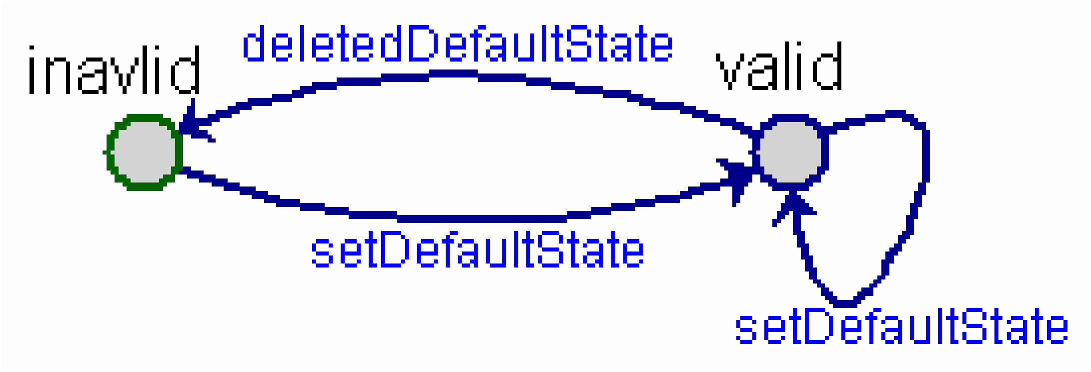
How interpretation works

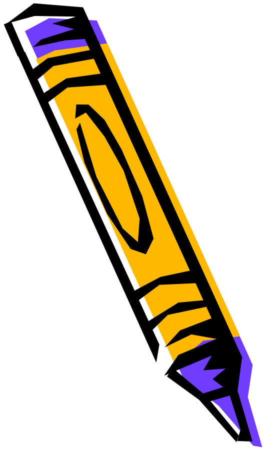




Statechart Diagram Validation

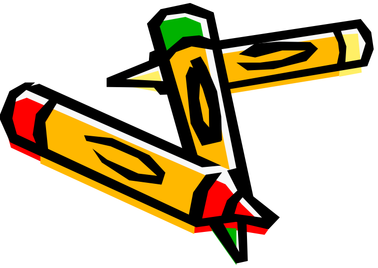
- A valid statechart diagram has to have a default state.



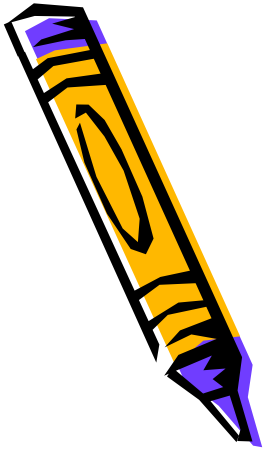


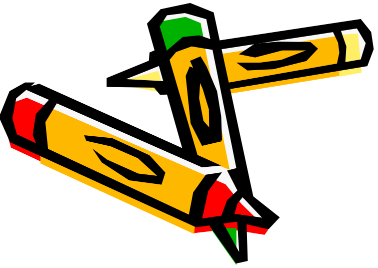
Agenda

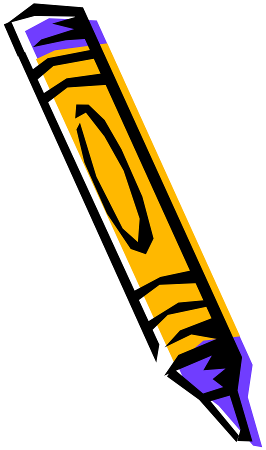
- Implementation Details
- SATIN
- Introduction to Statecharts
- TSS Syntax
- Demo
- Conclusion
- Future work



Demo

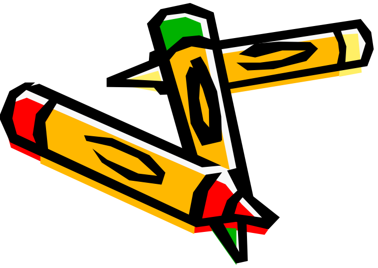


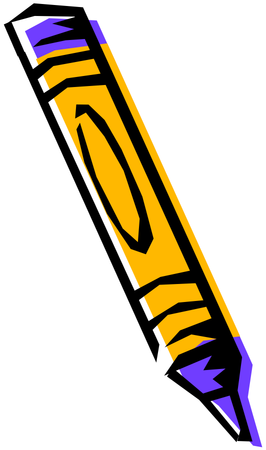




Conclusion

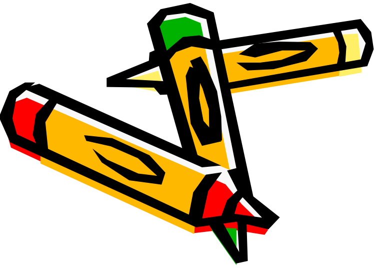
- SATIN saves time by providing a concrete framework for pen-based applications.
- It provides many of the common features in pen-based applications





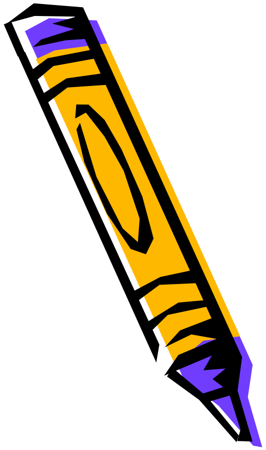
Conclusion

- It is hard to design gestures that are easy to learn by humans and easy to recognize by computers[1].
- Studies found that users who are used to using PDAs are better at designing “good” gestures[1].

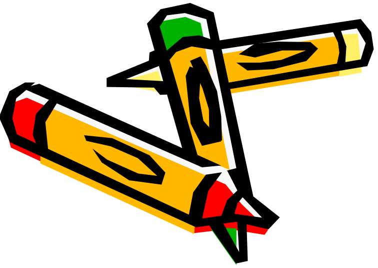


[1] Refer to reference [3].

Remaining work

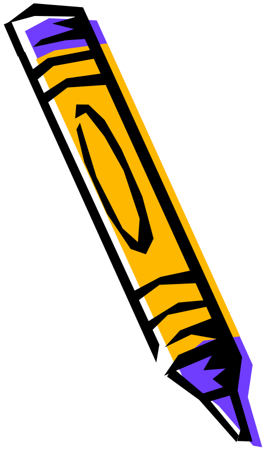


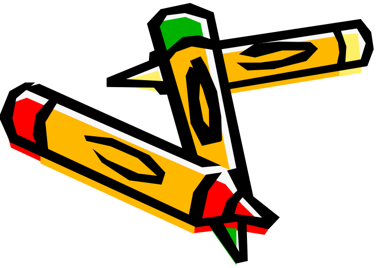
- Fix some known bugs:
  - Cannot edit transitions' labels.
  - When opening a saved file, transitions' labels do not show up.
  - Non-recognized objects are not saved.
  - Cannot select labels.
  - Moving, resizing, and deleting states and transitions don't always work.
- Write the report.

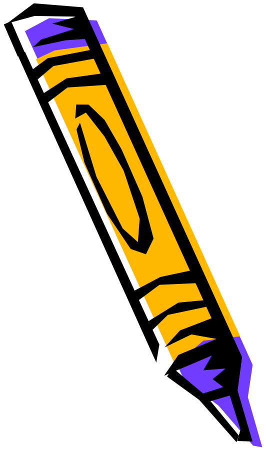


Future work

- Support composite and orthogonal states.
- Keep transitions the way they were drawn.



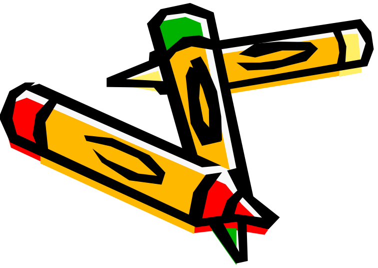




References

[1] David Harel, "**Statecharts: a visual formalism for complex system**," Science Computer Program, Vol 8, pp 231-274, 1987.

[2] Jason I. Hong and James A. Landay, "**SATIN: A Toolkit for Informal Ink-based Applications**." In UIST 2000, ACM Symposium on User Interface Software and Technology, *CHI Letters* , 2(2), p. 63-72.



References (cont.)

[3] Allan Christian Long, Jr., James A. Landay, and Lawrence A. Rowe, "**Implications for a Gesture Design Tool.**" In Proceedings of *Human Factors in Computer Systems: CHI 99*, Pittsburgh, PA, May 15-20, 1999, pp. 40-47.