Scratch Revolution
End-User Graphical & Visual Programming

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Scratch Revolution
End-User Graphical & Visual Programming

Want, Desire, Need, Wish, Requirement, Expectation, Anticipation
Expectation Violation, Problem, Challenge

(MAT) Motivation, Goal, Objective, Teleology || Ability || Trigger

Task, Agenda, Algorithm

(ORIC) Outcomes, Rewards, Investments, Continuations

App = Algorithm = Data + Manipulations

Data(Thematic Semantic Cases, ER:Relation.Entity.Attributes)

Data(ADT, OOP Class, Object)

Manipulations(P, M, S, C, IO)<CRUD|Data>, <Bra|Ket>
<Verb | Noun>; <Verb.Adverbs | Noun.Adjectives>

Control Structures: Sequence, Conditional Branching, Looping

Control Structures: Procedural, Parallel, Distributed, Networked,
Concurrent(Synchronized, Resource Sharing/Multi-Access Contention Coordination)

Actor, Agent, Bot, Agency, Ant, Sprite, Demon,

LEGO-like, Ikea-like, LittleBits, Educational Robots, STEM+A Robots

The 3Rs + 1: Reading, wRiting, aRithmetic + pRogramming

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Meet Scratch

Why Computer Programming

Programming-in-Context

Programming Paradigms & Styles

End-User Programming

Play With Scratch

Going Beyond Scratch

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Meet Scratch

Developed at MIT Media Labs

Assemble Computer Programs, Software

Use Lego-like Building Blocks Modules

Teach Anyone How to Program & Code

Including 4yr – 5yr olds & Above

ANYBODY Can Program!!!

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Scratch in Context

Future of Work, Jobs, Employment, Careers, Professions

Digital Technology

Automation

AI

Algorithms

Computational Thinking

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Why Computer Programming

Human-Computer Communication, Interaction

Human-Human Communication

Computer-Computer Communication

Computers CANNOT Yet Speak & Understand Natural Languages

Next: AI / NLP

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Programming-in-Context

SW: Application
SW: Middleware
SW: OS
SW: Firmware
HW

Web Desktop Laptop	Mobile Portable Laptop Smartphone Wearable Hearable	Internet	Server	Embedded Implantable BCI IOT

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Programming Paradigms & Styles

Multi-Paradigm

Procedural, Imperative

Object-Oriented

Functional, Function Style

Logic

Array

Parallel

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End-User Programming

Computational Thinking

Constructionalism: J. Piaget, S. Papert

Algorithms

Design Thinking: Structures + Manipulations

Structuralism, Assemblage Structures, Tensegrity Structures, Patterns, Schemas

Polyhedra, Graphs, Networks, Tilings, Tessellations, Algebras, Morphisms

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End-User Programming

Programming as a Journey, Flow
Stored-Program Automata (A. Turing, J. von Neumann)
Locus of Control
Algorithms: Control Structures (Boehm-Jacopini)
Sequencing
Conditional Branching
Looping, Iteration, Repetition

Concurrent Shared-Resource Resource Sharing
Parallel Processing
Distributed Processing
Gecko Adhesion: Arrays, Bundles: Lamella-Setae-Spatulae
Insect Societies: Ants, Bees, Termites, Wasps

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Play With Scratch

(Multimedia, Robots, Drones, IOT)

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Going Beyond Scratch

Scratch → Scripting L. → OOP L. → Server L. → Assembly

Professional Programming: High-Level Languages (HLL)

Formal Semantics: Translate, Compile Scratch into HLL; then HLL into ASIC or FPGA

Code Optimization: 50x Speed Up: Python→C

Non-Professional Programming: Scripting Lang.

Novice Programmers, Expert Programmers

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Going Beyond Scratch

Scratch and Computational STEM+HASP

Knowledge Processing

Analytical

Empirical, Experimental, Statistical

In Silico

Computational

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To Explore Further

Kai-Fu Lee, AI Superpowers: China, Silicon Valley, and the New World Order (2018), former president of Google China

MIT Sloan School of Management, Initiative on Digital Economy; AI and the Future of Work

Harvard Business Review, Future of Work

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Thank You

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