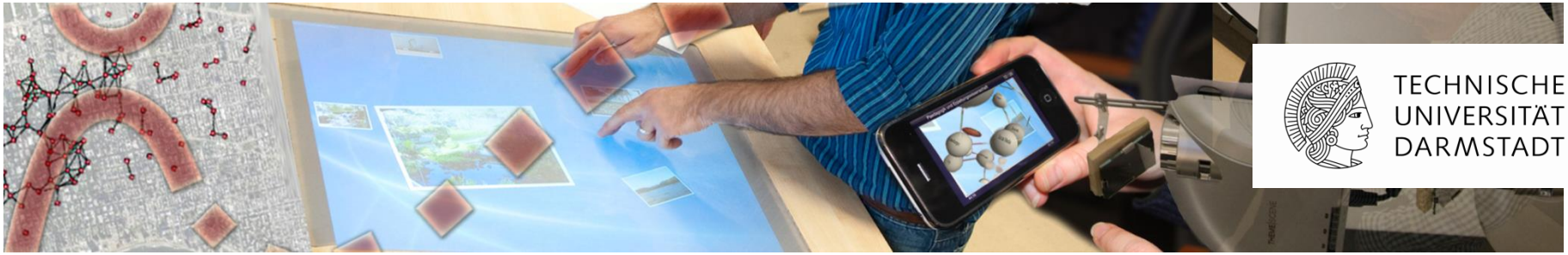

TK3 Exercises
Microsoft .NET Gadgeteer
(hands-on session)

Summer Term 2015

Before we start...

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- Unpack your laptop and start Visual Studio*
- Fill out the rental document (only one person per group!)
- Get one blue box (Starter kit)

IMPORTANT!

Please return all Gadgeteer kits on **08.06.2014**!

Please do not start on your own, first listen to the instruction then do the tasks carefully!

- *Already installed?
  1) Install Visual Studio 2013
  2) Follow instructions on: https://www.ghielectronics.com/support/netmf
  3) Enjoy

- For VS 2012 and VS 2015 look at https://moodle.informatik.tu-darmstadt.de/mod/page/view.php?id=27124

FEZ Spider Starter & Tinker Kits

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The Starter kit includes (#1-#14):

- FEZ Spider Mainboard
- Display T35 Module
- USB Client DP Module
- Mini USB cable
- Camera Module
- 2x Multicolor LED Module
- 2x Button Module
- Ethernet J11D Module
- SD Card Module
- USB Host Module
- Extender Module
- Joystick Module
- IDC cables

The Tinker kit includes (#15-#25):

- FEZ Spider Mainboard
- Display TE35 ModuleUSB Client EDP Module
- 2x Button Module
- Ethernet J11D Module
- Joystick Module
- LED Strip Module
- Light Sensor Module
- SD Card Module + 128mb SD Card
- Tune Module
- USB Host Module
- IDC cables
- Holey Board
- Micro USB Cable

Live Demo

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:-)

Assignment I

- Use moodle for your submission
- Upload your full Gadgeteer solution (containing every file)
- Upload a short video demonstrating your solution

- Deadline: **08.06.2015, 12:00**

Assignment II

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- Note: We can only give you full points if you
  - Comment your code
  - Write understandable, well written code
    (i.e. do not use one big class or method)
  - Connect all modules as shown in the following picture
  - have a solution that is fully runnable without any external tools
  - uploaded a short demonstration video

Assignment: Mastermind Game

- Create a simple Mastermind game using Gadgeteer! ☺

- *Note: You can play a one player Mastermind game online at http://www.archimedes-lab.org/mastermind.html*
- ***Important**: The online version is only an example to help you understand the game mechanics, not the actual task description!*

Assignment: Mastermind

- The game should have two modes: 1 Player and 2 Player
  - 1 Player: The initial code has to be random selected by the device
  - 2 Player: The initial code has to be selected by the first user, while the other one has to guess it.

- Each code needs to have exactly 4 pins in length where every pin has one of 6 possible colors.
  - (i.e. available pin colors: red, blue, green, purple, yellow, magenta; example code: blue, magenta, green, magenta)
  - Colors can be used multiple times in each code.

Assignment: Mastermind

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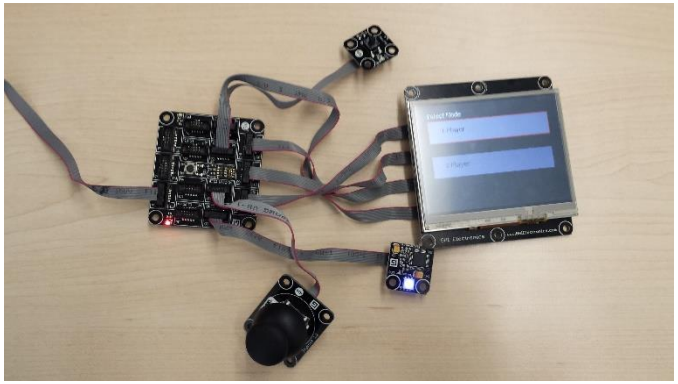
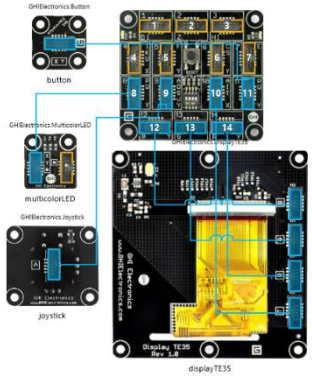
- Each guessing player has exactly 10 or less rounds to guess the right code.
  - The code has to be entered with the Joystick module.
  - After entering a valid code guess (4 colors selected), the user has to click the Button module to submit his guess.
  - When submitted, the application indicates how many pins are correct in color and position or how many pins have the correct color, but not the correct position
  - The indication needs to be sorted! First show how many pins are totally correct (correct color and position), then how many pins are partially correct (only correct color), then how many pins are wrong
    - (i.e. secret code is: Green, Blue, Red, Red
    - guess is: Red, Blue, Yellow, Purple
    - indicator shows: Correct, Partially Correct, Wrong Wrong)
  - If the player wins (entered correct code): Show the initial code, display a "Winner" message and flash the LED green.
  - If the player fails (10x wrong codes): Show the initial code, display a "Loser" message and flash the LED red.
- After the game is won or lost, the button can be pressed to go back to the initial game mode selection screen.

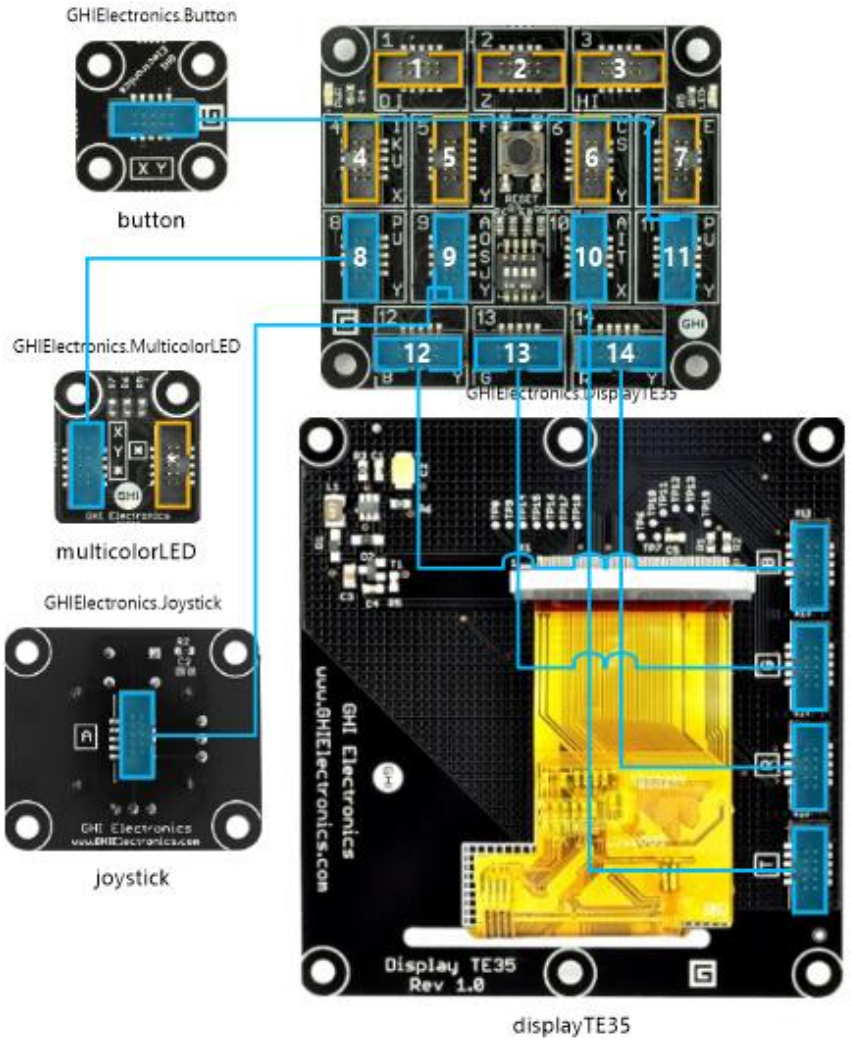
Assignment: Mastermind

- The game itself has to be entirely based on Gadgeteer hardware:
  - Use the Gadgeteer display for your output
  - Use the Joystick module for selecting the current color of a pin and for selecting the game mode (1 or 2 player game).
  - Use a button module for submitting your initial code (player 1) and for submitting your current guess (player 2)
  - Use the multicolor LED module (or the LED strip module) for signaling the actual game state.
    - (i.e. turn blue if it is player 2 turn, green if player 2 guesses the right code, flash red if player 2 fails to guess the right code in 10 rounds)





Assignment: Mastermind Modules

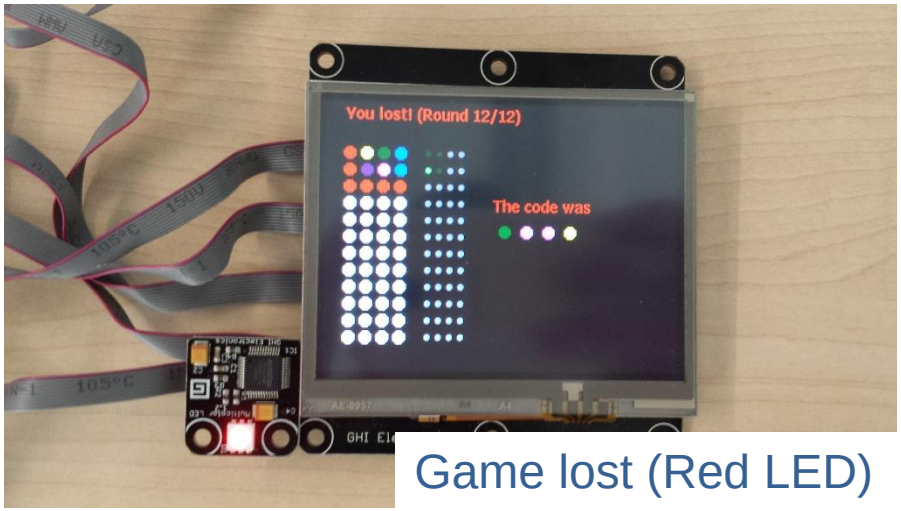


Assignment: Mastermind (Example)

- 1) Application Start: Show mode selection screen (1 or 2 Player Modes)
  - select mode with your Joystick
- 2.a) One Player mode selected
  - Game generates initial random secret code (not visible for player)
  - Player 2 can now guess the right code within 10 rounds
    - (i) Player 2 guesses the right code → LED flashes green & initial code shows up
    - (ii) Player 2 does not guess the right code after 10 rounds → LED flashes red & initial code shows up
  - After losing or winning the game, click the button again and you will get back to *1) Application start*
- 2.b) Two Player mode selected
  - Player 1 enters initial secret code and hands the device to Player 2 (code not visible for player 2)
  - Player 2 can now guess the right code within 10 rounds
    - (i) Player 2 guesses the right code → LED flashes green & initial code shows up
    - (ii) Player 2 does not guess the right code after 10 rounds → LED flashes red & initial code shows up
  - After losing or winning the game, click the button again and you will get back to *1) Application start*

Assignment: Mastermind (Example)

Intial Game Mode Selection



Game lost (Red LED)

Game Screen

Game won (Green LED)

Next exercise: Final Software Project

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- Prepare some cool ideas until **08.06.2015** ☺

- Using Gadgeteer is not a MUST
- You can use other relevant platforms:
  - uMundo, WebApps, Android, iOS...
- Hardware resources:
  - Gadgeteer (27 kits + Extra Modules)
  - Mobile programming (use simulator → iOS and Android)

Finding an Awesome Idea

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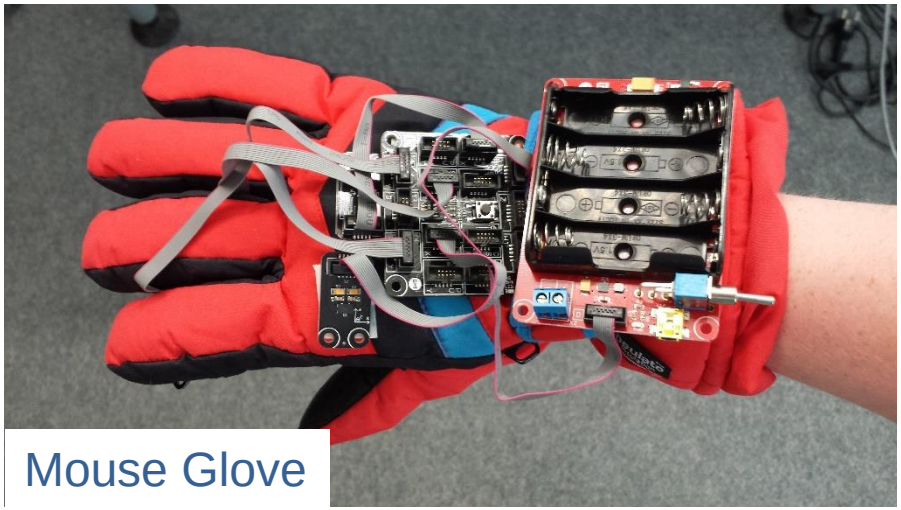
- Suggestion: Do a group brainstorming for generating ideas
  - Generate more than you think, don‘t decide too early
- Afterwards, go through the ideas and answer the following questions:
  - Can we describe the problem and solution in a user story?
    - you (as a group) need to understand the problem domain!
  - Can we implement a significant/interesting part of the solution?
    - time frame!!
    - complexity: not much experience with Gadgeteer\ uMundo \ UbiComp
  - Can you demonstrate the solution in a "cool" way?
    - Video, mockups…
    - Limit the scope of the demonstrator
- **Additional constraint: Does the solution involve UbiComp technology?**
  - data from “sensor” or integration of appliances
  - interaction away from the desktop

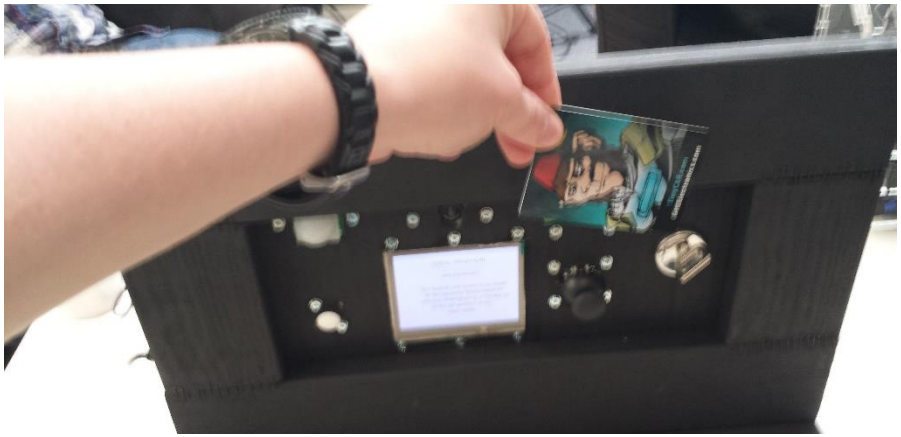
Gadgeteer Projects from last year

Smart Mailbox

Multiplayer Game Cubes



Mouse Glove



Smart Remote Door-Lock (incl. Android)

Available Extra Gadgeteer Modules

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- Motion Detection Module
- WiFi Connector
- Potentiometer
- Accelerometer
- Compass
- Light Sensor
- Moisture Sensor
- Cellular Radio
- GPS
- Motor Driver
- Bluetooth Connector
- Thermocouple
- RFID Reader

Contact & Office hours

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- Use the Moodle platform for support

- Office hours:
  - 27.05.2015 – 14:00-15:30 (TK Pool D012a)
  - 01.06.2015 – 16:15-17:00 (C120)
  - Maybe one more office hour if necessary.