

Final Code

Date	19 November 2022
Team ID	PNT2022TMID40543
Project Name	Project – Real Time Communication System Powered by AI for Specially Abled

```
1  import cv2
2
3  video = cv2.VideoCapture(0)
4
5  while True:
6      ret, frame = video.read()
7      cv2.imshow("Frame", frame)
8      k = cv2.waitKey(1)
9      if k == ord('q'):
10         break
11
12  video.release()
13  cv2.destroyAllWindows()
```

```
1  import cv2
2  import numpy as np
3  from tensorflow.keras.models import load_model
4  from tensorflow.keras.preprocessing import image
5
6  class Video(object):
7      def __init__(self):
8          self.video = cv2.VideoCapture(0)
9          self.roi_start = (50, 150)
10         self.roi_end = (250, 350)
11         self.model = load_model('asl_model.h5') # Execute Local Trained Model
12         # self.model = load_model('IBM_Communication_Model.h5') # Execute IBM Trained Model
13         self.index=['A','B','C','D','E','F','G','H','I']
14         self.y = None
15
16     def __del__(self):
17         self.video.release()
18
19     def get_frame(self):
20         ret, frame = self.video.read()
21         frame = cv2.resize(frame, (640, 480))
22         copy = frame.copy()
23         copy = copy[150:150+200, 50:50+200]
24         # Prediction Start
25         cv2.imwrite('image.jpg', copy)
26         copy_img = image.load_img('image.jpg', target_size=(64,64))
27         x = image.img_to_array(copy_img)
28         x = np.expand_dims(x, axis=0)
29         pred = np.argmax(self.model.predict(x), axis=1)
30         self.y = pred[0]
31         cv2.putText(frame, 'The Predicted Alphabet is: '+str(self.index[self.y]), (100, 50), cv2.FONT_HERSHEY_SIMPLEX, 1, (0, 0, 0), 3)
32         ret, jpg = cv2.imencode('.jpg', frame)
33         return jpg.tobytes()
```

```
1  <!DOCTYPE html>
2  <html>
3  <head>
4  <meta name="viewport" content="width=device-width, initial-scale=1">
5  <style>
6  body {font-family: Arial, Helvetica, sans-serif;}
7
8  /* Full-width input fields */
9  input[type=text], input[type=password] {
10     width: 100%;
11     padding: 12px 20px;
12     margin: 8px 0;
13     display: inline-block;
14     border: 1px solid #ccc;
15     box-sizing: border-box;
16 }
17
18 /* Set a style for all buttons */
19 button {
20     background-color: #273298;
21     color: white;
22     padding: 14px 20px;
23     margin: 8px 0;
24     border: none;
25     cursor: pointer;
26     width: 100%;
27 }
28
29 button:hover {
30     opacity: 0.8;
31 }
```

```
33  /* Extra styles for the cancel button */
34  .cancelbtn {
35    width: auto;
36    padding: 10px 18px;
37    background-color: #f44336;
38  }
39
40  /* Center the image and position the close button */
41  .imgcontainer {
42    text-align: center;
43    margin: 24px 0 12px 0;
44    position: relative;
45  }
46
47  img.avatar {
48    width: 40%;
49    border-radius: 50%;
50  }
51
52  .container {
53    padding: 16px;
54  }
55
56  span.psw {
57    float: right;
58    padding-top: 16px;
59  }
60
61  /* The Modal (background) */
62  .modal {
63    display: none; /* Hidden by default */
64    position: fixed; /* Stay in place */
65    z-index: 1; /* Sit on top */
66    left: 0;
67    top: 0;
68    width: 100%; /* Full width */
69    height: 100%; /* Full height */
```

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67    top: 0;
68    width: 100%; /* Full width */
69    height: 100%; /* Full height */
```

```

106 @-webkit-keyframes animatezoom {
107   from {-webkit-transform: scale(0)}
108   to {-webkit-transform: scale(1)}
109 }
110
111 @keyframes animatezoom {
112   from {transform: scale(0)}
113   to {transform: scale(1)}
114 }
115
116 /* Change styles for span and cancel button on extra small screens */
117 @media screen and (max-width: 300px) {
118   span.psw {
119     display: block;
120     float: none;
121   }
122   .cancelbtn {
123     width: 100%;
124   }
125 }
126 </style>
127 </head>
128 <body>
129
130 <h2 style="text-align: center; color: rgba(1, 2, 2, 0.874);">REAL TIME COMMUNICATION SYSTEM POWERED BY AI FOR SPECIALLY ABLED</h2>
131
132 <button onclick="document.getElementById('id01').style.display='block'">Login</button>
133
134 <div id="id01" class="modal">
135
136   <form class="modal-content animate" action="/action_page.php" method="post">
137     <div class="imgcontainer">
138       <span onclick="document.getElementById('id01').style.display='none'" class="close" title="Close Modal">&times;</span>
139       
140     </div>
141

```

```

142     <div class="container">
143         <label for="uname"><b>Username</b></label>
144         <input type="text" placeholder="Enter Username" name="uname" required>
145
146         <label for="psw"><b>Password</b></label>
147         <input type="password" placeholder="Enter Password" name="psw" required>
148
149         <button type="submit">Login</button>
150         <label>
151             <input type="checkbox" checked="checked" name="remember"> Remember me
152         </label>
153     </div>
154
155     <div class="container" style="background-color: #f1f1f1">
156         <button type="button" onclick="document.getElementById('id01').style.display='none'" class="cancelbtn">Cancel</button>
157         <span class="psw">Forgot <a href="#">password?</a></span>
158     </div>
159 </form>
160 </div>
161 <!doctype html>
162 <html lang="en">
163 <head>
164     <meta charset="UTF-8">
165     <meta name="viewport"
166         content="width=device-width, user-scalable=no, initial-scale=1.0, maximum-scale=1.0, minimum-scale=1.0">
167     <meta http-equiv="X-UA-Compatible" content="ie=edge">
168     <link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/bootstrap/4.1.3/css/bootstrap.min.css">
169     <link rel="stylesheet" href="style.css">
170     <title>Document</title>
171 </head>
172 <body>
173     <div class="display-cover">
174         <video autoplay></video>
175         <canvas class="d-none"></canvas>
176
177         <div class="video-options">
178             <select name="" id="" class="custom-select">

```

```

179         <option value="">Select camera</option>
180     </select>
181 </div>
182
183     <img class="screenshot-image d-none" alt="">
184
185     <div class="controls">
186         <button class="btn btn-danger play" title="Play"><i data-feather="play-circle"></i></button>
187         <button class="btn btn-info pause d-none" title="Pause"><i data-feather="pause"></i></button>
188         <button class="btn btn-outline-success screenshot d-none" title="ScreenShot"><i data-feather="image"></i></button>
189     </div>
190 </div>
191
192 <script src="https://unpkg.com/feather-icons"></script>
193 <script src="script.js"></script>
194 </body>
195 <html><head>
196 </head><body>
197     <video src="" ></video>
198     <br />
199 <button id='flipCamera'>Flip</button>
200 </body>
201 <script>
202     var front = false;
203     var video = document.querySelector('video');
204     document.getElementById('flipCamera').onclick = function() { front = !front; };
205     var constraints = { video: { facingMode: (front? "user" : "environment"), width: 640, height: 480 } };
206     navigator.mediaDevices.getUserMedia(constraints)
207     .then(function(mediaStream) {
208         video.srcObject = mediaStream;
209         video.onloadedmetadata = function(e) {
210             video.play();
211         };
212     })
213     .catch(function(err) { console.log(err.name + ": " + err.message); })
214 </script></html>
215 </html>

```



```
253     display: flex;
254 }
255
256 .controls > button {
257     width: 45px;
258     height: 45px;
259     text-align: center;
260     border-radius: 100%;
261     margin: 0 6px;
262     background: transparent;
263 }
264
265 .controls > button:hover svg {
266     color: white !important;
267 }
268
269 @media (min-width: 300px) and (max-width: 400px) {
270     .controls {
271         flex-direction: column;
272     }
273
274     .controls button {
275         margin: 5px 0 !important;
276     }
277 }
278
279 .controls > button > svg {
280     height: 20px;
281     width: 18px;
282     text-align: center;
283     margin: 0 auto;
284     padding: 0;
285 }
286
287 .controls button:nth-child(1) {
288     border: 2px solid #1a12b3;
289 }
```



```
216 <style>
217 .screenshot-image {
218     width: 150px;
219     height: 90px;
220     border-radius: 4px;
221     border: 2px solid whitesmoke;
222     box-shadow: 0 1px 2px 0 rgba(0, 0, 0, 0.1);
223     position: absolute;
224     bottom: 5px;
225     left: 10px;
226     background: white;
227 }
228
229 .display-cover {
230     display: flex;
231     justify-content: center;
232     align-items: center;
233     width: 70%;
234     margin: 5% auto;
235     position: relative;
236 }
237
238 video {
239     width: 100%;
240     background: rgba(0, 0, 0, 0.2);
241 }
242
243 .video-options {
244     position: absolute;
245     left: 20px;
246     top: 30px;
247 }
248
249 .controls {
250     position: absolute;
251     right: 20px;
252     top: 20px;
```

```
291 .controls button:nth-child(1) svg {
292   color: #2b128e;
293 }
294
295 .controls button:nth-child(2) {
296   border: 2px solid #008496;
297 }
298
299 .controls button:nth-child(2) svg {
300   color: #008496;
301 }
302
303 .controls button:nth-child(3) {
304   border: 2px solid #0048b5;
305 }
306
307 .controls button:nth-child(3) svg {
308   color: #0f0a5b;
309 }
310
311 .controls > button {
312   width: 45px;
313   height: 45px;
314   text-align: center;
315   border-radius: 100%;
316   margin: 0 6px;
317   background: transparent;
318 }
319
320 .controls > button:hover svg {
321   color: rgb(75, 173, 230);
322 }
323 </style>
324
325 <script>
326 // Get the modal
327 var modal = document.getElementById('id01');
```

```
291 .controls button:nth-child(1) svg {
292   color: #2b128e;
293 }
294
295 .controls button:nth-child(2) {
296   border: 2px solid #008496;
297 }
298
299 .controls button:nth-child(2) svg {
300   color: #008496;
301 }
302
303 .controls button:nth-child(3) {
304   border: 2px solid #0048b5;
305 }
306
307 .controls button:nth-child(3) svg {
308   color: #0f0a5b;
309 }
310
311 .controls > button {
312   width: 45px;
313   height: 45px;
314   text-align: center;
315   border-radius: 100%;
316   margin: 0 6px;
317   background: transparent;
318 }
319
320 .controls > button:hover svg {
321   color: rgb(75, 173, 230);
322 }
323 </style>
324
325 <script>
326 // Get the modal
327 var modal = document.getElementById('id01');
```

```

329 // When the user clicks anywhere outside of the modal, close it
330 window.onclick = function(event) {
331     if (event.target == modal) {
332         modal.style.display = "none";
333     }
334 }
335 feather.replace();
336
337 const controls = document.querySelector('.controls');
338 const cameraOptions = document.querySelector('.video-options>select');
339 const video = document.querySelector('video');
340 const canvas = document.querySelector('canvas');
341 const screenshotImage = document.querySelector('img');
342 const buttons = [...controls.querySelectorAll('button')];
343 let streamStarted = false;
344
345 const [play, pause, screenshot] = buttons;
346
347 const constraints = {
348     video: {
349         width: {
350             min: 1280,
351             ideal: 1920,
352             max: 2560,
353         },
354         height: {
355             min: 720,
356             ideal: 1080,
357             max: 1440
358         },
359     }
360 };
361 </script>
362 <script>
363 const getCameraSelection = async () => {
364     const devices = await navigator.mediaDevices.enumerateDevices();

```

```

365     const videoDevices = devices.filter(device => device.kind === 'videoinput');
366     const options = videoDevices.map(videoDevice => {
367       return `<option value="${videoDevice.deviceId}">${videoDevice.label}</option>`;
368     });
369     cameraOptions.innerHTML = options.join('');
370   });
371
372   </script>
373   <script>
374
375   play.onclick = () => {
376     if (streamStarted) {
377       video.play();
378       play.classList.add('d-none');
379       pause.classList.remove('d-none');
380       return;
381     }
382     if ('mediaDevices' in navigator && navigator.mediaDevices.getUserMedia) {
383       const updatedConstraints = {
384         ...constraints,
385         deviceId: {
386           exact: cameraOptions.value
387         }
388       };
389       startStream(updatedConstraints);
390     }
391   };
392
393   const startStream = async (constraints) => {
394     const stream = await navigator.mediaDevices.getUserMedia(constraints);
395     handleStream(stream);
396   };
397
398   const handleStream = (stream) => {
399     video.srcObject = stream;
400     play.classList.add('d-none');
401     pause.classList.remove('d-none');

```

```
402     screenshot.classList.remove('d-none');
403     streamStarted = true;
404 };
405
406 getCameraSelection();
407
408 cameraOptions.onchange = () => {
409     const updatedConstraints = {
410         ...constraints,
411         deviceId: {
412             exact: cameraOptions.value
413         }
414     };
415     startStream(updatedConstraints);
416 };
417
418 const pauseStream = () => {
419     video.pause();
420     play.classList.remove('d-none');
421     pause.classList.add('d-none');
422 };
423
424 const doScreenshot = () => {
425     canvas.width = video.videoWidth;
426     canvas.height = video.videoHeight;
427     canvas.getContext('2d').drawImage(video, 0, 0);
428     screenshotImage.src = canvas.toDataURL('image/webp');
429     screenshotImage.classList.remove('d-none');
430 };
431
432 pause.onclick = pauseStream;
433 screenshot.onclick = doScreenshot;
434 </script>
435
436 </body>
437 </html>
```



```

1  <!DOCTYPE html>
2  <html lang="en">
3
4  <head>
5      <meta charset="utf-8">
6      <meta name="viewport" content="width=device-width, initial-scale=1.0, shrink-to-fit=no">
7      <title>SmartBridge_WebApp_VideoTemplate</title>
8      <link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/css/bootstrap.min.css">
9      <link rel="stylesheet" href="https://use.fontawesome.com/releases/v5.12.0/css/all.css">
10     <link rel="stylesheet" href="assets/css/Banner-Heading-Image.css">
11     <link rel="stylesheet" href="assets/css/Navbar-Centered-Brand.css">
12     <link rel="stylesheet" href="assets/css/styles.css">
13 </head>
14
15 <body style="background: #394348;">
16     <nav class="navbar navbar-light navbar-expand-md py-3" style="background: #212529;">
17         <div class="container">
18             <div></div><a class="navbar-brand d-flex align-items-center" href="#"><span
19                 class="bs-icon-sm bs-icon-rounded bs-icon-primary d-flex justify-content-center align-items-center me-2 bs-icon"><i
20                     class="fas fa-flask"></i></span><span style="color: #212529;">Real-Time Communication
21                 System Powered By AI&nbsp;For Specially Abled</span></a>
22             <div></div>
23         </div>
24     </nav>
25     <section>
26         <div class="d-flex flex-column justify-content-center align-items-center">
27             <div class="d-flex flex-column justify-content-center align-items-center" id="div-video-feed"
28                 style="width: 640px;height: 480px;margin: 10px;min-height: 480px;min-width: 640px;border-radius: 10px;border: 4px dashed #212529 ;">
29                 
31             </div>
32         </div>
33         <div class="d-flex flex-column justify-content-center align-items-center" style="margin-bottom: 10px;"><button
34             class="btn btn-info" type="button" data-bs-target="#modal-1" data-bs-toggle="modal">Quick Reference
35             <strong> ASL Alphabets</strong></button></div>
36     </section>
37 </section>

```

```

38     <div class="container">
39         <div class="accordion text-white" role="tablist" id="accordion-1">
40             <div class="accordion-item" style="background: #333741;">
41                 <h2 class="accordion-header" role="tab"><button class="accordion-button" data-bs-toggle="collapse"
42                     data-bs-target="#accordion-1 .item-1" aria-expanded="true"
43                     aria-controls="accordion-1 .item-1"
44                     style="background: #394348;color: #212529;">About The Project</button></h2>
45                 <div class="accordion-collapse collapse show item-1" role="tabpanel" data-bs-parent="#accordion-1">
46                     <div class="accordion-body">
47                         <p class="mb-0">Artificial Intelligence has made it possible to handle our daily activities
48                             in new and simpler ways. With the ability to automate tasks that normally require human
49                             intelligence, such as speech and voice recognition, visual perception, predictive text
50                             functionality, decision-making, and a variety of other tasks, AI can assist people with
51                             disabilities by significantly improving their ability to get around and participate in
52                             daily activities.<br><br>Currently, Sign Recognition is available <strong>only for
53                             alphabets A-I</strong> and not for J-Z, since J-Z alphabets also require Gesture
54                             Recognition for them to be able to be predicted correctly to a certain degree of
55                             accuracy.</p>
56                     </div>
57                 </div>
58             </div>
59             <div class="accordion-item" style="background: #333741;">
60                 <h2 class="accordion-header" role="tab"><button class="accordion-button collapsed"
61                     data-bs-toggle="collapse" data-bs-target="#accordion-1 .item-2" aria-expanded="false"
62                     aria-controls="accordion-1 .item-2"
63                     style="background: #394348;color: #212529;">Developed By</button></h2>
64                 <div class="accordion-collapse collapse item-2" role="tabpanel" data-bs-parent="#accordion-1">
65                     <div class="accordion-body">
66                         <p class="mb-0">Students at VIT-Bhopal University during SmartBridge AI Externship
67                             Program.<br><br>1. <strong>Nirlov Deb</strong> 19BCG10067<br>2.
68                             <strong>Kushagra</strong> 19BCG10025<br>3. <strong>Kartik Dhasmana</strong> 19BCG10002
69                         </p>
70                     </div>
71                 </div>
72             </div>
73         </div>
74     </div>

```



```

75     </section>
76     <div class="modal fade" role="dialog" tabindex="-1" id="modal-1">
77       <div class="modal-dialog" role="document">
78         <div class="modal-content">
79           <div class="modal-header">
80             <h4 class="modal-title">American Sign Language - Alphabets</h4><button type="button"
81               class="btn-close" data-bs-dismiss="modal" aria-label="Close"></button>
82           </div>
83           <div class="modal-body"></div>
84           <div class="modal-footer"><button class="btn btn-secondary" type="button"
85             data-bs-dismiss="modal">Close</button></div>
86         </div>
87       </div>
88     </div>
89     <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.1.3/dist/js/bootstrap.bundle.min.js"></script>
90 </body>
91
92 </html>

```

```

1 .bs-icon {
2   --bs-icon-size: .75rem;
3   display: flex;
4   flex-shrink: 0;
5   justify-content: center;
6   align-items: center;
7   font-size: var(--bs-icon-size);
8   width: calc(var(--bs-icon-size) * 2);
9   height: calc(var(--bs-icon-size) * 2);
10  color: var(--bs-primary);
11 }
12
13 .bs-icon-xs {
14   --bs-icon-size: 1rem;
15   width: calc(var(--bs-icon-size) * 1.5);
16   height: calc(var(--bs-icon-size) * 1.5);
17 }
18
19 .bs-icon-sm {
20   --bs-icon-size: 1rem;
21 }
22
23 .bs-icon-md {
24   --bs-icon-size: 1.5rem;
25 }
26
27 .bs-icon-lg {
28   --bs-icon-size: 2rem;
29 }
30
31 .bs-icon-xl {
32   --bs-icon-size: 2.5rem;
33 }
34
35 .bs-icon.bs-icon-primary {
36   color: var(--bs-white);
37   background: var(--bs-primary);

```

```
38 }
39
40 .bs-icon.bs-icon-primary-light {
41   color: var(--bs-primary);
42   background: rgba(var(--bs-primary-rgb), .2);
43 }
44
45 .bs-icon.bs-icon-semi-white {
46   color: var(--bs-primary);
47   background: ■ rgba(255, 255, 255, .5);
48 }
49
50 .bs-icon.bs-icon-rounded {
51   border-radius: .5rem;
52 }
53
54 .bs-icon.bs-icon-circle {
55   border-radius: 50%;
56 }
```