



COLLEGE OF TECHNOLOGY

Department of Computer & Information Technology

PURDUE  
UNIVERSITY™

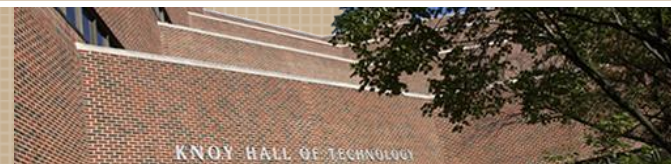
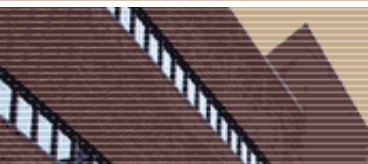
# Designing a One-Day Program to Engage Interest in STEM

**Alka Harriger**  
harrigea@purdue.edu

&

**Brad Harriger**  
bcharrig@purdue.edu

**NAPE PDI, April 17, 2012, 2:15-3:30 pm**





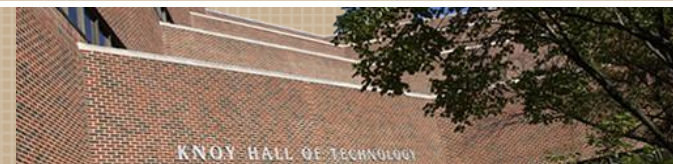
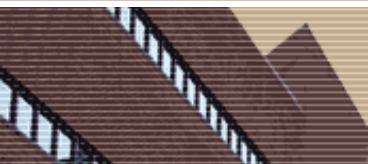
# COLLEGE OF TECHNOLOGY

Department of Computer & Information Technology

**Abstract:** Inspiring interest in STEM subjects in today's youth is a critical, national goal. Unfortunately, developing such a program is a challenge. The literature suggests that demonstrating the societal relevance of specific subjects will better reach and convince students to consider STEM. Through an evolutionary process, the workshop presenters developed a one-day program with exactly that objective. They will share several hands-on activities that use freely-available tools that can be easily modified reach target groups.

**Intended Audience:** The activities presented may be used by educators in middle school and, high school as well as college faculty and staff who offer (or want to offer) outreach activities to spark interest in their STEM programs/subjects.

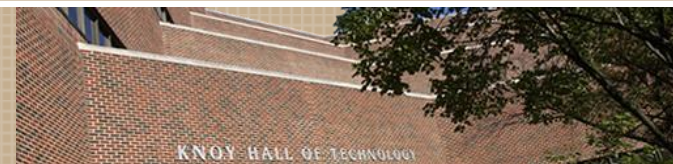
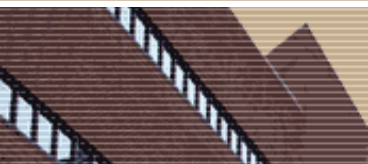
**Objectives:** Participants will get sample activities that employ freely available tools to spark interest in STEM subjects. The presenters' areas are Information Technology (computing) and manufacturing, but we can describe adaptations for other areas.





## **Workshop Agenda**

- 1. SPIRIT & COT Outreach Programs**
- 2. Converting 1-week camp to 1-day program**
- 3. Goals for each activity**
- 4. Sampling of interactive activities**
  - a) Dancing in the Streets with Scratch**
  - b) Researching Health Information with Technology**
  - c) Creating your own Social Network with Technology**
  - d) Getting Fit with Technology**
- 5. Summary**





## **SPIRIT & COT Outreach Programs**

### **1. SPIRIT (Surprising Possibilities Imagined and Realized through Information Technology)**

- <http://www.ITPossibilities.org>

### **2. COT Outreach Programs**

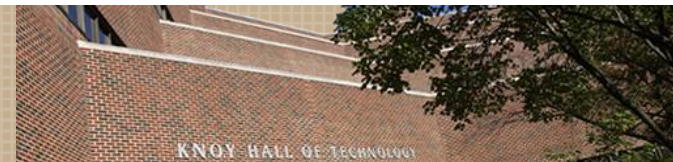
- <http://www.tech.purdue.edu/camps/>

### **3. Primary goals**

- **Correcting misconceptions about STEM**
- **Recruiting target groups to STEM**

### **4. Differences**

- **One week vs. one day vs. one 45-min session**



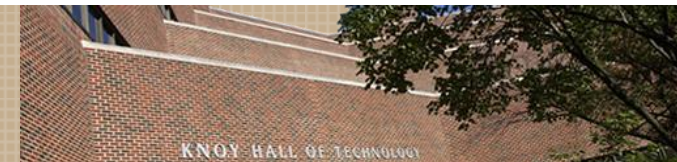
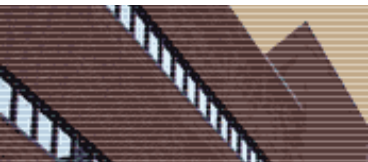


### **Goals**

- **Correct negative perceptions about STEM**
  - **STEM skills are relevant to a broad range of disciplines**
  - **STEM benefits society**
  - **STEM work can be fun, welcoming, interesting**
  - **Both men and women can have successful careers in STEM**

### **Approach**

- **Let participants try out and create useful product using technology**
- **Relate activity to STEM study in college**
- **Use presenters who look like participants**
- **Provide take-away**



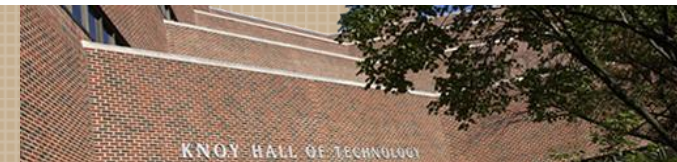


## Goals

- **Correct negative perceptions about STEM**
  - Skills are relevant to a broad range of disciplines
  - We benefit society
  - Our work can be fun, welcoming, interesting
  - Both men and women can have successful careers in STEM

## Approach

- Let participants try out and create useful applications in MANY subject areas
- Give guidance on what to do now to have a successful career using engaging presenters
- Provide take-aways



# SPiRiT one-week camp



## COLLEGE OF TECHNOLOGY

Department of Computer & Information Technology



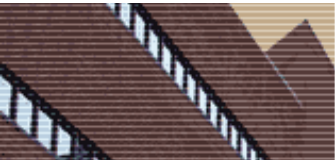
	Monday	Tuesday	Wednesday	Thursday	Friday
<b>8:30 AM</b>	8:30 - 9:30 Elevator Speech	8:30 - 9:30 new Alice feature	8:30 - 9:45 Entrepreneuership Session	8:30 - 9:30 CS Unplugged	Parallel sessions: 8:30, 9:30, 10:30 1. Alice in a cave 2. Complete Final Assessments 3. Work on SPiRiT projects
<b>9:00 AM</b>	9:30-10:40 Students: Intro to Alice Guidance Counselors: Meet with university advisors	9:45 - 10:45 IT Careers Panel	9:50 - 10:45 new Alice feature	9:35 - 10:45 Work on Projects	
<b>10:50 AM</b>  <b>Mon-Wed: Parallel Sessions</b> <b>10:50, 1:10 , 2:20, 3:45</b> <b>Lunch noon- 1 pm</b> <b>break 3:25- 3:40 pm</b>	1. Music and IT  2. Theatre and IT  3. Moving Beyond the Screen: Merging IT and Fashion through E- Textiles  4. Alice work session	1. Robot races  2. Pico Cricket Design Studio  3. New Applications for Smart Phones  4. Alice work session	1. Social Networking  2. How IT Supports Medicine  3. Intelligent Human-Machine Interaction  4. Alice work session	1. How IT Supports the Racing Industry  2. Introduction to Cyber Forensics  3. EV Grand Prix and Electric Vehicles  4. Alice work session	11:45 - 12:45 Celebration luncheon  12:45-1:45 Project demos  2:00-4:00 Students check-out (Teachers and counselors final meeting)  4:00-5:00 Teachers, counselors, camp counselors check-out



# COLLEGE OF TECHNOLOGY

Department of Computer & Information Technology

9:00 am – 9:30 am	<b>Computing Careers Overview</b>	
9:35 am – 10:35 am	Computing in Law Enforcement – Cyber forensics	
10:45 am – 11:45 am	Computing in Manufacturing	
11:50 am – 12:30 pm	LUNCH	
12:35 pm – 1:35 pm	Supporting Human Interaction with Computing	
1:45 pm – 2:45 pm	Computing in Health Sciences	
2:55 pm – 3:55 pm	Creating Animations with Scratch	

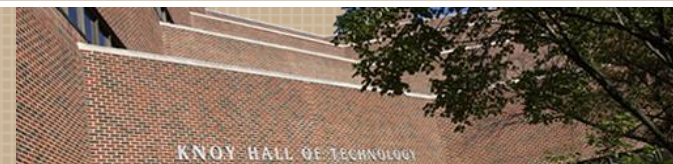
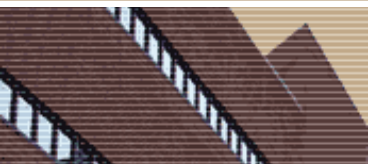






## **Converting 1-week camp to 1-day program**

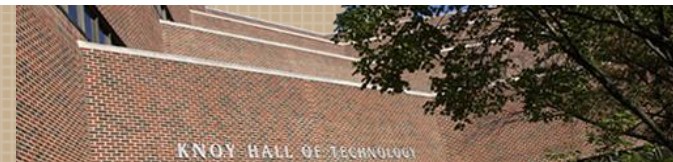
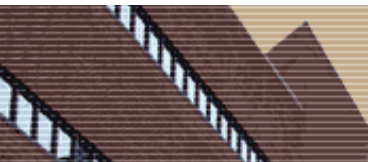
- 1. Select activities with greatest, positive feedback**
- 2. Select presenters who look like the students**
- 3. Begin with overview of breadth and flexibility of technology careers**
- 4. Hire experienced college students to lead them through all activities**
- 5. Provide monetary incentive to increase response rate on feedback survey**





## **Goals for each activity**

- 1. Convey (positive) societal impact of STEM**
- 2. Employ freely-available tools**
- 3. Activity should be doable in allotted time**
- 4. Participants work in teams**
- 5. Each team creates and may present final product**
- 6. Supply take-away instructions for participants to repeat activity later**
- 7. Provide contact information of presenters (indirect recruiting to our programs)**



# What is your passion?



## COLLEGE OF TECHNOLOGY

**Music**

A computer workstation with a monitor, keyboard, and mouse, used for music production or digital audio workstations.

**Movies**

A movie poster for Avatar, showing a close-up of a blue-skinned Na'vi character's face with a glowing green eye.

**Fashion**

A 3D digital model of a person wearing a futuristic, glowing, translucent blue dress, representing digital fashion design.

**Education**

A 3D white figure holding a stack of colorful books, symbolizing education and learning.

**Healthcare**

A large medical MRI scanner, representing healthcare technology.

**Farming**

A tractor with a yellow robotic arm, representing precision agriculture and autonomous farming.

**Sports & Fitness**

A person using a virtual reality fitness system with a steering wheel and a screen displaying a virtual environment.

**Sports & Fitness**

A 3D digital model of a human body, used for fitness tracking and biomechanical analysis.

**Robotics**

A group of students working with a prosthetic arm and a small white robot, representing hands-on robotics education.

**Construction**

A construction worker wearing a hard hat and safety vest, sitting at a desk with a laptop, representing construction technology.

**Sports & Fitness**

A person using a virtual reality sports system, leaning forward as if playing a game.

**Law Enforcement**

A police officer standing next to a desk with a computer monitor and a box labeled 'EVIDENCE', representing law enforcement technology.

**Cooking**

A kitchen counter with a laptop and a smart scale, representing smart home technology in cooking.

**Automobiles/Racing**

A student-built racing car on a track, representing automotive engineering and racing technology.

**Disaster Relief**

A small, tracked robot used for search and rescue operations in disaster relief.

**Disaster Relief**

Students operating a robot in a simulated disaster relief environment, representing humanitarian technology.

**Automobiles/Racing**

The interior of a car, showing the steering wheel and dashboard, representing automotive technology.

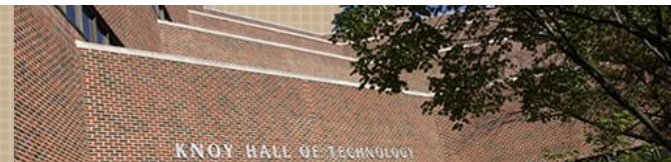
**Automobiles/Racing**

The interior of a car, showing the steering wheel and dashboard, representing automotive technology.



## How does <fill in area> benefit from technology?

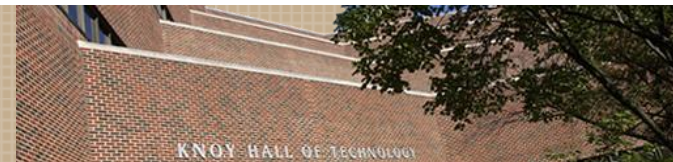
- **Entertainment: music, movies & games**
- **Everyday living: construction, fashion & cooking**
- **Human interaction: social networking & office tools**
- **Health: personalized healthcare, diet management**
- **Safety: disaster relief (e.g., firefighting robots)**
- **Law enforcement: cyber forensics**
- **Education: tools to visualize concepts**
- **Sports/fitness: track and/or perform activities**
- **Design & manufacturing: simulation**





## **Activity: Dancing in the Streets with Scratch**

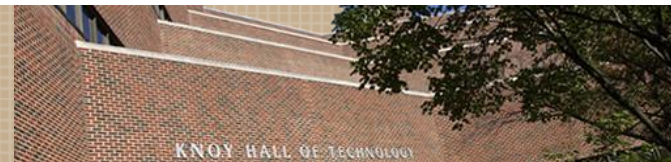
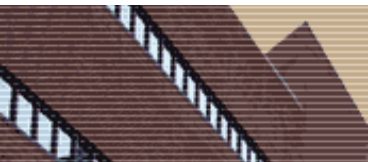
- 1. Societal Impact: education & entertainment**
- 2. Tool(s): Scratch available at [scratch.mit.edu](http://scratch.mit.edu)**
- 3. Time allotted for activity: 45-75 minutes**
- 4. Teamwork: create animation to inform**
- 5. Take-away**
  - Instructions on creating specific animation that include how to download the tool later**
  - Working animation on Scratch website**
  - Relevance of Scratch to learning programming, a foundational subject in computing programs**





## **Activity: Researching Health Info with technology**

- 1. Societal Impact: health**
- 2. Tool(s): Search engine & Prezi at [prezi.com](http://prezi.com)**
  - Free Edu Enjoy access for .edu emails
- 3. Time allotted for activity: 60 minutes**
- 4. Teamwork: research disease & develop Prezi**
- 5. Take-away**
  - Knowledge of assigned disease
  - Working Prezi to educate others about disease
  - Experience using Prezi to create dynamic presentation





## **Activity: Creating your own Social Network**

**1. Societal Impact: communication**

**2. Tool(s): socialGo**

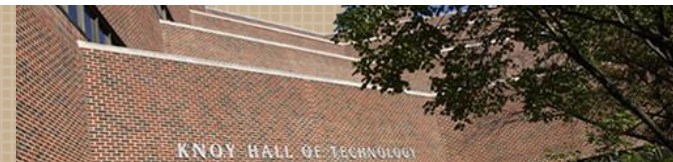
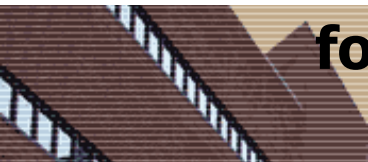
- Free 14-day trial at <http://www.socialgo.com/>
- Free tools: [www.elgg.org](http://www.elgg.org), [www.spruz.com](http://www.spruz.com), [wall.fm](http://wall.fm)

**3. Time allotted for activity: 60 minutes**

**4. Teamwork: identify key messages & social network**

**5. Take-away**

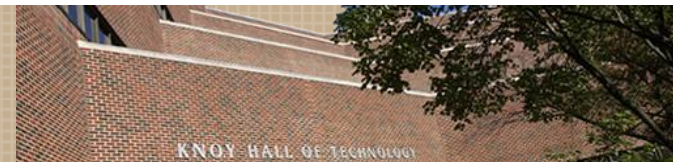
- Instructions on creating social network site for specific cause, including instructions
- Experience using socialGo to create social network for a specific cause





## **Activity: Getting Fit with Technology**

- 1. Societal Impact: address obesity epidemic**
- 2. Tool(s): nanoNavigator**
  - **Download link available at**  
**[http://www.phoenixcontact.com/automation/34197\\_34424.htm](http://www.phoenixcontact.com/automation/34197_34424.htm)**
- 3. Time allotted for activity: 60 minutes**
- 4. Teamwork: develop simulation of activity**
- 5. Take-away: nanoNavigator flowchart of game simulation**

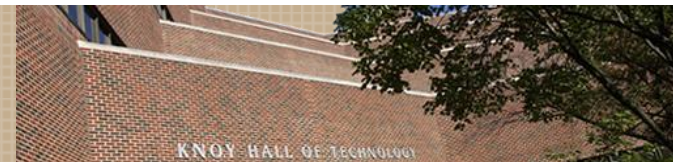






## **Other Activities**

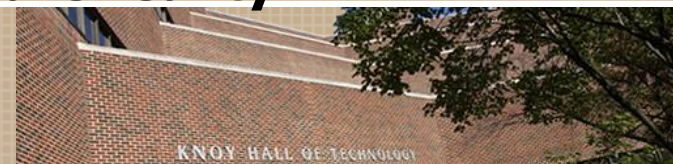
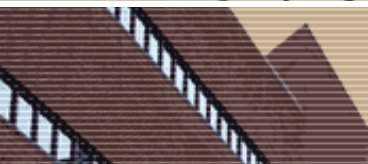
- 1. Creating a commercial with Xtranormal**
- 2. Creating a simple game with Small Basic**
- 3. Analyzing needs for a future cell phone  
(mostly paper & pen team activity to practice systems analysis)**
- 4. Developing a website using Visual Web Express**
- 5. Dissecting an old PC & putting it back together**
- 6. Investigating a crime scene to capture digital evidence**





## SUMMARY

- **Most don't realize how pervasive IT really is**
  - Choose activities that show societal impact
- **Most don't realize that using technology can be fun**
  - The right activity CAN spark interest
- **Many think you have to be a genius to be in STEM**
  - A doable and repeatable activity is important
- **Some think there aren't enough jobs in STEM or it is less secure**
  - Share data to show the current and future reality





# COLLEGE OF TECHNOLOGY

Department of Computer & Information Technology

## Questions?????

### Contact Information

- **Alka Harriger, SPIRIT PI**
    - Phone: 765-494-2565
    - Email: [harrigea@purdue.edu](mailto:harrigea@purdue.edu)
  - **Brad Harriger, TECHFIT Co-PI & SPIRIT Presenter**
    - Phone: 765-494-7515
    - Email: [bcharrig@purdue.edu](mailto:bcharrig@purdue.edu)
- FAX: 765-496-1212**  
**www.ITPossibilities.org**
- FAX: 765-4??-????**

