Meeting Agenda (Midsem break – week 2)

19th April 2019, 3PM – 4PM

Attendance:

Member	Attendance
Ben	Yes
John	Yes
Jose	Yes
Jordan	Yes
Jireh	Yes
Minh	Yes
Link	No

Tasks review (from last meeting):

1. **Improving the response rate of DOA algorithm -**
   Initially, 4 outliers were removed for every 8 values and then the average was taken to give the direction of the sound. For instance, if 8 values were given as [1 2 30 30 30 30 200 210], the four outliers would be ignored, and the average would be taken as 30, indicating a direction of 30 degrees relative to the mic array. The code would then proceed to output the next 8 values, and so on. After testing, this result has shown to be not very accurate. Additionally, there a delay was observed because of grouping 8 values together at a time.

   In order to improve the response rate of the DOA algorithm, a new method was implemented by John and Jose. The code would still detect 8 values at a time, though in an overlapping manner. For example, if the first group of values were [a b c d e f g h], then the next group would delete the first value, and append the next value, giving: [b c d e f g h i], and so on. This function operates in the same manner as the previous one, although with this slight change, and it is designed to loop indefinitely.

2. **Determining how the Raspberry-pi can output UVC to a computer with a MJPEG output from camera –**
   Progress was made to de-warping the fish-eye lens, however, it was discovered that open cv doesn't support MJPEG output from the camera and can only support up to 160 degree de-warping. Therefore another open source video module for python was looked at named Video4Linux, which will support MJPEG output from the camera. Other open source algorithms are being examined to de-warp the 210 degrees viewing angle of the fisheye camera.

3. **Get fish-eye camera to work with the existing facial detection algorithm**
   The current face detection algorithm can detect a face reliably but is still prone to background noise. The process is still reliant on OpenCV to complete the task, and the team will need to move towards basic machine learning or neural network for face detection.

4. **Redesign the prototype to ensure minimal interference with camera and microphone input**

5. **Work on 2 documentation files outlined in Meeting log 5/4 with collaboration with other sub teams**
   The Documentation process.md was updated to include the aforementioned changes for the Sound team improving the response rate of the DOA algorithm.

Main objectives:

1. Progress update for each subteam
2. Planning assembly of components and cables in particular
3. Discussing which tasks to continue and complete for next week

Points of discussion:

Progress update for each subteam

A large portion of the meeting was dedicated to discussing the progress made since last week. The key points of each subteam's progress may be viewed in the Task Review section above.

Planning assembly of components and cables in particular

With all remaining components (AHD digital video camera, Tyless 360 conference USB microphone) having arrived from the online orders, the team decided to draft concept designs for the final product based on the given dimensions of these given components.

Table 1 - Component dimensions

Function	Component	Dimensions
Microprocessor	Raspberry Pi 3 model B+	85.6mm x 56.5mm x 17mm
Visual input	AHD digital video camera	35.8mm x 35.8mm x 35.5mm
Audio input	- Respeaker 4-Mic Array for Raspberry Pi - Tyless 360 Conference USB microphone	65mm x 65mm x 9mm 70mm x 15mm

From these devices, three main wires have been identified that should be considered in the design:
(1) Ethernet output from Raspberry Pi to PC
(2) one for USB camera
(3) one for USB microphone

Based on the dimensions of the components (*Table 1),* the team drafted another design to accommodate the hardware. As seen in Figure 1, the design is similar to the previous schematic presented in Week 6. The main change to the design is the removal of one of the four supporting columns, with the remaining three being moved to the middle of each side rather than each corner (*Figure 1*). This was done in order to mitigate sound interference for the respeaker mic array and the USB mic. Additionally, one of the columns have been removed to provide room for the three protruding cables from the Raspberry Pi.

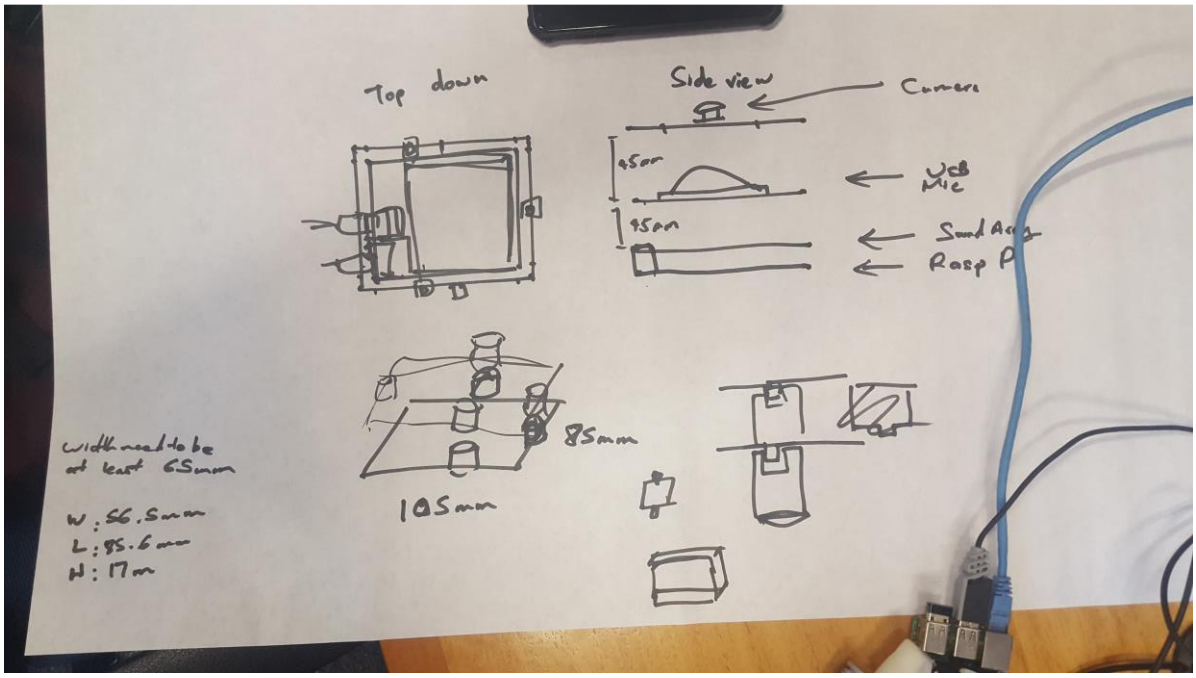

Figure 1- Late stage conceptual design

As mentioned in the Concept of Operations, the housing of the device is planned to be 3D printed. Through this concept design the team aims to print layers where the columns can be placed on top of each other to lock into place for ease of removal and access to the internal device components (*bottom right of Figure 1*).

Furthermore, the approximate height of this design was tested and deemed feasible for the client's requirements of web-conferencing (*Figure 2*).

Critical decision made:

No critical decisions have been made, the team is more focused on completing tasks.

Task delegation:

Sub-team	Team members	Task
Sound	John, Jose	Capture sound with 4 mic array. Amplify sound output of USB microphone.
I/O	Link, Jordan, Ben	How to interface between Raspberry Pi and PC for Raspberry Pi to be recognised as a camera
Image	Link, Jordan, Ben	Face detection using neural networking. Rewrite open source dewarping algorithm from Python 2 to Python 3.
Assembly	Minh, Jireh	Create a solidworks model for prototype device
Documentation	Minh, Jireh	Work on 2 documentation files