Teaching Computer Science Without a Computer
Session Plan

• Introduction to Unplugged methods (~5 minutes)
• Unplugged activities (~30 minutes):
  • My Robotic Friends
  • CSUnplugged: Binary Numbers & Image Representation
Teaching CS without a Computer

- CS is not just about computers!
- What if you have no access to computer lab?
- What if students don't have the ICT skills to use certain apps / devices?
- Can use unplugged methods
Activities

• We are going to split into groups of 4 - 5
• Then split into sub-groups (computer scientists and robots)
• The robots will work on CSUnplugged activities
• The computer scientists will work on My Robotic Friends
• Then we'll swap
• But not yet, I will explain *My Robotics Friends* first
My Robotic Friends

• Created by *Thinkersmith* for CSEd week
• An example of sequencing and writing algorithms
• Choose a cup tower (or a few) for the robots to build
• The computer scientists will write instructions for robots
My Robotic Friends

But you can only use the following six symbols:

↑ - Pick Up Cup
↓ - Put Down Cup
→ - Move 1/2 Cup Width Forward
← - Move 1/2 Cup Width Backward
↺ - Turn Cup Right 90°
↺ - Turn Cup Left 90°
My Robotic Friends - Example

We may want our robot to build this tower:
My Robotic Friends - Example

Start from the cup stack - each step is 1/2 a cup width
My Robotic Friends

• Split into groups of 4 - 5
• Then split groups into computer scientists / robots
• Computer scientists will write algorithms for 10 - 15 minutes
• Robots will do the CSUnplugged activities
• Swap over and robots will follow the algorithms and write their own for 10 - 15 minutes
• Come back together for a wrap-up at the end
Computer Science Unplugged

• CS Unplugged for short
• A collection of free activities
• Large range of concepts relevant to DT curriculum
• Activities targeted at age groups 5 - 12 - but for anyone!
• We will do the Binary Numbers & Image Representation activities today
CS Unplugged - Binary Numbers

- When a binary number card is not showing - it is represented by a 0
- When it is showing, it is represented by a 1
- This is the binary number system
- The system we normally use is the decimal system
- decimal = 10 digits = 0 1 2 3 4 5 6 7 8 9
- binary = 2 digits = 0 1
CS Unplugged - Binary Numbers

- What number is 10001 in decimal?
- What would 17 be in binary?
- How about 6, 15, 21?
CS Unplugged - Binary Numbers

• What do you notice about the number of dots on the cards?
• How many dots would the next card have if we carried on to the left?
• What is the biggest number you can make? What is the smallest?
CS Unplugged - Binary Numbers

• Is there more than one way to get any number?
• Is there any number you can’t make between the smallest and biggest numbers?
• Now try counting from zero onwards, is there a pattern?
CS Unplugged - Binary Numbers

• What happens when you put a 0 on the right of a binary number?

• Is there a pattern for odd and even numbers?
CS Unplugged - Image Representation

• How could you represent different fonts or images on a computer?
CS Unplugged - Image Representation
CS Unplugged - Image Representation

6, 2, 2, 2
5, 1, 2, 2, 2, 1
6, 6
4, 2, 6, 2
3, 1, 10, 1
2, 1, 12, 1
2, 1, 3, 1, 4, 1, 3, 1
1, 2, 12, 2
0, 1, 16, 1
0, 1, 6, 1, 2, 1, 6, 1
0, 1, 7, 2, 7, 1
1, 1, 14, 1
2, 1, 12, 1
2, 1, 5, 2, 5, 1
3, 1, 10, 1
4, 2, 6, 2
6, 6
CS Unplugged - Image Representation