CS3530: CN Project
Progress Report - Group 2

Resources collected

We found some repositories which are linked below:

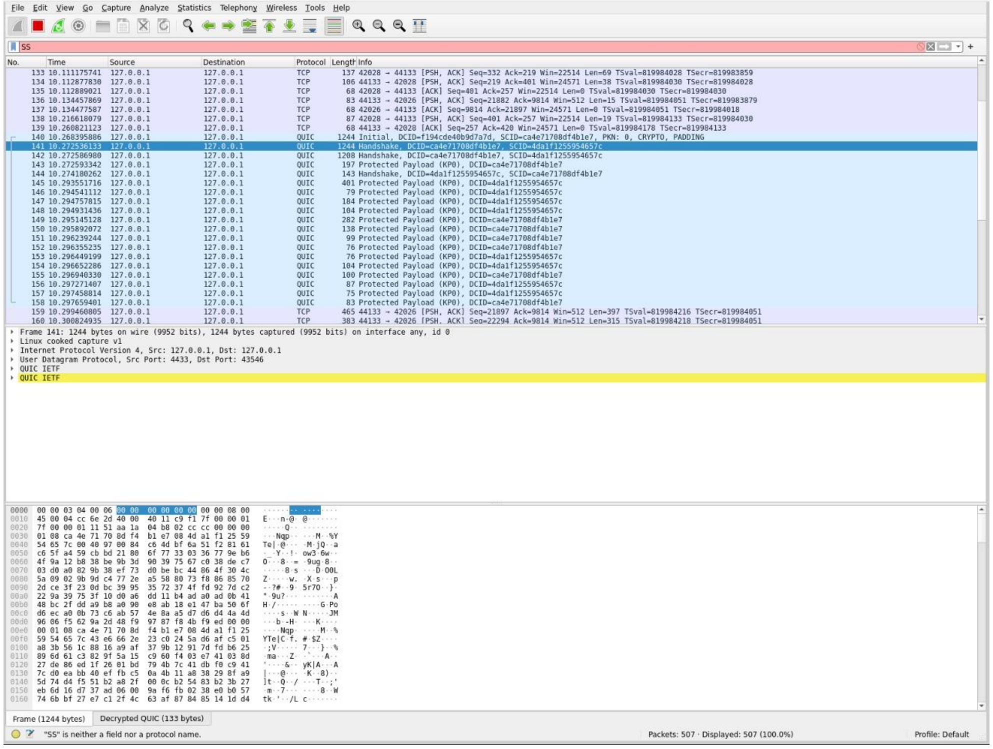
1. Head tracker using saliency map:
   https://github.com/phananh1010/PanoSalNet
2. QUIC implementation in python
   https://github.com/aiortc/aioquic

Experimentation with QUIC

We experimented with the code and established connection between server-client and tested the verification using wireshark.

As mentioned above we used aioquic open source library to establish the QUIC connection between client and server for which we wrote small python codes with help of examples provided by them which required understanding of aioquic and asyncio. Now the next step is to modify these codes and stream a video using DASH.

Here is the output of packet capture:


File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

```
SS

No.  Time          Source     Destination  Protocol  Length Info
 133 10.111175741  127.0.0.1  127.0.0.1    TCP        137 42028 → 44133 [PSH, ACK] Seq=332 Ack=219 Win=22514 Len=69 TSval=819984028 TSecr=819983859
 134 10.112877830  127.0.0.1  127.0.0.1    TCP        106 44133 → 42028 [PSH, ACK] Seq=219 Ack=401 Win=24571 Len=38 TSval=819984030 TSecr=819984028
 135 10.112889021  127.0.0.1  127.0.0.1    TCP         68 42028 → 44133 [ACK] Seq=401 Ack=257 Win=22514 Len=0 TSval=819984030 TSecr=819984030
 136 10.134457869  127.0.0.1  127.0.0.1    TCP         83 44133 → 42026 [PSH, ACK] Seq=21882 Ack=9814 Win=512 Len=15 TSval=819984051 TSecr=819983879
 137 10.134477587  127.0.0.1  127.0.0.1    TCP         68 42026 → 44133 [ACK] Seq=9814 Ack=21897 Win=24571 Len=0 TSval=819984051 TSecr=819984018
 138 10.216618079  127.0.0.1  127.0.0.1    TCP         87 42028 → 44133 [PSH, ACK] Seq=401 Ack=257 Win=22514 Len=19 TSval=819984133 TSecr=819984030
 139 10.260821123  127.0.0.1  127.0.0.1    TCP         68 44133 → 42028 [ACK] Seq=257 Ack=420 Win=24571 Len=0 TSval=819984178 TSecr=819984133
 140 10.268395886  127.0.0.1  127.0.0.1    QUIC      1244 Initial, DCID=f194cde40b9d7a7d, SCID=ca4e71708df4b1e7, PKN: 0, CRYPTO, PADDING
 141 10.272536133  127.0.0.1  127.0.0.1    QUIC      1244 Handshake, DCID=ca4e71708df4b1e7, SCID=4da1f1255954657c
 142 10.272586980  127.0.0.1  127.0.0.1    QUIC      1208 Handshake, DCID=ca4e71708df4b1e7, SCID=4da1f1255954657c
 143 10.272593342  127.0.0.1  127.0.0.1    QUIC       197 Protected Payload (KP0), DCID=ca4e71708df4b1e7
 144 10.274180262  127.0.0.1  127.0.0.1    QUIC       143 Handshake, DCID=4da1f1255954657c, SCID=ca4e71708df4b1e7
 145 10.293551716  127.0.0.1  127.0.0.1    QUIC       401 Protected Payload (KP0), DCID=4da1f1255954657c
 146 10.294541112  127.0.0.1  127.0.0.1    QUIC        79 Protected Payload (KP0), DCID=4da1f1255954657c
 147 10.294757815  127.0.0.1  127.0.0.1    QUIC       184 Protected Payload (KP0), DCID=4da1f1255954657c
 148 10.294931436  127.0.0.1  127.0.0.1    QUIC       104 Protected Payload (KP0), DCID=4da1f1255954657c
 149 10.295145128  127.0.0.1  127.0.0.1    QUIC       282 Protected Payload (KP0), DCID=ca4e71708df4b1e7
 150 10.295892072  127.0.0.1  127.0.0.1    QUIC       138 Protected Payload (KP0), DCID=ca4e71708df4b1e7
 151 10.296239244  127.0.0.1  127.0.0.1    QUIC        99 Protected Payload (KP0), DCID=ca4e71708df4b1e7
 152 10.296355235  127.0.0.1  127.0.0.1    QUIC        76 Protected Payload (KP0), DCID=ca4e71708df4b1e7
 153 10.296449199  127.0.0.1  127.0.0.1    QUIC        76 Protected Payload (KP0), DCID=4da1f1255954657c
 154 10.296652286  127.0.0.1  127.0.0.1    QUIC       104 Protected Payload (KP0), DCID=4da1f1255954657c
 155 10.296940330  127.0.0.1  127.0.0.1    QUIC       100 Protected Payload (KP0), DCID=ca4e71708df4b1e7
 156 10.297271407  127.0.0.1  127.0.0.1    QUIC        87 Protected Payload (KP0), DCID=4da1f1255954657c
 157 10.297458814  127.0.0.1  127.0.0.1    QUIC        75 Protected Payload (KP0), DCID=4da1f1255954657c
 158 10.297659401  127.0.0.1  127.0.0.1    QUIC        83 Protected Payload (KP0), DCID=ca4e71708df4b1e7
 159 10.299460805  127.0.0.1  127.0.0.1    TCP        465 44133 → 42026 [PSH, ACK] Seq=21897 Ack=9814 Win=512 Len=397 TSval=819984216 TSecr=819984051
 160 10.300824935  127.0.0.1  127.0.0.1    TCP        383 44133 → 42026 [PSH, ACK] Seq=22294 Ack=9814 Win=512 Len=315 TSval=819984218 TSecr=819984051

▸ Frame 141: 1244 bytes on wire (9952 bits), 1244 bytes captured (9952 bits) on interface any, id 0
▸ Linux cooked capture v1
▸ Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
▸ User Datagram Protocol, Src Port: 4433, Dst Port: 43546
▸ QUIC IETF
▸ QUIC IETF

0000  00 00 03 04 00 06 00 00  00 00 00 00 00 00 08 00   ················
0010  45 00 04 cc 6e 2d 40 00  40 11 c9 f1 7f 00 00 01   E···n-@·@·······
0020  7f 00 00 01 11 51 aa 1a  04 b8 02 cc cc 00 00 00   ·····Q··········
0030  01 08 ca 4e 71 70 8d f4  b1 e7 08 4d a1 f1 25 59   ···Nqp·····M··%Y
0040  54 65 7c 00 40 97 00 84  c6 4d bf 6a 51 f2 81 61   Te|·@····M·jQ··a
0050  c6 5f a4 59 cb bd 21 80  6f 77 33 03 36 77 9e b6   ·_·Y··!·ow3·6w··
0060  4f 9a 12 b8 38 be 9b 3d  90 39 75 67 c0 38 de c7   O···8··=·9ug·8··
0070  03 d0 a0 82 9b 38 ef 73  d0 be bc 44 86 4f 30 4c   ·····8·s···D·O0L
0080  5a 09 02 9b 9d c4 77 2e  a5 58 80 73 f8 86 85 70   Z·····w.·X·s···p
0090  2d ce 3f 23 0d bc 39 95  35 72 37 4f fd 92 7d c2   -·?#··9·5r7O··}·
00a0  22 9a 39 75 3f 10 d0 a6  dd 11 b4 ad a0 ad 0b 41   "·9u?··········A
00b0  48 bc 2f dd a9 b8 a0 90  e8 ab 18 e1 47 ba 50 6f   H·/·········G·Po
00c0  d6 ec a0 0b 73 c6 ab 57  4e 8a a5 d7 d6 d4 4a 4d   ····s··WN·····JM
00d0  96 06 f5 62 9a 2d 48 f9  97 87 f8 4b f9 ed 00 00   ···b·-H····K····
00e0  00 01 08 ca 4e 71 70 8d  f4 b1 e7 08 4d a1 f1 25   ····Nqp·····M··%
00f0  59 54 65 7c 43 e6 66 2e  23 c0 24 5a d6 af c5 01   YTe|C·f.#·$Z····
0100  a8 3b 56 1c 88 16 a9 af  37 9b 12 91 7d fd b6 25   ·;V·····7···}··%
0110  89 6d 61 c3 82 9f 5a 15  c9 60 f4 03 e7 41 03 8d   ·ma···Z··`···A··
0120  27 de 86 ed 1f 26 01 bd  79 4b 7c 41 db f0 c9 41   '····&··yK|A···A
0130  7c d0 ea bb 40 ef fb c5  0a 4b 11 a8 38 29 8f a9   |···@····K··8)··
0140  5d 74 d4 f5 51 b2 a8 2f  00 0c b2 54 83 b2 3b 27   ]t··Q··/···T··;'
0150  eb 6d 16 d7 37 ad 06 00  9a f6 fb 02 38 e0 b0 57   ·m··7·······8··W
0160  74 6b bf 27 e7 c1 2f 4c  63 af 87 84 85 14 1d d4   tk·'··/Lc·······

Frame (1244 bytes)   Decrypted QUIC (133 bytes)

"SS" is neither a field nor a protocol name.        Packets: 507 · Displayed: 507 (100.0%)        Profile: Default
```

Experimentation with Dash

Simulation steps

a. Split the video and create manifest file using ffmpeg -

```
ffmpeg -i classroom.mp4 -map 0 -map 0 -c:a aac -c:v libx264 -b:v:0 800k
-b:v:1 300k -var_stream_map "v:0,name:800k v:1,name:300k" -f dash
-dash_segment_type mp4 -single_file 1 classroom_manifest.mpd
```

b. We can simply stream it to a server using a HTML file where we can add a source for video as a manifest file created from the above command.

Used DASH to stream normal video to client from server using TCP - for basic understanding

Objectives of this project

1. Main objective is to replicate the modules, integrate and experiment with the architecture proposed by our reference paper.
2. Extended goal will be to experiment with different modules for performance gains.
3. Improve head tracking using saliency map of VR video and current head position to predict the head movement.

Our code and progress can be found in the repository here: https://github.com/PushkalM11/CN-Project