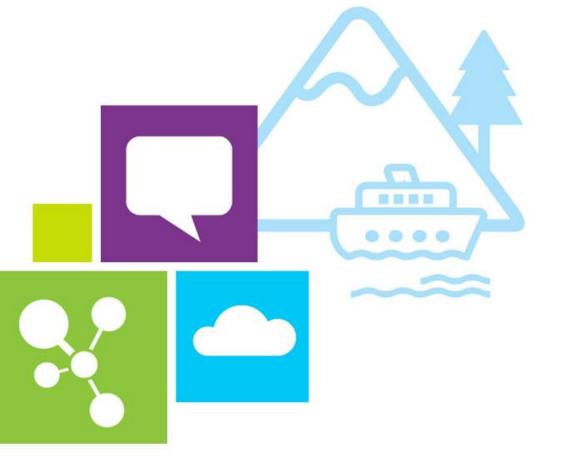
#### Microsoft<sup>\*</sup>



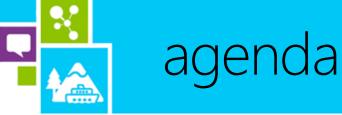


# Research Faculty Sumpti 2012

ADVANCING THE STATE OF THE ART



## End-User Programming for Mobile Devices



introduction Nikolai Tillmann, Microsoft Research

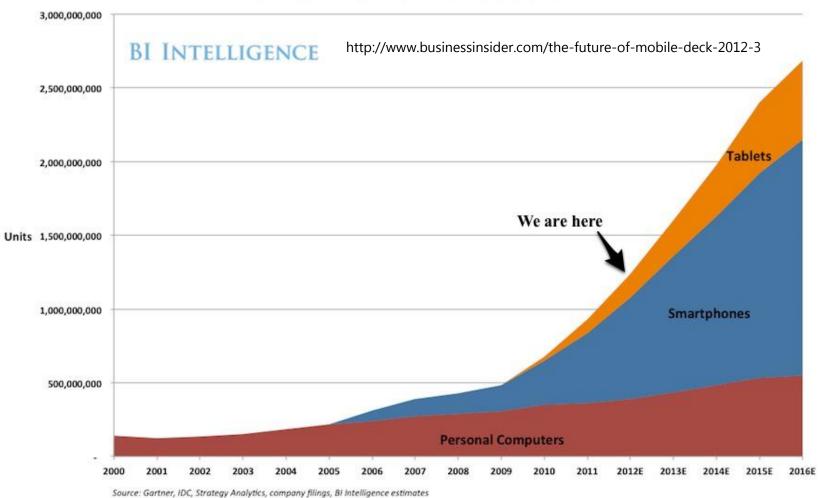
An Experiment in Developing Small Mobile Phone Applications Comparing On-Phone to Off-Phone Development Tuan A. Nguyen, Sarker T.A. Rumee, Christoph Csallner, University of Texas at Arlington

Teaching introduction to computer science on mobile devices Suresh Lodha, University of California, Santa Cruz



## technology shift

#### **Global Internet Device Sales**





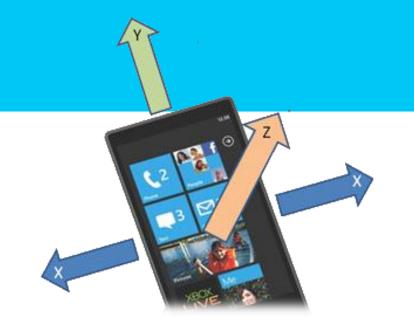
#### pervasive, sensors

mobile devices have more to offer than your last PC:

users carry phone at all times sensors: touchscreen, high-resolution camera(s),

WiFi, cellular, bluetooth,

GPS, accelerometer, gyroscope, compass, ambient light sensor, proximity sensor, FM tuner, NFC, ...







### a touch-based IDE in your pocket

touchdevelop by Microsoft Research log in info installed p Create and share scripts on your phone with touchdevelop. Take the tour!	touchdevelop by Microsoft Research log in installed new to samples	<ul> <li>turtle triangle spiral</li> <li>A turtle program that draws triangles into a spiral.</li> <li>No capabilities required.</li> <li>actions data</li> </ul>	action main() Edit this action to create your own turtle drawings. $code \rightarrow initialize$ We are going to draw triangle if increasing sizes and different colors. Var length := 100 for 0 $\leq$ i $\leq$ 64 do	action main() Edit this action to create your own turtle drawings. code $\rightarrow$ initialize We are going to draw triangle if increasing sizes and different colors. var length := 100 for 0 < i < 64 do	code <mark>→ spiral color</mark> ((i + 1) / 64)			
🏄 26 🛞 🛄 🚆	accelero colors	main	Turn a little and draw a triangle $code \rightarrow turn(360 / 64)$	edit + select more	Picks a color an Number) (x : Ni		r spectrum. priv ng	ate; (x : tap for more
	accelerometer graph	Edit this action to create your own turtle drawings. no params	Increase size length := length + 2 Update color	anneity selected expression and above alari selection Update color	<del>(</del>	→	5	$\langle X$
	airplane easy	draw triangle Draws a triangle. private; (length : Number)	code $\rightarrow$ spiral color((i + 1) / 64) Draw a triangle. code $\rightarrow$ draw triangle(length)	code $\rightarrow$ spiral color((i + 1) / 64) Draw a triangle. code $\rightarrow$ draw triangle(length)	move cursor	move cursor	undo	backspace
new top featured	beat board	initialize Creates the trutle and wakes it up!. private; no params	©Don't forget to publish your turtle drawing!!	cut go to +	123 <b>-</b> 456. 7890	< < ≥ >	and or not wall true faise	"abc"
forum notifications	bouncy balls     /ojfl	Move Moves the turtle to a specified distance. If the pen is		to diploand selected action and below				sung
Reso	forgotten songs	down, it will draw a line as it moves. private; (distance : Number)			cut	сору		rename
	no to nicture	move to					≔	►►I
• • • • · · ·	(+ @ ····		<ul> <li>▶ ⊕ (♣) ⊗ …</li> </ul>				explore all	next suggestions

**touch**develop is an app to create, share, run scripts everything happens on your phone – no PC required!

# touchdevelop

# demo

introduction to Windows Phone introduction to **touch**develop app basic program editing song shaker



#### what do our users do?

Balaji Athreya, Faezeh Bahmani, Alex Diede, Chris Scaffidi – Oregon State University

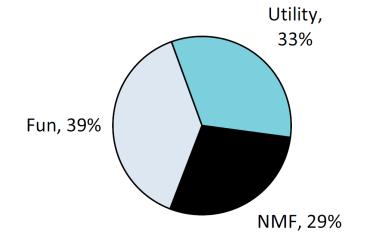
students conducted qualitative analysis of scripts

many scripts resemble regular apps

1/3 of scripts serve no apparent functional purpose (NMF)

other scripts tend to implement unique functionality

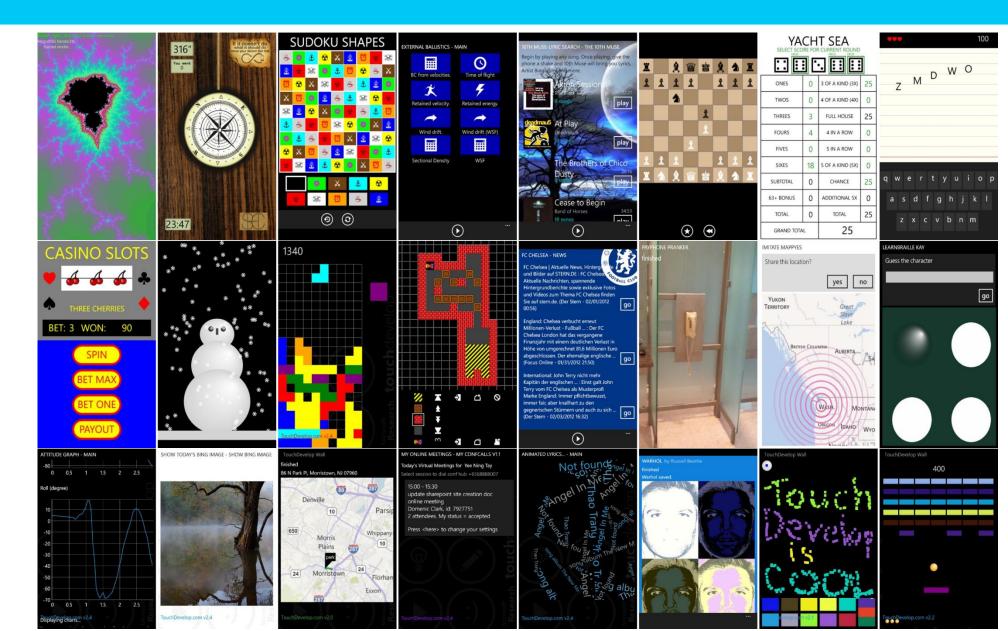
low rate of code reuse (5%)





#### touchdevelop.com

# >6000 scripts





a new programming experience

# reaching more people programming on the go

modern language specialized for mobile devices

social experience



#### book + slides



available free online touchdevelop.com/book touchdevelop.com/slides

introduction to programming on a phone how to use app + editor + language

for teachers + students



#### need phones?

#### University Phone Loan Program for **touch**develop

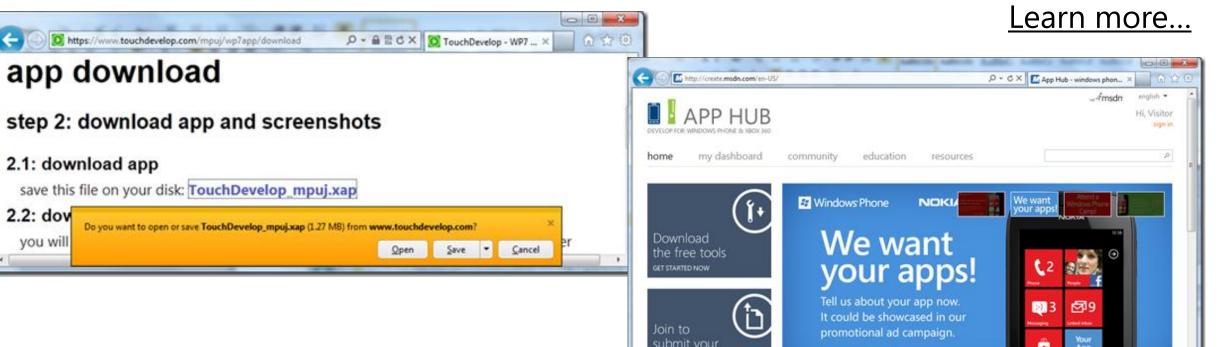
are you interested in using **touch**develop for teaching... basic programming concepts? mobile computing classes? compiler and languages classes? investigating the **touch**develop language? loan program: get Windows Phones for a semester. how to apply: <u>touchdevelop.com/teach</u>





#### submit your scripts as real apps to Windows Phone Marketplace!

requires App Hub developer account (free for students via <u>Dreamspark</u>) app needs to pass regular certification process on App Hub





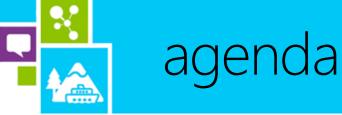
opportunities...

# teaching

introductory courses, advanced courses

research

user interfaces, clone analysis, privacy concerns, plug-ins, distributed state, distributed execution



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