

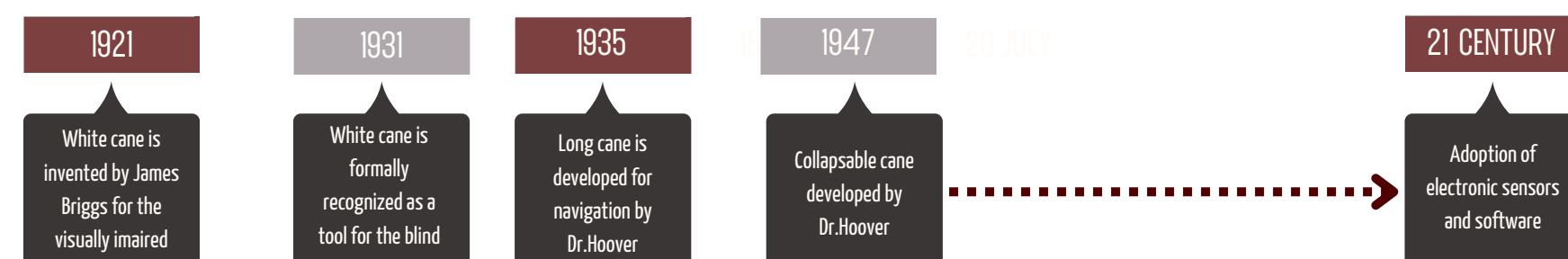
GUIDANCE UTILITY FOR IMPAIRED DAILY EXPERIENCES

"GUIDE"

Alyan Tharani, Diana Canchola, Jack Couture, Jack Letsinger, Noah Kilpatrick, Ryan Wu

PROBLEM STATEMENT

The visually impaired population makes up around 285 million people all over the world, 50 million of which are completely blind according to the World Health Organization. Although there have been many innovations to accessibility and our infrastructure, it remains difficult to navigate certain environments such as university campuses. The current limitations for the visually impaired include the inability to detect obstacles in front of them and the distances of those obstacles.

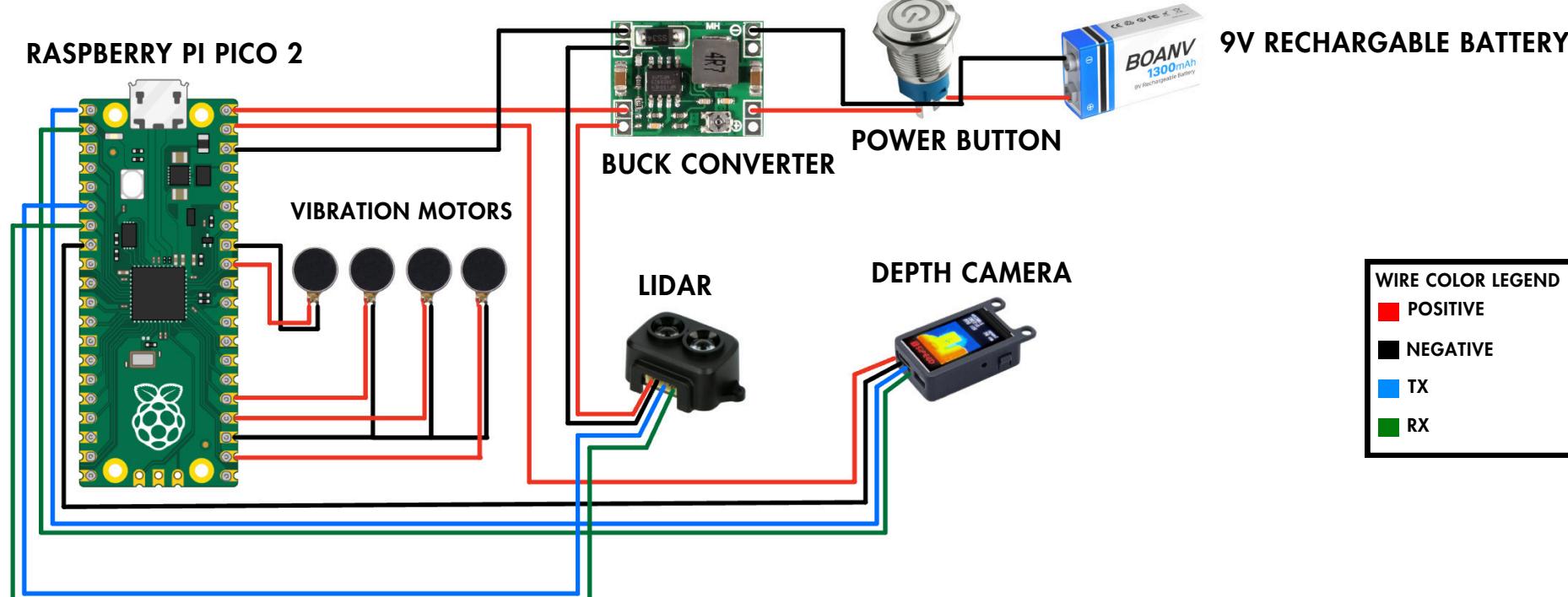


REQUIREMENTS AND CONSTRAINTS

GUIDE is geared towards visually impaired individuals, serving as a means to detect obstacles and to provide feedback to the user to alert them of their surroundings.

- FULL MOBILITY**
- OBSTACLE DETECTION**
- ALERT USERS**
- SMALL COMPACT SIZE**
- LIGHT-WEIGHT DESIGN**
- BATTERY LIFE**
- LOW LATENCY**

IMPLEMENTATION



RASPBERRY PI PICO 2

- Handles all communication between each system part
- Dual-core ARM Cortex-M33 processor provides a sufficient clock speed (150 MHz) to handle computation
- 21 mm x 51 mm size, 1.8-5.5V input power

9V RECHARGEABLE BATTERY

- Stronger, rechargeable battery reduces overall size
- 48.8 mm x 26.0 mm, 0.265 lbs

BUCK CONVERTER

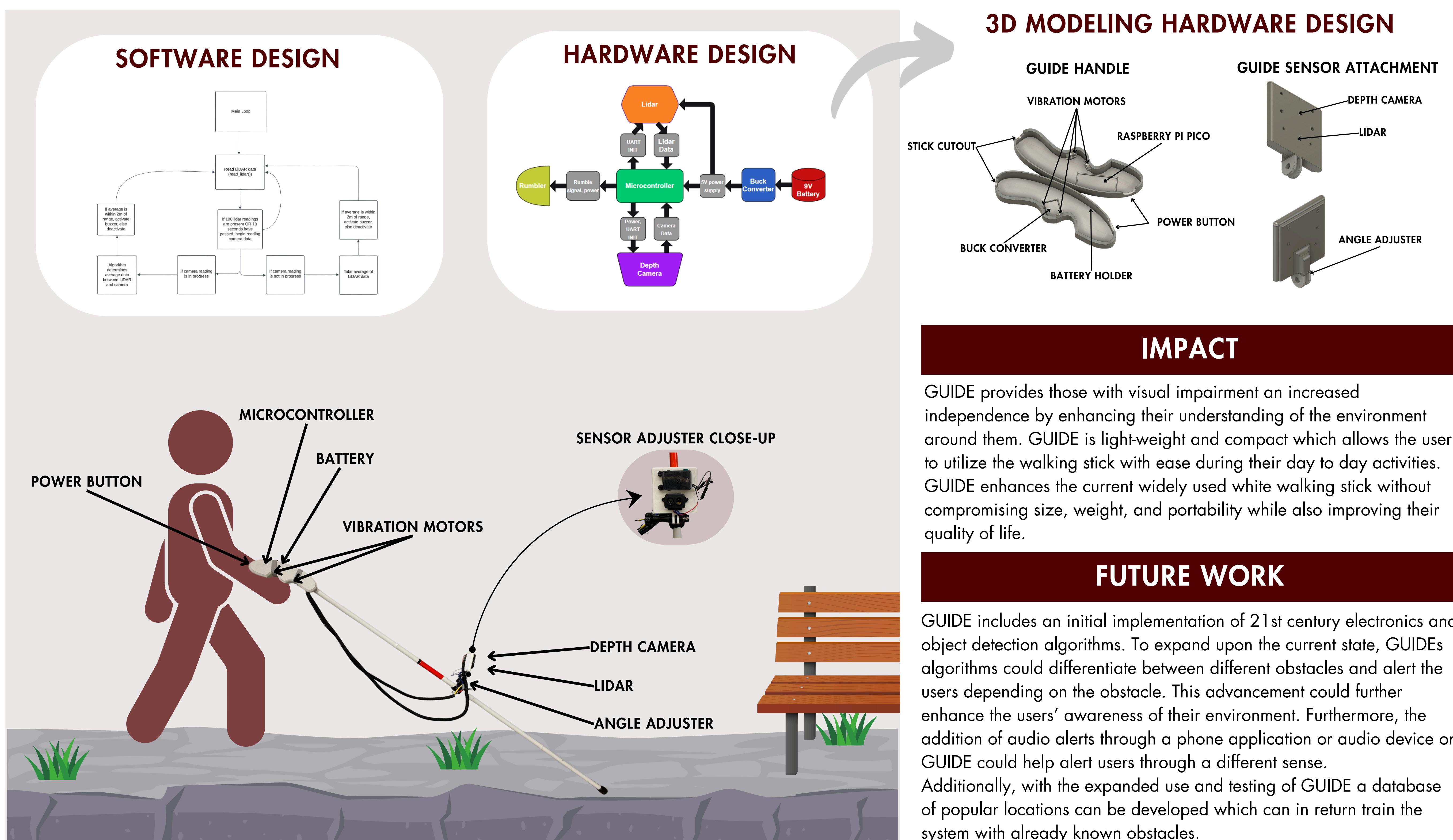
- Converts 9V battery input to 5V input for components
- 22 mm x 17 mm, 0.106 oz

LIDAR

- Powered by the battery
- 8 ms - 11 ms response time
- 10mm x 2.7 mm

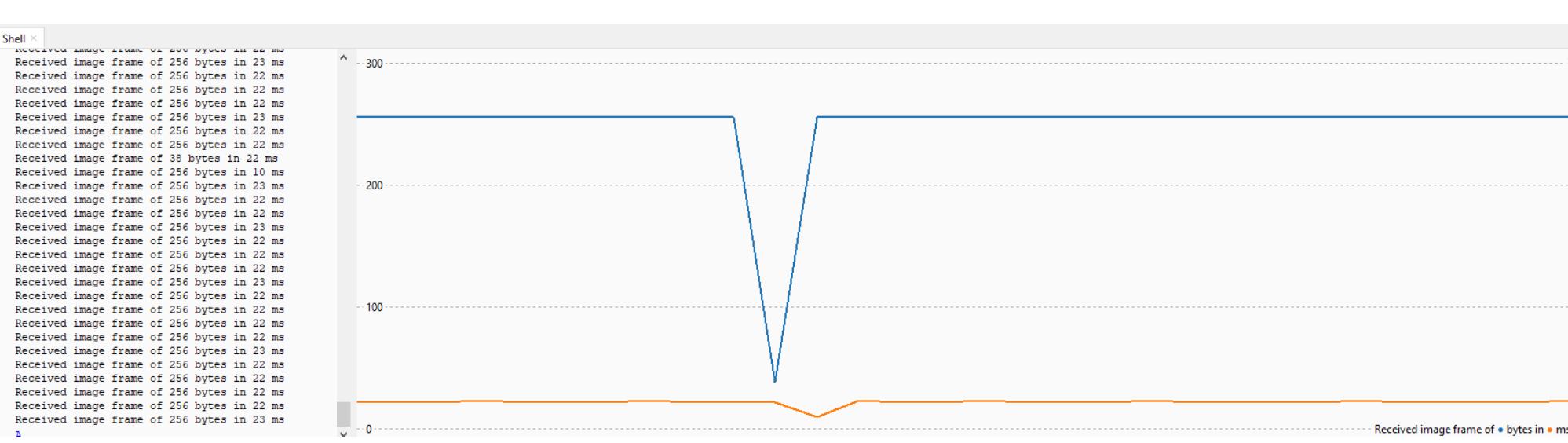
DEPTH CAMERA

- Powered through Pico
- 19 ms - 25 ms response time
- 10mm x 2.7 mm



RESULTS

DEPTH CAMERA DISTANCE AND RESPONSE TIME



SENSOR RESPONSE TIME

	NO LIDAR	LIDAR
NO DEPTH CAMERA	N/A	9.97 MS
DEPTH CAMERA	21.98 MS	44.14 MS

The response time of the sensors is a critical part of this project. Our initial target reaction time of 0.5 seconds (500ms), current data collection testing indicates that we will be well within the specification. It is interesting to note that the LiDAR had an average faster response time. Additionally, both sensors had a little to no response variation, with the depth camera ranging between 19 and 25 ms, and lidar ranging between 8 and 11 ms when tested individually. However, having both sensors collecting data at once (with limited cpu resources), makes the average data response around 44ms.

