Motion Detection Voice Memo

Introduction:

The initial idea came about during a conversation with my grandmother. She mentioned that while leaving the house she often forgot her walking stick and mask, even with notes etc. trying to remind her. As I had recently finished my previous Arduino project, the idea of creating an active reminder using an Arduino microcontroller came to mind

Build:

The full code is available on my GitHub however as a brief summary:

- Every second, the light dependant resistor records the level of light to a variable named lightValue
- If the lightValue is below a certain threshold (night-time), the Arduino gets stuck in a while loop, checking the new lightValue every hour.
- Once light, the Arduino escapes the while loop and begins emitting and receiving short ultrasonic pulses using the ultrasonic sensor.
- The distance to an object is measured as:

$$\frac{Total\ time\ taken\ for\ pulse\ to\ return}{Speed\ of\ sound} \div 2$$

- Once the distance falls below a specified threshold – i.e. detects motion, an if statement sends a high signal to a pin on the speaker module
- The speaker module then plays the pre-recorded message. In this example, the pre-recorded message of me reminding my Grandma to bring her walking stick and mask etc.

There were many iterations to this project, both hardware and code wise. Initially the battery life was barely 24 hours (using a 9V battery and no LDR). This was fixed by using a boost converter with multiple AA batteries for a much longer life span, and the LDR to reduce activity during unnecessary periods (night). Code iterations mainly focused on the reduction of the rate of the ultrasonic pulses, while keeping the frequency viable for detecting passing motion. These iterations designed about power conservation extended the battery life to the best part of a week, a much more viable lifespan.

Conclusion:

Final product works as intended, and although the lifespan is only a week, the ease of access to the external battery pack means my grandmother is comfortable changing it. Overall, a successful project.

Future Iterations:

Ideally, there would be no battery pack and the device would run from a plug, however, my grandmother's hallway does not have a plug socket. In any future scenarios if I were to build it again, I would make it mains powered presuming the client had a power socket.