PERANCANGAN DAN ANALISA SISTEM KAMERA PENGAWAS RUANGAN DAN KONTROL PERGERAKAN KAMERA SECARA *PEER-TO-PEER* MENGGUNAKAN *WEB REAL-TIME COMMUNICATION* (WEBRTC)

TUGAS AKHIR

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Judul	Perancangan dan Analisa Sistem Kemera Pengawas Ruangan dan Kontrol Pergerakan Kamera Secara *Peer-to-Peer* Menggunakan *Web Real-Time Communication* (WebRTC)	Haris Akbar
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Abstrak

Kamera pengawas ruangan sangat penting untuk mengawasi keadaan ruangan. Pengontrolan pergerakan kamera diperlukan agar ruang lingkup pengawasan lebih luas. Perkembangan internet membuat monitoring kamera pengawas dapat dilakukan secara jarak jauh. Kamera pengawas seperti IP kamera dalam proses pembuatannya diperlukan biaya yang tidak sedikit dan masih banyak menggunakan metode *client/server*. Maka dirancang sebuah sistem dengan memanfaatkan *webcam* dan *Raspberry Pi* menggunakan protokol aplikasi WebRTC secara *peer-to-peer* serta mengetahui *Quality of Service* (QoS) pengiriman data media dan biner pada beberapa resolusi video. Hasil pengujian menunjukkan QoS pengiriman video dan audio berpengaruh terhadap perubahan resolusi sedangkan QoS pengiriman data biner tidak berpengaruh terhadap perubahan resolusi. *Throughput* video tertinggi pada resolusi 720p yaitu 1.931,983 kbps sedangkan *throughput* audio tertinggi pada resolusi 720p yaitu 64,915 kbps. *Delay* video tertinggi pada resolusi 720p yaitu 53,088 ms, *delay* audio tertinggi pada resolusi 720p yaitu 25,347 ms, dan *delay* rata-rata pengiriman data biner sebesar 0,00262 ms. *Jitter* video tertinggi pada resolusi 720p yaitu 59 ms sedangkan *jitter* audio tertinggi pada resolusi 720p yaitu 15,333 ms. *Delay* dan *jitter* pengiriman video dan audio memenuhi standar rekomendasi QoS Cisco Press pada kasus pengiriman *video conference* dan VoIP kecuali *jitter* pengiriman video pada resolusi 480p dan 720p. Waktu yang dibutuhkan untuk mengendalikan servo sejauh 10° melalui jaringan sebesar 110,00262 ms. Agar koneksi *peer-to-peer* dapat terbangun tipe perilaku NAT masing-masing perangkat harus menggunakan *endpoint-independent-mapping.*

Kata Kunci : Kamera pengawas, WebRTC, *peer-to-peer*, *Internet of Things* (IoT), sistem tertanam, *Quality of Service* (QoS), *delay*, *throughput*, *jitter*

Title	*Design and Analysis of Surveillance Camera and Control Camera Movement System With Peer-To-Peer Method Using Web Real-Time Communication (WebRTC)*	Haris Akbar
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Abstract

Surveillance cameras are very important in monitoring room condition. Controlling the movement of the camera is needed so the scope of surveillance is wider. The development of the internet makes surveillance cameras monitoring can be done remotely. Surveillance cameras such as IP cameras in the manufacturing process require a lot of money and many of them still used client/server methods. Hence a system was designed by utilizing a webcam and Raspberry Pi using the WebRTC in peer-to-peer connection and knowing the Quality of Service (QoS) of media and arbitrary data delivery at several video resolutions. The test results shows that QoS of video and audio delivery affected by video resolutions changes while QoS of arbitrary data delivery has no effect on resolution changes. The highest video throughput is obtained at 720p resolution which is 1,931.983 kbps while the highest audio throughput is obtained at 720p resolution at 64.915 kbps. The highest video delay obtained at 720p resolution which is 53.088 ms, the highest audio delay obtained at 720p resolution which is 25.347 ms, and average arbitrary data delay is 0.00262 ms. The highest video jitter obtained at 720p which is 59 ms while the highest audio jitter obtained at 720p resolution which 15.333 ms. The delay and jitter of video and audio delivery pass the standards of QoS recommendations by Cisco Press on the case of video conferencing and VoIP delivery except the jitter of video delivery in 480p and 720p video resolutions. The time it takes to control the servo range 10° through networks is 110.00262 ms. *For establish peer-to-peer connection the type of NAT behavior of each device must use endpoint-independent-mapping.*

Keywords: Surveillance camera, WebRTC, peer-to-peer, Internet of Things (IoT), embedded system, Quality of Service (QoS), delay, throughput, jitter