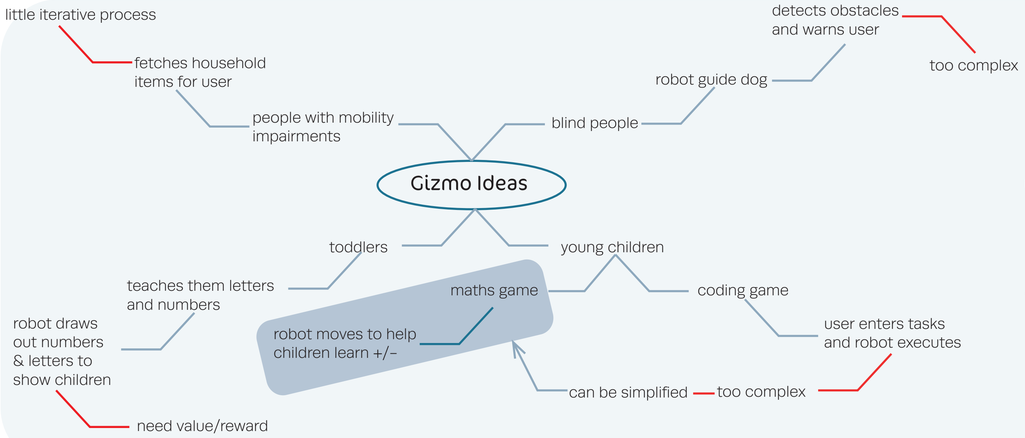
TeddyBot

Several young children find maths boring, and thus shows the usefulness of TeddyBot. It is a simple maths games designed to improve the mental maths of young children. A target number between 10 and 20 is given, as well as four numbers between 1 and 9. Pressing numbers on the keypad will cause the robot to move either forwards or backwards that number of steps. By adding and subtracting these four numbers (i.e making the robot move forwards or backwards that number of steps), the aim of the game is to get the robot to the correct square, providing a more interactive way for children to learn addition and subtraction.

Ideation



After assessing options, I decided to pursue the idea of a maths game for young children, as it could be achieved within the time constraints as well as having an appropriate amount of iteration and value/reward in it.

Final Design

Wheels

When the user enters a number on the keypad that is one of the options, the wheels will rotate, moving the robot either forwards or backwards depending on what the user has indicated, addition or subtraction.

Target Number

The target number is the number that will the user has to get the robot to. It will light up using either a red or blue LED when the board is plugged in.

Number Choices

4 numbers on the back of the robot will light up, and the user will have to use a combination of these 4 numbers to move the robot to the target number

LCD Screen

The screen on the back of the robot will prompt the user to enter their target number and then will display either a win or lose pattern at the end of the game

Electronics + Computing

1 Arduino Mega

All hardware components are connected to the Arduino Mega. Only one is needed for each of the board and the robot, as they have all the required pins. Code is uploaded to the board.

2 LEDs

LEDs on the robot are used to indicate which numbers can be used for movement, which switch off once that number has been used. At the end, the LEDs on the robot will display either a win or lose pattern, depending on the result. LEDs on the board indicate the target number to be reached

3 Buzzer

The buzzer will sound if the user presses a key that cannot be used as it is not one of the options.

4 Servos

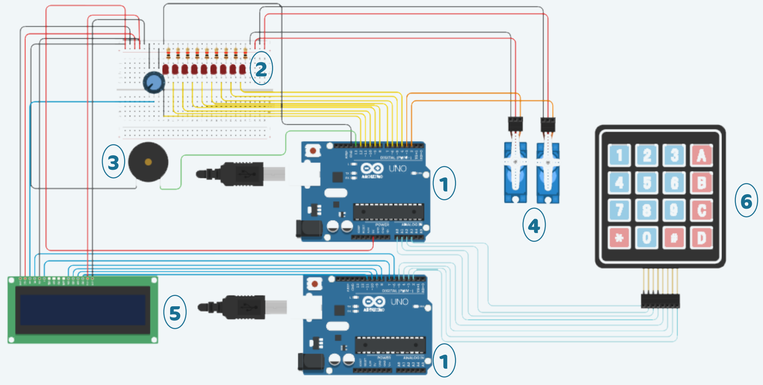
Mini servos cause the wheels to turn, and have been modified to make them continuous. Their potentiometer is removed and replaced with 2 5k resistors. They turn until the robot has reached the required square.

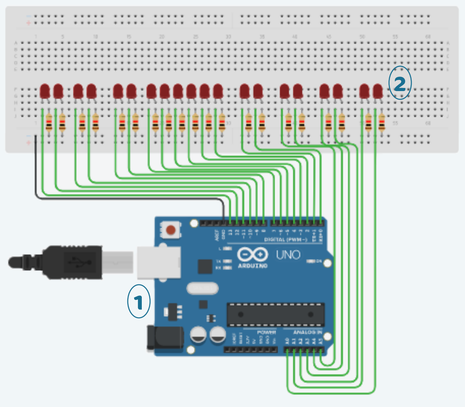
5 LCD Display

The LCD display prompts the user to enter their target number (the number they are attempting to reach) and at the end will display either a winning or a losing message to the user.

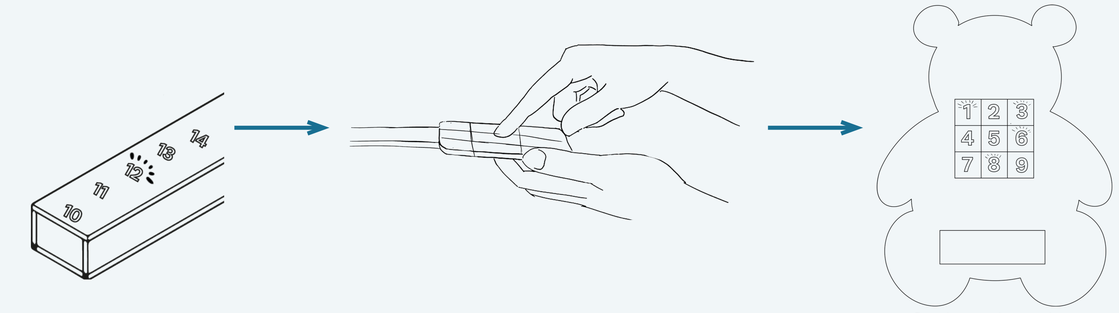
6 Keypad

The user can enter the distance they wish the robot to move using the keypad, as well as indicating whether they wish the robot to move forwards or backwards using the A and B keys (portraying addition and subtraction).





How It Works



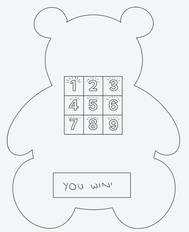
Plug in board and get target number (the number that lights up)

Enter the target number using the keypad

Get the number options from the lit up numbers on the back of the robot

Press a number on the keypad to move the robot that number of steps forward. Make sure that the number is one of the options available on the back of the robot, otherwise the buzzer will sound.

Repeat the process, pressing A and then a number to move the robot that many steps forward, or B and the number to move it that many steps backwards, until all 4 moves have been used up



If the robot has reached the target square, all lights will come on and the screen will display a win message. Otherwise, a cross will appear and it will display a lose message