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# BIOMEDICAL MECHANICAL ELECTRONICS

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YEAR 10 1ST

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# **Statement of intent**



Patient: Anna

**I intend to make a controller** for Anna, who was born with muscular dystrophy, that puts less strain on the upper limb. The controller will be made primarily for platformer games, requiring few controls.

**My accessible controller will include** much larger buttons, in contrast to other controllers, and a longer joystick to improve overall comfort. The buttons will also include combos to reduce hand movement; an example of this is pressing the left and right buttons at the same time. It will additionally include a programmable knob and an OLED screen to add customization, as it is Anna's personal controller and not anyone else's. It will be slightly angled and placed on the person's lap to further reduce strain on the weakened muscle.

**By using my controller**, upper limb mobility will be an afterthought and will be improved over time. Overall, the controller will prioritise comfort over performance and make controls easy to remember.

# Evaluation of existing ideas

Existing Ideas	Evaluation
 <p>XBOX Adaptive Controller</p>	<p>The XBOX Adaptive Controller is meant to be for people with all sorts of disabilities (not just for people with muscular dystrophy like Anna). It works with external equipment devices meant to be mounted onto the controller, such as buttons, triggers, joysticks, etc. This is to accommodate the different range of disabilities, giving the user more freedom. The controller includes a D-pad and two large buttons that perform many tasks, such as night mode.</p>
 <p>Project Leonardo</p>	<p>The Project Leonardo is a gamepad meant to prioritise comfort and long gaming sessions. The controller also includes customization (like the previously mentioned controller), such as analogue stick caps and buttons in different forms, which are targeted at a larger disabled audience. Two of these can be used to mimic the feeling of a default controller.</p>



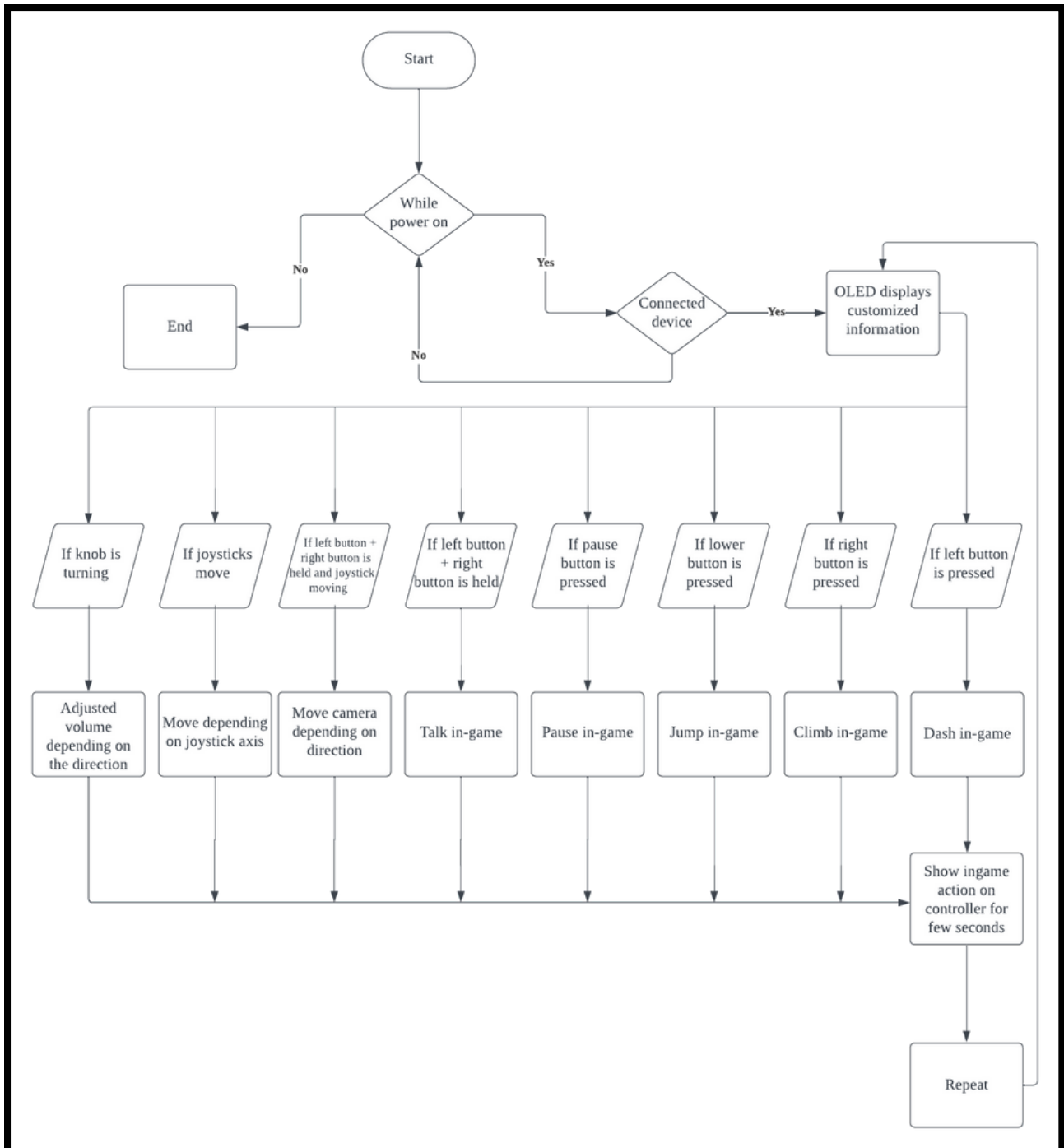
Quadjoy 3

The Quadjoy 3 is meant to be a joystick for quadriplegics, or people who have poor hand movement. The mouth-operated controller eliminates the need for upper limb involvement, as it is designed to be used solely within the person's mouth. It also doesn't skimp out on performance, mimicking an 8-button joystick. The joystick also works with external devices, such as buttons.

# Empathy map



# Logic flow chart



# Communication log with patient

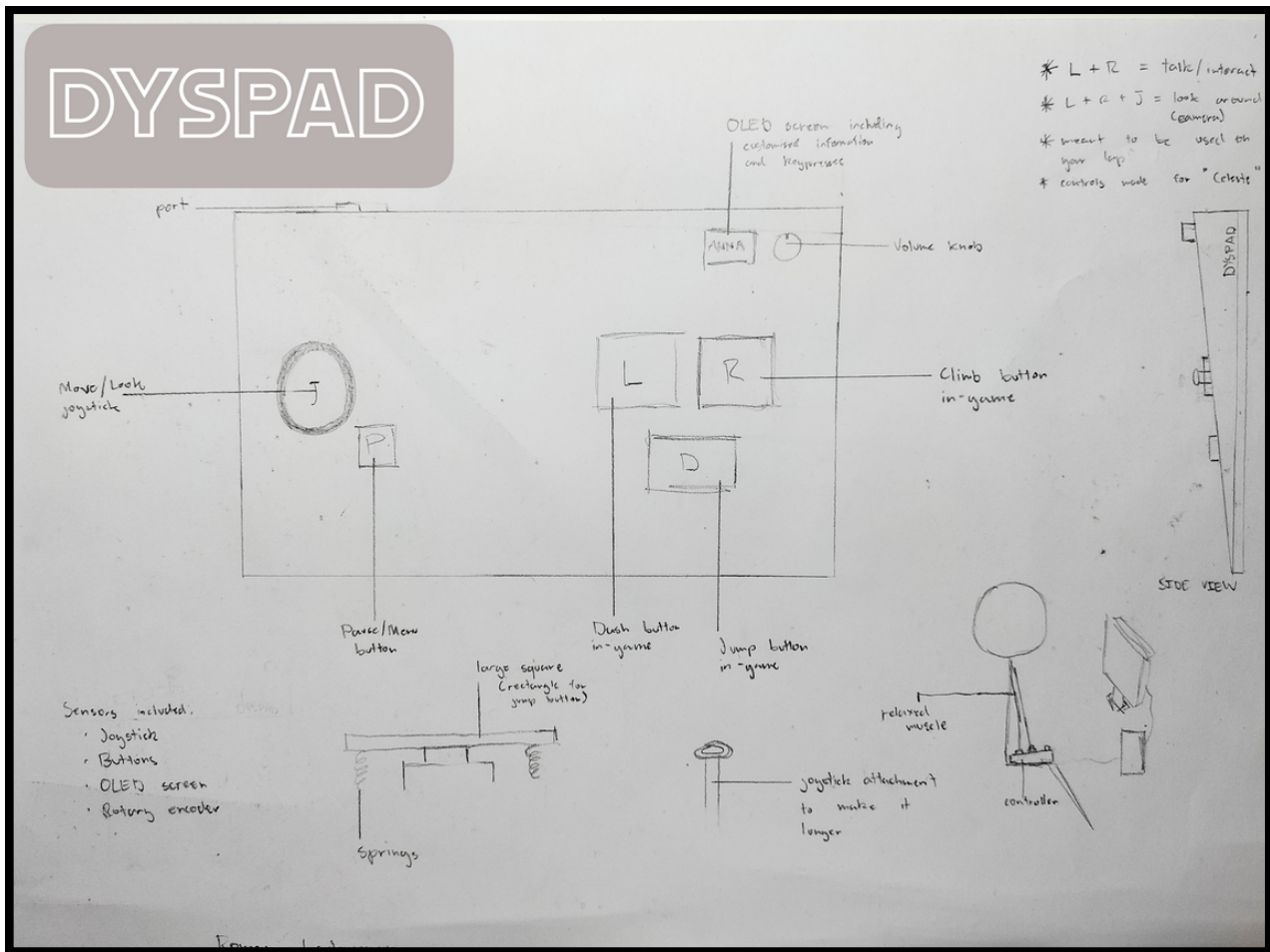
Type of Communication	Date	Who	About
Private message via Google Classroom	11/9/23	Ben Jones (Specialist)	Finishing an accessible controller concept for Anna, recieved feedback to add longer joysticks.
Email	12/10/23	Anna	Preference on buttons to left or right of the controller. She said her dominant hand is the right.



# Pseudocode

```
1  START
2    SETUP OLED
3    SETUP Joystick
4    SETUP Button
5    SETUP Rotary encoder
6    myButtonR = 1
7    myButtonL = 2
8    myButtonD = 3
9    myButtonP = 4
10   myJoystick = 5
11   myKnob = 6
12   myOLED = 7
13
14   Display customised message onto myOLED
15
16   IF myButtonD is pressed THEN
17     jump in-game
18   END IF
19
20   IF myButtonL is pressed THEN
21     dash in-game
22   END IF
23
24   IF myButtonR is pressed THEN
25     climb in-game
26   END IF
27
28   IF myButtonP is pressed THEN
29     pause in-game
30   END IF
31
32   IF myKnob is turning THEN
33     adjust volume to direction
34   END IF
35
36   IF myJoystick is moving THEN
37     move character according to axis
38   END IF
39
40   IF myButtonL + myButtonR is held THEN
41     talk/interact in-game
42     IF moving myJoystick THEN
43       move camera
44     END IF
45   END IF
46
47   IF myButtonL OR myButtonD OR myButtonR OR myButtonP OR myJoystick OR myKnob does action THEN
48     show in-game action on myOLED
49   END IF
50
51  END
```

# Pictorial



# UAT Plan

[https://docs.google.com/document/d/14YCvftYsn-StOgnKXl\\_umQhw798DIzpbalrOc7qaEXg/edit?usp=sharing](https://docs.google.com/document/d/14YCvftYsn-StOgnKXl_umQhw798DIzpbalrOc7qaEXg/edit?usp=sharing)