

System	Feature	Classifier	EER (%)	
			Dev. Set	Eval. Set
1	Baseline	Baseline	-	-
2	IMFCCs	GMM	3.85	-
	SCMCs	GMM	-	11.49
3	A: CFCCIF	GMM	6.80	34.49
	B: VESA+IFCC	GMM	4.61	14.06
	Prosody	GMM	29.40	31.40
	A+ B + Prosody	GMM	0.13	18.33
4	CQCC	GMM	10.35	28.15
	DA-CQCC	GMM	7.01	19.18
	ResNet	-	6.32	23.14
	Score Level Fusion	-	3.52	16.39
5	System-1 (S1) EF (2-static + 2- $\Delta$ + 2- $\Delta\Delta$ )	GMM	36.29	28.66
	System-2 (S2) PSRMS	GMM	31.60	28.90
	System-3 (S3) IFCC (20-static + 20- $\Delta$ + 20- $\Delta\Delta$ )	GMM	24.81	35.19
	System-4 (S4) CQCC (30- $\Delta\Delta$ )	GMM	9.79	19.58
	System-5 (S5) MFCC (13-static + 13- $\Delta$ + 13- $\Delta\Delta$ )	GMM	18.90	23.55
	S1 + S2 + S3 + S4 + S5	GMM	5.31	13.95
6	CQCC (full-band)	GMM	11.86	24.57
	CQCC (6-8 kHz)	GMM	5.13	17.31
	Cepstrum (6-8 kHz)	GMM	3.38	22.24
	LPCCres (6-8 kHz)	GMM	6.37	27.61
7	CQCC180+ReliefF	SVM	9.47	-
	CQCC180+ReliefF+MRMR	SVM	9.45	-
	FEAT564+ReliefF	SVM	10.59	-
	FEAT564+ReliefF+MRMR	SVM	10.20	-
	CQCC180+Pitch+ReliefF	SVM	8.04	-
	CQCC180+Pitch+ReliefF+MRMR	SVM	6.90	-
	CQCC180+ReliefF+MRMR	SVM	-	27.45
	CQCC180+Pitch+ReliefF+MRMR	SVM	-	24.77
8	CQCC	GMM	10.35	30.60
	CQCC <sub>MVN</sub>	GMM	9.85	17.31
	CQCC	SVM <sub>i-vect</sub>	9.80	12.54
	FFT	LCNN	4.53	7.37
	FFT <sup>SW</sup>	LCNN	5.25	11.81
	CQT	LCNN	4.80	16.54
	CNN <sub>FFT</sub>	RNN	7.51	10.69
	LCNN <sub>SW-FFT</sub> + SVM <sub>i-vect</sub> + CNN <sub>FFT</sub> + RNN	-	3.95	6.73
9	MFCC	CT-DNN	16.45	-
	LFCC	CT-DNN	8.16	-
	IMFCC	GMM (Full)	7.50	-
10	S1: CQCC	GMM	11.00	24.70
	S2: Norm. CQCC	GMM	13.70	28.50
	S3: HFCC	GMM	5.90	23.90
	Score fusion of S1 and S3	-	3.20	18.10
	CQCC + DNN	SVM	6.90	16.50
	HFCC + CQCC + DNN	SVM	7.60	11.50

11	CQCC - GMM	-	10.83	28.46
	CQCC – DNN	-	5.18	19.41
	CQCC ResNet	-	5.05	18.79
	MFCC ResNet	-	10.95	16.26
	CQCC DNN + CQCC ResNet	-	5.05	18.79
	MFCC ResNet + CQCC ResNet	-	3.45	14.88
	CQCC GMM + MFCC ResNet + CQCC ResNet	-	2.58	13.30
	CQCC GMM + MFCC ResNet + CQCC DNN	-	2.76	13.44
12	SFFCC-D	GMM	2.35	20.20
	SFFCC-D	BLSTM	3.66	22.40
	SFFCC-SDA	GMM	4.44	30.73
	SFFCC-SDA	BLSTM	4.10	20.86

- 1) The ASVspoof 2017 Challenge: Assessing the Limits of Replay Spoofing Attack Detection
- 2) Experimental analysis of features for replay attack detection–Results on the ASVspoof 2017 Challenge
- 3) Novel Variable Length Teager Energy Separation Based Instantaneous Frequency Features for Replay Detection
- 4) Countermeasures for Automatic Speaker Verification Replay Spoofing Attack : On Data Augmentation, Feature Representation, Classification and Fusion
- 5) Spoof Detection Using Source, Instantaneous Frequency and Cepstral Features
- 6) Audio Replay Attack Detection Using High-Frequency Features
- 7) Feature selection based on CQCCs for automatic speaker verification spoofing
- 8) Audio replay attack detection with deep learning frameworks
- 9) A Study on Replay Attack and Anti-Spoofing for Automatic Speaker Verification
- 10) Replay Attack Detection using DNN for Channel Discrimination
- 11) ResNet and Model Fusion for Automatic Spoofing Detection
- 12) SFF Anti-Spoofing: IIIT-H Submission for Automatic Speaker Verification Spoofing and Countermeasures Challenge 2017