Camera-Based AI in UK Classrooms: The State of Evidence

Research Unit

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1 Introduction

Camera-based AI in education can be used for three different purposes: supervision of in-person examinations, analysis of student behaviour or engagement during teaching, and administrative functions such as identity verification or attendance. This paper examines publicly documented UK activity in these areas and separates operational deployments from academic research and future proposals.

As of July 2026, no publicly verified UK school or university was found to be using AI cameras routinely to score classroom engagement or to replace human invigilators in physical examination rooms. The evidence is concentrated elsewhere. Research teams have recorded pupils in a secondary-school classroom to create engagement-labelled video, analysed collaborative behaviour from video of co-located learners, and developed models for multimodal engagement recognition. Schools have also used facial recognition for cashless catering, although these systems were not used for teaching, attendance, or examination supervision.

At the same time, digital assessment is expanding. Cambridge International reports that it delivered its first live digital examinations in 2026 through its Early Adopter Programme and is pursuing a phased rollout with the ambition that 85% of Cambridge IGCSE and Cambridge International AS & A Level subjects will be available in both digital and paper formats by 2033. [3].

Human supervision remains the operating standard for school examinations. For the 2025/26 examination cycle, the Joint Council for Qualifications (JCQ) requires at least one invigilator for every 30 candidates in written examinations. For on-screen tests, the ratio is one invigilator for every 20 candidates unless the awarding body authorises another arrangement [1].

In May 2025, Colin Hughes, the chief executive of AQA (Assessment and Qualifications Alliance), backed a gradual move towards AI-assisted digital invigilation for GCSE and A-level examinations. An accessible republication of the interview reports that Hughes described AI-enhanced cameras flagging potentially suspicious behaviour to a human invigilator monitoring examination rooms remotely. He argued that the approach could reduce the burden of recruiting and training invigilators and allow one person to monitor several examination rooms. He also stated that implementation would require Ofqual (the Office of Qualifications and Examinations Regulation) approval [4].

In February 2026, Hughes told *The Observer* that AQA expected between one-third and one-half of GCSE and A-level examinations to move online within 10 to 15 years. He argued that digital assessment could improve security, resilience, fairness, and accessibility, particularly for pupils requiring examination adjustments [5].

In July 2026, Ofqual, the independent regulator of qualifications and assessments in England, updated its policy on artificial intelligence. Ofqual describes AI-supported invigilation as an emerging area and raises concerns about relying solely on AI to establish trustworthy remote-assessment evidence. The policy highlights risks relating to fairness, bias, security, and reliability, and points to appropriate human involvement and safeguards [2].

Education is devolved across England, Scotland, Wales, and Northern Ireland. The Department for Education guidance cited in this paper applies to England, the North Ayrshire deployment occurred in Scotland, and the school-biometric provisions of the Protection of Freedoms Act 2012 apply to England and Wales. Legal and procurement conditions therefore need to be checked within the relevant jurisdiction.

2 Scope and Methodology

The review covers:

- camera-supported supervision inside physical classrooms or examination rooms;
- visual analysis of student presence, attention, engagement, interaction, and conduct during teaching;
- camera-based administrative applications in education facilities, including biometric identity verification and attendance-related functions.

Remote webcam proctoring and virtual-classroom engagement detection are included only where they demonstrate a UK technical capability that may be relevant to a future physical-room application. They are not treated as evidence of classroom deployment.

Sources included peer-reviewed papers, accepted manuscripts, university repositories, official research-group pages, regulator publications, legislation, awarding-body materials, and supplier documentation. For each case, the review checked the physical setting, participants, equipment and software, purpose, reported result, and whether the work was a study, an active research programme, an operational deployment, or only a proposal. Missing technical details are stated as unavailable rather than inferred.

3 Research-Led Classroom AI Evidence

3.1 University of Strathclyde AI in Education Doctoral Research Group

The University of Strathclyde group is working on several strands of human-centred AI in education. Its public research page lists classroom engagement analysis, emotional assessment for pupils with additional support needs, teacher perspectives on inclusive AI, and speech-recognition robustness in noisy environments [7].

3.1.1 Classroom Engagement Analysis and Feedback

Ashwitha Devasya, Andrew Abel, Yuchen Wang, and Laibing Jia are developing *Classroom Engagement Analysis and Feedback Using Multimodal Emotion Recognition* [8]. The project page describes consent-based camera recording of classroom sessions and analysis of facial expressions, body movement, and other visual signals. The intended output is individual and class-level information that teachers can use when reviewing teaching methods and learning materials [7].

The 2025 peer-reviewed conference poster reports the first model-development stage rather than a completed classroom deployment. It uses the public DAiSEE dataset, which contains 9,068 short videos labelled for boredom, confusion, engagement, and frustration. The researchers tested a custom CNN–LSTM model and a MobileNetV2–LSTM model in Keras. Dlib was used for face detection, and the comparison also examined whether broader body and contextual information

improved classification. The custom CNN–LSTM reached 97.7% accuracy on two-second video segments and performed better than the larger MobileNetV2-based model [8].

The published material does not report a completed recording campaign in a Strathclyde classroom. It documents a model trained on an existing dataset and a planned route toward consent-based classroom collection. The project is therefore an active research programme, not an operational monitoring system.

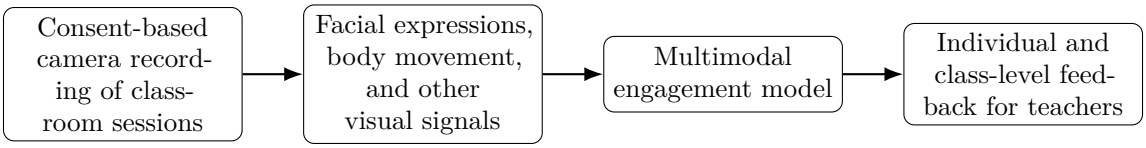

Figure 1: Intended Strathclyde classroom-engagement workflow, summarised from the research-group description [7]. Original Research Unit schematic.

3.1.2 Other Strathclyde Projects and Related Publications

A second project, *AI-Based Emotional Assessment for Students with Additional Support Needs*, is supervised by Andrew Abel and Laibing Jia. It proposes multimodal analysis of facial micro-expressions, observable behaviour, physiological signals such as heart rate, and audio or video data to support pupils with additional support needs in Scottish classrooms [7]. The public project description outlines the intended research direction but does not report a completed classroom trial or an evaluated operational system.

The group also lists *AI in Inclusive Education: Teacher's Perspective*, which investigates how AI tools can support teacher effectiveness and equitable learning environments in inclusive classrooms in Scotland. It examines teachers' perceptions, implementation challenges, professional-development needs, and the design and implementation of AI tools. Its ultimate objective is to inform educational policy and practice so that AI supports educators while promoting fairness and inclusivity for all students and reducing existing biases and inequalities. This project concerns AI adoption and inclusive educational practice rather than camera-based student monitoring [7].

The same four researchers also published a closely related technical study, *Affective State Recognition in Online Learning: A Deep Learning Approach with Data Augmentation*. Using the public Dataset for Affective States in E-Environments (DAiSEE), the study developed a streamlined spatiotemporal framework combining a customised convolutional neural network–bidirectional long short-term memory (CNN–BiLSTM) architecture with time-distributed processing and tested facial cropping and data augmentation. Its comparison of full-frame and face-only inputs found that body posture and contextual cues supplied useful information beyond facial expressions. The study used online-learning videos from DAiSEE; it did not report data collected in a Strathclyde classroom or an operational school deployment [9].

3.2 Peer Data Labelling System

Parsonage, Horton, and Read introduced the Peer Data Labelling System (PDLS) in 2023 as a participatory method for creating labelled classroom-engagement data [10]. The paper describes the research site in its methodology as a single UK secondary school and identifies it as Ribblesdale High School only in the acknowledgements; the author's doctoral thesis explicitly confirms that both studies were conducted there [10, 12]. The studies involved 45 pupils: 22 pupils aged 11 to 15

participated in the data-collection study, while 23 pupils aged 11 to 12 participated in the second study.

During the first study, pupils worked in pairs and exchanged roles halfway through the activity. One pupil completed a computer-based cryptography task while a camera recorded the learner. The second pupil observed the learner without seeing the task screen and used an online form to mark each change between two categories: *engaged* and *disengaged*. The labels were therefore recorded alongside the classroom video rather than being added retrospectively by external annotators [10].

The study produced 22 recordings, of which 17 were usable. These provided 2 hours, 27 minutes, and 32 seconds of labelled video and 221,300 labelled image frames. Most of the material was classified as engaged. The second study examined pupils' confidence in peer judgements and their acceptance of a possible automated engagement-monitoring system. Participants expressed greater confidence in human peer judgements than in the proposed automated alternative [10].

The researchers published a follow-up study in 2024, *Evaluating the Effectiveness of the Peer Data Labelling System (PDLS)*, which assessed the reliability of the labels created through the original method [11]. Algorithmic validation approaches did not produce sufficiently consistent classifications. Human reviewers reached agreement with the pupil observers for most of the material labelled as engaged, while identifying disengagement remained more difficult and required further refinement.

The PDLS data were also used in Graham Parsonage's 2024 doctoral thesis, *Behind the Wizard's Curtain: Designing and Developing Intelligent Systems for use in Educational Contexts* [12]. Chapter 8 describes an engagement classifier based on a Long Short-Term Memory model. The model processed sequences from the PDLS material and produced a binary classification of the recorded pupil as engaged or disengaged, which was written onto the video output. The thesis presents the implementation as a feasibility demonstration rather than a production-ready classroom system and acknowledges the need for further development and validation.

The published evidence therefore extends beyond dataset creation. It includes an evaluation of the peer-generated labels and an experimental machine-learning classifier trained within the same doctoral research programme. No independent study was identified that reused the PDLS dataset to validate or deploy a camera-based engagement-recognition system in another educational setting.

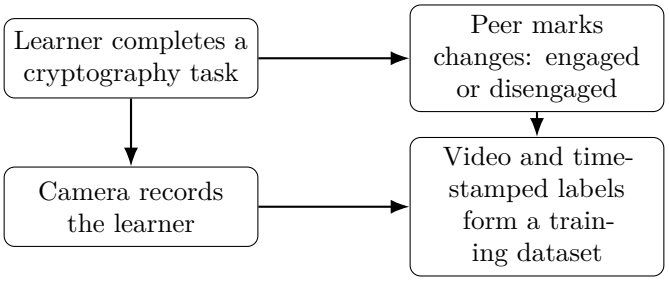

Figure 2: PDLS experiment structure, based on Parsonage et al. (2023) [10]. Original Research Unit schematic.

3.3 Video Analytics for Collaborative Problem Solving

Cukurova et al. (2020) analysed approximately 500 minutes across 15 videos of 18 engineering students working in groups of three on collaborative design tasks. FaceNet was used to assign participant identities, while OpenPose extracted body-position measures. Decision-tree models predicted speaking, listening, making, and watching behaviours with accuracies between 60.00%

and 64.58%, and collaborative problem-solving competence with 62.50% accuracy. The authors found that video-only models performed worse than multimodal approaches and reported missing data caused by camera distance, incomplete capture, and camera movement. The paper reports an experimental study, not an operational classroom deployment [13].

4 Adjacent UK Research in Remote and Virtual Learning

The projects in this section also use cameras, facial movement, gaze, or body-pose estimation to analyse learning behaviour. Unlike the studies above, they were developed for remote, online, or virtual-learning environments rather than through cameras recording groups of learners in a shared physical classroom. They are included as evidence of UK technical capability, not as evidence of in-class deployment.

4.1 EngageSense

Irfan, Patel, and Hassan of London Metropolitan University published *EngageSense* in 2025 for real-time engagement detection in virtual classrooms [14]. The system used laptop webcams rather than fixed cameras in a physical classroom.

Dlib's Histogram of Oriented Gradients detector and a linear Support Vector Machine were used for face detection. A convolutional neural network classified gaze as left, right, or centre, while OpenPose MobileNetV1 estimated 19 body key points. Gaze and pose were combined over one-second video intervals to classify the learner as fully engaged, partially engaged, or not engaged [14].

The custom eye dataset contained 4,453 augmented images from 10 participants. The paper reports 99.5% accuracy for gaze-direction classification and approximately 90% accuracy for the combined engagement classification. The authors identify the small participant group as a limitation and propose a larger and more diverse dataset in future work.

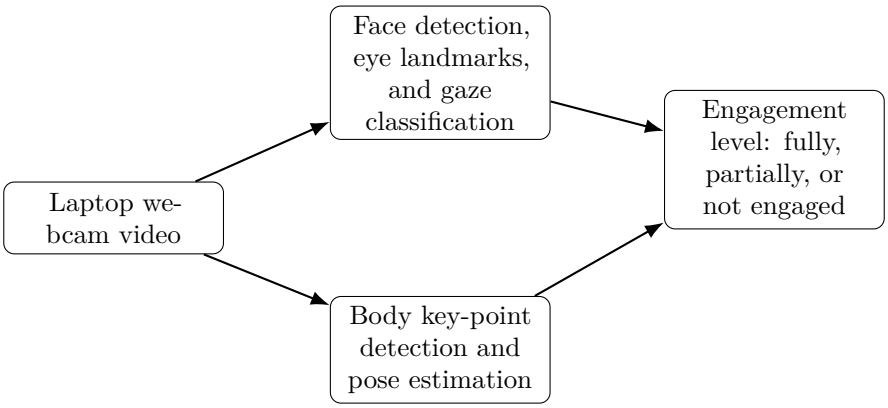

Figure 3: EngageSense processing pipeline, summarised from Irfan, Patel, and Hassan (2025) [14]. Original Research Unit schematic.

EngageSense provides a functioning UK-developed pipeline for gaze- and pose-based classification, but its evaluation was small and remote. It should not be described as a camera system installed in a physical classroom.

4.2 PUZZLED: Facial-Movement Analysis of Student Struggle

Linson, Xu, English, and Fisher (2022) developed the PUZZLED prototype to identify group-level student struggle during asynchronous video-lecture viewing [15]. The study involved 10 university students. Participants watched two recorded computer-vision lectures on their own devices while laptop webcams captured their faces. They also clicked an on-screen control when they felt they were struggling and later completed retrospective self-reports. Independent observers reviewed the recordings and annotated possible struggle-related states.

The prototype integrated pre-trained models from Intel's Open Model Zoo for face detection, facial-landmark localisation, gaze estimation, head-pose estimation, and eye-state detection. The analysis focused particularly on changes in vertical gaze direction and mapped computer-vision outputs, self-reports, and observer annotations onto a common lecture timeline [15].

The pilot found that upward gaze-aversion events often aligned with difficult lecture segments and with manual struggle annotations, although the authors emphasised the small sample, browser and interface problems during data collection, and individual differences in facial behaviour. PUZZLED was designed as teacher-facing feedback: the timeline was intended to show where a cohort encountered difficulty so instructors could revise content or provide support. It was not a physical-classroom deployment and did not automate sanctions or assessment decisions.

5 Camera-Based Administrative Deployments in Schools

5.1 North Ayrshire Council School Canteens

North Ayrshire Council introduced facial recognition technology (FRT) in nine Scottish school canteens on 6 September 2021, affecting 2,569 pupils. The official investigation letter from the Information Commissioner's Office (ICO) describes the system and the regulator's findings but does not identify the supplier [16].

A catering employee manually activated the till camera. It captured one still image of the pupil and attempted to match that image with a stored biometric template. A successful match opened the pupil's online account, after which the employee approved or declined the transaction. Where several possible matches appeared, the employee selected the correct account manually [16].

The system was transaction-triggered rather than continuous live facial recognition. The ICO letter does not identify the supplier or report the camera model, matching algorithm, independent accuracy testing, or numerical false-match rate [16].

The council paused the system on 22 October 2021 and confirmed that facial templates and backups had been deleted by 11 November 2021. The ICO identified likely infringements concerning lawful basis, transparency, retention, and the Data Protection Impact Assessment [16].

5.2 Chelmer Valley High School

Chelmer Valley High School in Essex introduced facial recognition technology for cashless catering in March 2023, after using fingerprint recognition since 2016. The technology was provided by CRB Cunninghams, which acted as a data processor on behalf of the school. The ICO reprimand does not report a camera model or independent performance test [17].

The school had used fingerprint recognition for catering since 2016. It introduced facial recognition without completing the required Data Protection Impact Assessment before processing began and treated pupils as enrolled unless parents opted out. The ICO found that this was not valid affirmative consent and noted that many pupils were old enough to exercise their own data rights [17].

6 Regulatory Position and Practical Implications

The Department for Education updated its guidance on children's biometric information in June 2026. It applies to schools and colleges in England and covers automated biometric recognition, including fingerprint and facial recognition [18].

The guidance says facial recognition will often be inappropriate for functions such as school-lunch payments where less intrusive alternatives are available. It also states that live facial recognition is not appropriate in schools and colleges because it would be difficult to justify as fair, necessary, proportionate, and lawful under the UK GDPR [18]. In England and Wales, the Protection of Freedoms Act 2012 requires parental notification and consent arrangements, requires processing to stop if the pupil objects, and requires a reasonable non-biometric alternative [19].

A consent form alone does not make continuous classroom recording lawful. An institution still has to establish a clear purpose, lawful basis, necessity, proportionality, transparency, data minimisation, security, retention limits, and suitable rights for pupils. High-risk video or biometric processing requires a Data Protection Impact Assessment before collection begins [18, 20].

Consent-based academic recording can be approved under research ethics and data-protection controls, as in the PDLS study. Continuous identification, attention inference, or automated decisions would require a stronger justification and closer safeguards. Ofqual's current policy highlights concerns about sole use of AI for remote invigilation and the need for appropriate human involvement and safeguards. A credible examination-room product would also require independent testing of false positives, accessibility, bias, cyber security, and technical failure [2].

7 Conclusion

The UK evidence does not support a claim of broad deployment of AI cameras for classroom engagement tracking or in-person examination invigilation. The verified school deployments concern facial recognition for canteen payments, and both attracted regulatory intervention.

The academic evidence is more substantial. Strathclyde has an active programme directed at multimodal classroom engagement, with initial model results published from the DAiSEE dataset and plans for consent-based classroom recording. PDLS produced engagement-labelled video in a real secondary-school classroom. UCL-led work used OpenPose and interpretable models to analyse co-located collaborative learning. EngageSense produced a real-time gaze- and pose-based pipeline for virtual classrooms, while PUZZLED mapped webcam-derived facial movement and self-reported struggle onto a lecture timeline. Neither remote study establishes physical-classroom deployment.

AI-camera support for physical examination rooms remains a future proposal in the reviewed evidence. Human invigilators are still required under current school-examination rules. Digital assessment is nevertheless expanding: Cambridge International delivered its first live digital examinations in 2026 and aims for 85% of Cambridge IGCSE and Cambridge International AS A Level subjects to be available in both digital and paper formats by 2033. AQA has publicly promoted gradual exploration of AI-assisted digital invigilation, while Ofqual expresses concern about sole reliance on AI and emphasises appropriate human involvement and safeguards [1, 3, 4, 5, 2].

The viable direction for a UK pilot is therefore narrow: human-supervised decision support, a clearly defined educational or assessment purpose, prior ethical and data-protection approval, limited data collection and retention, transparent information for participants, and independent evaluation in realistic rooms.

References

[1] Joint Council for Qualifications. (2025). *Instructions for Conducting Examinations, 1 September 2025 to 31 August 2026*. https://www.jcq.org.uk/wp-content/uploads/sites/2/2025/10/Print-version-JCQ-Instructions-for-conducting-examinations-2025_6_FINAL.pdf

[2] Ofqual. (2026). *Ofqual's Approach to Regulating the Use of Artificial Intelligence in the Qualifications Sector*. Updated 16 July 2026. https://www.gov.uk/government/publications/ofquals-approach-to-regulating-the-use-of-artificial-intelligence-in-the-qualifications-sector/ofquals-approach-to-regulating-the-use-of-artificial-intelligence-in-the-qualifications-sector--2

[3] Cambridge International Education. (2026). *Digital Assessment Availability*. Accessed July 2026. https://www.cambridgeinternational.org/programmes-and-qualifications/developing-digital-exams/digital-assessment-availability/

[4] Hulme, D. (2025). *Use AI Cameras to Invigilate GCSEs, Says Exam Board Chief*. LinkedIn Pulse, 19 May 2025. Accessible republication of reporting based on the May 2025 Tes interview with AQA chief executive Colin Hughes. https://www.linkedin.com/pulse/use-ai-cameras-invigilate-gcses-says-exam-board-chief-dan-zamce/

[5] Sylvester, R. (2026). *Up to Half of School Exams "Will Be on Screen Within a Decade", Says Board Chief*. The Observer, 13 February 2026. https://observer.co.uk/news/national/article/up-to-half-of-school-exams-will-be-on-screen-within-a-decade-says-board-chief

[6] AQA. (2026). *Who We Are* and *Our Heritage*. https://www.aqa.org.uk/about-us/who-we-are https://www.aqa.org.uk/about-us/who-we-are/our-heritage

[7] University of Strathclyde, AI in Education Doctoral Research Group. *Research Study*. https://haiti.cis.strath.ac.uk/research-study/

[8] Devasya, A., Abel, A., Wang, Y., and Jia, L. (2025). *Classroom Engagement Analysis and Feedback Using MER*. BERA Annual Conference 2025, peer-reviewed poster. https://pureportal.strath.ac.uk/en/publications/classroom-engagement-analysis-and-feedback-using-mer/

[9] Devasya, A., Abel, A., Wang, Y., and Jia, L. (2025). *Affective State Recognition in Online Learning: A Deep Learning Approach with Data Augmentation*. In *2025 20th International Workshop on Semantic and Social Media Adaptation and Personalization (SMAP)*, pp. 108–113. IEEE. https://doi.org/10.1109/SMAP66932.2025.00027

[10] Parsonage, G., Horton, M., and Read, J. C. (2023). *The Peer Data Labelling System (PDLS): A Participatory Approach to Classifying Engagement in the Classroom*. INTERACT 2023. https://knowledge.lancashire.ac.uk/id/eprint/48659/1/pdls.pdf

[11] Parsonage, G., Horton, M., and Read, J. C. (2024). *Evaluating the Effectiveness of the Peer Data Labelling System (PDLS)*. In *Artificial Intelligence in HCI*, Lecture Notes in Computer Science, vol. 14734, pp. 67–83. Springer. https://doi.org/10.1007/978-3-031-60606-9_5

[12] Parsonage, G. (2024). *Behind the Wizard's Curtain: Designing and Developing Intelligent Systems for use in Educational Contexts*. Doctoral thesis, University of Central Lancashire. https://doi.org/10.17030/uclan.thesis.00052603

[13] Cukurova, M., Zhou, Q., Spikol, D., and Landolfi, L. (2020). *Modelling Collaborative Problem-Solving Competence with Transparent Learning Analytics: Is Video Data Enough?* In *Proceedings of the Tenth International Conference on Learning Analytics & Knowledge*, pp. 270–275. Association for Computing Machinery. https://doi.org/10.1145/3375462.3375484

[14] Irfan, M., Patel, P., and Hassan, B. (2025). *EngageSense: A Hybrid Approach for Real Time Engagement Detection for Virtual Classrooms*. IEEE EDUCON 2025. https://doi.org/10.1109/EDUCON62633.2025.11016600

[15] Linson, A., Xu, Y., English, A. R., and Fisher, R. B. (2022). *Identifying Student Struggle by Analyzing Facial Movement During Asynchronous Video Lecture Viewing: Towards an Automated Tool to Support Instructors*. In *Artificial Intelligence in Education*, Lecture Notes in Computer Science, vol. 13355, pp. 53–65. Springer, Cham. https://doi.org/10.1007/978-3-031-11644-5_5

[16] Information Commissioner's Office. (2022). *North Ayrshire Council's Use of Facial Recognition Technology in Its Schools*. https://ico.org.uk/media2/migrated/4023847/ico-letter-to-nac-appendix.pdf

[17] Information Commissioner's Office. (2024). *Reprimand Issued to Chelmer Valley High School*. https://ico.org.uk/media2/migrated/4030350/20240702-cvhs-reprimand.pdf

[18] Department for Education. (2026). *Protection of Biometric Data of Children in Schools and Colleges*. Updated 17 June 2026. https://assets.publishing.service.gov.uk/media/6a313437141f0690ad5fa3fb/Protection_of_biometric_data_of_children_in_schools_and_colleges.pdf

[19] UK Parliament. (2012). *Protection of Freedoms Act 2012, Part 1, Chapter 2*. https://www.legislation.gov.uk/ukpga/2012/9/part/1/chapter/2

[20] Information Commissioner's Office. *Video Surveillance Guidance for Organisations*. https://ico.org.uk/for-organisations/uk-gdpr-guidance-and-resources/cctv-and-video-surveillance/guidance-on-video-surveillance-including-cctv/