International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

New Cloud-Based Service for Broadcasting and Identification for Solving Data Traffic Re-Using for Mobile Communications

Dr.Parmanand Prabhat
Assistant Professor,Department of School of computer science and engineering,
Sandip University,Neelam V idya Vihar,Sajoul,Mailam,Madhubhani(Bihar),India.
p.prabhat222@gmail.com

Dr.Nilesh T.Gole
Figure 11 shows the percentage of efficiency gain associated with the temperature change due to passive cooling of the panels by using a low-emissivity coating, which acts as an optical filter that reflects the IR part of the incoming radiation and transmits the visible part

Dr.Syed Umar
Professor, Department of Computer Science & Engineering, (AI&ML)
MRITS,
Hyderabad,India
e-mail: umar332i@gmail.com

Prof.Saurabh Vinayak Lawate
Assistant.Professor,Department of Electrical Engineering
Vidarbha Insstitute of Technology,Nagpur,India
lawatemavil@rediffmail.com

Abstract— In recent decades, the majority of mobile communications data traffic has relied on RF technology. Even if optimization efficiency for use or reuse is implemented, there are limits to the growing traffic demand for RF communications. Visible light communications (VLC) is a new technology that can work with RF to overcome these limitations. The standard for VLC was published in 2011 as IEEE 802.15.7, which specifies specifications for the MAC layer and PHY layer. This standard is one of the first for this technology. The light emission decoding operation at the receiver in IEEE 802.15.7 is mainly based on photo detectors. However, with the development of image sensors (photodiode arrays) in smart devices, changes to the IEEE 802.15.7 specification are being considered. This expansion will primarily focus on communications with image sensors, called optical camera communications (OCC). In this paper, we analyze the performance of camera communication systems based on different types of image sensor architectures. We then propose OCC-ID, a novel streaming service application that uses camera communication and a cloud model. The proposed architecture is a general implementation scenario for camera communications. Optical camera communication has great potential in future wireless communications due to the advantages of VLC and business trends. A revision of the IEEE 802.17.5 standard is currently under study. However, OCC's issues regarding timing, data rate, and interference still need to be resolved. Synchronization is an important issue because the signal received from the camera is a discrete image from the transmitter without any feedback information and because camera communication applications are based on a transmission topology. Roller blinds have more advantages in terms of timing than overall blinds. In this study, we present and evaluate the performance of two image detection techniques, namely rolling shutter and global shutter. The performance of the two image sensors and their considerations will play an important role in the standard's contribution. Finally, we propose a new service application for OCC based on cloud architecture, called OCC-ID. Invisible identification can be accomplished using visible light communications, camera communications, and cloud computing technology. The ID is integrated into the optical channel using OOK or OOK frequency shift modulation. The receiver uses the camera to decode the information embedded in the LED and then transmits it to the cloud server transmission link based on the detected ID. The OCC-ID system shows the advantages of dynamic content management compared to traditional identification systems.

Keywords: OOK frequency, VLC, OCC-ID system, RF communications

1. Introduction:

The rapid development of semiconductors has significantly changed lighting technology, especially LEDs. LEDs are increasingly used due to their advantages in terms of energy consumption. Compared to traditional light bulbs, another advantage of LEDs is their switch ability. LEDs can change light intensity levels at very high frequencies. Therefore, LEDs promise to be used in communication technologies based on visible light communication (VLC). This new technology is a combination of lighting and communication. However, so far VLC has achieved excellent performance in terms of data throughput. Shortly, VLC will play an important role in generating wireless communications. Compared with RF communication, VLC-based communication technology has the advantages of directional transmission, safety, security, and high bandwidth. Traffic demand for communications and multimedia has increased significantly. Number of smart devices, which are powerful in terms of processing, memory, screen resolution, and camera capacity, is increasing every day. Camera communication is a good business trend at VLC. One of the great advantages of camera communications is the existing architectural heritage. Compared to VLC, there are no additional hardware costs on the receiver. The main costs are the data integration board on the transmitter and the integrated camera control application. Optical Camera Communication (OCC) provides higher directional communication than traditional VLC. Unlike RF communications systems, the OCC's transmitter is a light source from an LED, digital billboard, display device, or other electroluminescent device. A receiver is an application that uses image data from the camera's image sensor. This could be a webcam, a digital camera, a video surveillance camera, or some image sensors.

Communication inside the camera, the most important limitation is the data rate. On commercial cameras, the image frame rate is around 30 or 60 fps. So the data rate cannot support high-speed communications. The solution to increase throughput can be obtained using MIMO technology [1]. However, this technique depends on the architecture of the image sensor. Based on structure and data processing, image sensors have two basic catalogs: global shutter and rolling shutter. The image construction process of these two techniques is different; therefore, performance in terms of data throughput and topology implementation also varies. The camera communication implementation and service are based on short data transmission. In this paper, we propose a novel cloud computing topology based on broadcast applications for camera communication technology. The architecture of the proposed model is shown in Figure 1. This service can be considered a typical camera communication application. The remainder of this paper will detail the OCC system analysis and then describe the proposed cloud service scenario model based on OCC. In Section 2, we provide an overview of existing research related to OCC. Section 3 presents our proposed OCC and cloud architecture based on streaming services. The system performance evaluation based on two typical image sensor architectures is described in Section 4. Finally, the paper is concluded in Section 5.

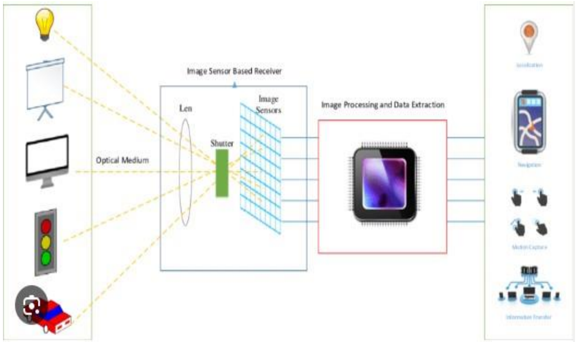
I. FIGURE1: OCC-ID SERVICE SYSTEM

2. Literature Survey:

The VLC application was developed a long time ago. However, the main goal of VLC is to create a new communication system that can be used in lighting systems. With the advantage of fast switching, LED was an important factor in the birth of VLC. Communication and lighting are combined for a wireless communication system. VLC search has a long history. One of the first applications was the transmission of sound using light waves by Alexander Graham Bell in 1880 [2]. In the early 2000s, Keio University proposed LED lighting and communications for home networks. These early studies are considered the first motivation for VLC research. The first VLC standard was reel s d by Visible Jap n in 2014. However, VLC, PHY, and MAC specifications were proposed by IEEE as 802.15.7 [7]. The IEEE 802.15.7 standard also describes the use of scenarios and VLC for private wireless networks, location applications, and lighting control issues in lighting systems.

Another problem with VLC receivers is image sensor communication. This technique is also known as camera communication. When the term camera is used, most people think of pictures, images, and videos. In fact, the original function of the camera is entertainment such as multimedia data. With the development of computers, especially in processing and storage, many camera-based computer vision applications are proposed, such as tracking, object recognition, object recognition, and localization. In recent years, advances in semiconductors and wireless communications have improved smart cameras and mobile devices. Camera-based applications and smart mobile devices are a promising area for the future. Communication is a relatively new thing for cameras in the last decade. The OCC architecture is shown in Figure 2. Communication problems can be applied to road and automobile communication systems or data transmission [8, 9].

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*



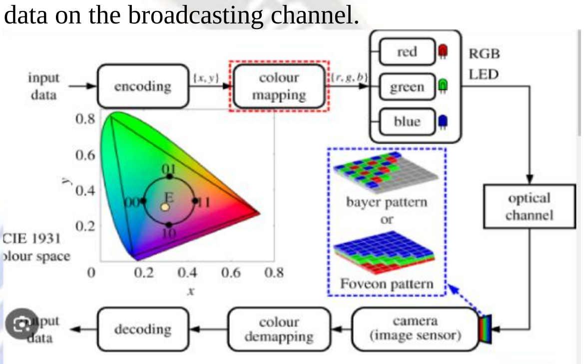
II. FIGURE2: OCC ARCHITECTURE

The camera-vehicle communication system [10], which includes LEDs and high-speed cameras, is used to solve the safety problems of the traffic system. The proposed OCC system provides a reference architecture of ITS services via a hierarchical transmission scheme. Digital data is modulated on the transmitter's LED array using OOK modulation. The receiver is a high speed complementary metal oxide semiconductor (CMOS) cameras. "An under sampled scheme for on-off switching frequency locking" [11] works for rolling shutter cameras and global shutter cameras. This schematic is for visible light emitters without flickering issues. For global shutter image sensors, the subsampling rate shift-locking scheme requires high synchronization between the transmitter and receiver. This requirement is achieved by detecting the frequency and light intensity phase of the sub select alias to decode the transmitted bits. VLC-based CMOS camera systems [12, 13] utilize LEDs as transmitters and smartphones with built-in cameras as receivers. The LED emission light source is modulated by improving the turn-on locking scheme using Manchester coding. The receiver is a camera app for Android. The camera uses a CMOS-based rolling image sensor. The captured image contains the multi-sampled signal from the LED transmitter as a strip of pixels. Using simple image processing algorithms, these groups can be converted back to the original binary data.

Another well-known technique that can be applied to cameras is barcoding. The barcode concept includes a linear code, a 2D matrix, and a 2D reading speed. Barcodes are now widely used in various applications such as advertising, newspapers, product management, social networks, signage, education, and retail. Given the development of smart mobile devices, barcodes h v the potential for r pid market growth due to camera-based scanning technology. Barcodes are becoming increasingly useful and important for businesses and consumers. Recognizing the importance of barcode usage and mobile devices, many researchers have investigated the usability and acceptance of barcode mobile applications. A barcode system consists of three main components, namely a barcode generator, a barcode reader or barcode scanner, and a database. The resulting code is unique to the intended target. This can be a sequence of numbers, an identification code, or a URL link. Barcode scanners must be able to read black and white zebra stripes or 2D codes on the surface of objects and transmit the detected information to a processing terminal, such as a computer, which can identify the target information in a database. In terms of basic topology, barcode technology is similar to RFID systems. However, barcodes have more advantages in vision management. Compared with barcode and RFID systems, the proposed OCC-ID inherits the advantages of barcode visibility, RFID-free movement, and full illumination of VLC technology.

3. Proposed System:

The proposed architecture of OCC-ID is shown in Figure 3. The main contributions of the proposed architecture are camera communication for broadcasting services and cloud architecture for data management. In this topology, the broadcast information controlled by a cloud service is displayed on lighting devices such as LEDs, digital signs, viewing boards, or lighting systems. The focal point of a crack and shape becomes invisible as illumination for illumination. The service will not disrupt the lighting function of the existing lighting system. For the use of focal broadcasting services, where a customer can receive the full data on the broadcasting channel.



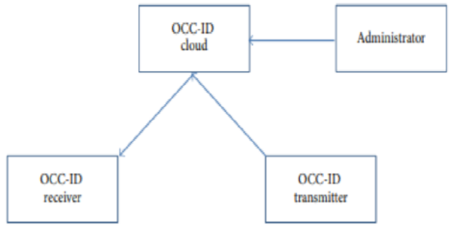
III. FIGURE3: OCC-ID ARCHITECTURE

However, as discussed in the complicated sections, camera communication has limitations in data rate, so the communication topology, which is activated on a long connection, does not show the possibility of practical implementation. The basic connection OCC must be found on the correct data transmission. Our proposed system will be able to include information containing the link address. This address can be called the ID link, it is stored and managed by a cloud server. Use an ID Nasc and an ID Nasc and an ion connection with a mobile phone or a mobile phone that can be connected to a chair and can be connected to RF technology such as Wi-Fi, 3G, and 4G LTE. A broadcasting service with centralized data management is propos d. If the cloud model is suitable, the broadcast data link can be easily managed and updated.

It is a good OCC ID that fears SEO connection: sender, receiver, and cloud computing infrastructure. The operation flow of the service is illustrated in Figure 4. There is also a transmitter embedded in the lighting or display systems by an additional module. Leirionn and focal three modulated light. The problem with the problem and the t-eolas is that they fear the processing of a cloud service. The transmitter and cloud infrastructure are connected via wires of a wireless connection. The link connection technology selected must establish the connection, such as video streaming. The receiver contains two functions, an OCC receiver and a link

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

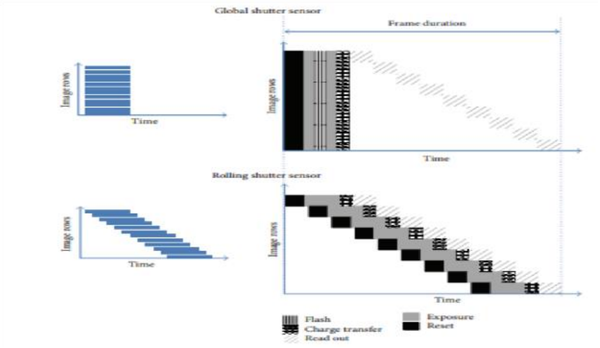
redirect. This is the ID string of the OCC connection that retrieves the data from the cloud server.



IV. FIGURE 4: OCC-ID FLOW DIAGRAM

4. Evaluation of OCC-ID camera based broadcast.

4.1 camera based broadcast for OCC-ID:
The camera communication technology works like VLC. Signals from a light source are absorbed and converted into photons in a single image. The OCC architecture is shown in Figure 2. The digital transmission bits will be managed by one or more lightweight transactions, depending on the modulation scheme. Casting techniques can be classified into two main categories, namely OOK casting and OOK subsystem casting. Two modulation systems work based on changing the state of the light source on and off in certain directions. They can be applied to flicker conditions in the transmitter description. This is one of the basic requirements of VLC. The light intensity must be the same as that detected by the human eye; thus the light cycle of light intensity must meet the response of the eye. For flickering and dimming [14] in VLC, studies and specifications are arranged differently than modulation, RGB color balance, or encoded signals. OOK rope molding is a typical technique used for interior and exterior applications. At the receiver, the on and off states of the light source will be recorded as grouped RGB color pixels for the "on" state or background for the "off" state in one image. The rendering process depends on the properties of the image layer. The camera image chip structure can be classified into two main technologies: CCD and CMOS. Following this technique, image processing is also determined by global shutter and rolling shutter. The forming process of a rolling image sensor and a universal shutter image sensor is shown in Figure 5. In a rolling image sensor, image pixels are captured row by row so that different rows of pixel arrays in an image are exposed at different times to absorb light intensity through the sensor. By delaying exposure between rows of pixel arrays, the rolling shutter mechanism can record changes in an object's position over time.

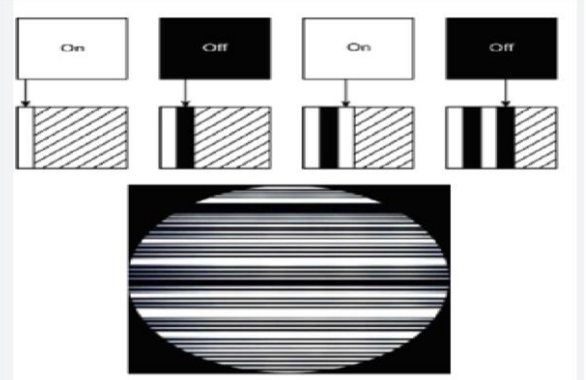


V. FIGURE 5: GLOBAL SHUTTER AND ROLLING SHUTTER OPERATION [17, 18]

In digital images, this ability causes movement to blur so that objects appear fragmented. However, in the OCC, this provision is an important advantage. A series of light sources will be captured and saved in one image. For global shutter, open and close all sensor pixels simultaneously. Therefore, all points in the image will receive light information from the sensor at the same time and at the same time. This mechanism can provide lighting capabilities to capture moving objects.

For multimedia photography, this technique is useful for obtaining high-quality images. For OCC, the global shutter can accept only one light source state in one image.

4.2 Performance Evaluation of Proposed System:
The operation of the OOK frequency shift image signal in a rolling shutter image sensor is shown in Figure 6. The digital bits encode the signal for turning the light on or off, and these bits are represented by a group of colored pixels. Depending on the structure of the image sensor, the number of discrete light state bits captured varies. With a rolling shutter, a single image can only contain one, but multiple images can be acquired with a rolling shutter.

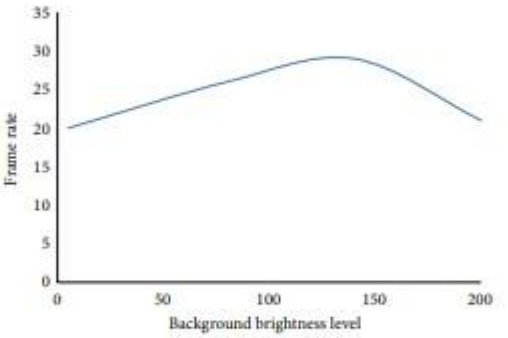


VI. FIGURE 6: OOK FREQUENCY SHIFT IMAGE

The OOK frequency shift image signal for a global shutter camera is shown in Figure 6. For OOK modulation, the process is similar to OOK frequency shift; the only difference is the data rate performance. Figure 6 shows the rolling camera imaging process for OOK modulation. Based on the performance of OOK frequency shift with global shutter, several issues related to OCC need to be considered.

International Journal on Recent and Innovation Trends in Computing and Communication
ISSN: 2321-8169 Volume: 11 Issue: 9
***Article Received:** 25 July 2023 **Revised:** 12 September 2023 **Accepted:** 30 September 2023*

Regarding synchronization, the maximum bit rate of the light source that can be captured by exposing the camera to the fully decoded bits must be determined. How can we guarantee that the sampling frame will get the full bit pattern in the OOK frequency offset with a rolling shutter image sensor? For OOK modulation with a global shutter, how can sampling occur in the beacon pulse? Sampling planning must ensure camera collection times. In practice, camera frame rates vary due to the mechanical structure and light sensitivity of the image sensor. For example, depending on environmental conditions, the camera's frame rate varies. In Figure 7, the camera frame rates depend on the backlight conditions. The camera will try to change the exposure value to bring the image into focus. So, if the background is too dark or too bright compared to the emitted light source, the camera needs more time to absorb the photons to the sensor. Due to the developed commercial architecture, OCC is mainly used in broadcast topologies, so the full duplex protocol due to synchronization is not easy to implement in commercial products.



VII. FIGURE 7: FRAME RATE VARIATION

Most research on timing problems considers transmitter design or receiver sampling planning [9, 11, 15, 16] for asynchronous transmission. In terms of communication range, the camera's image sensor will not receive photons directly. Photons from a light source must pass through a lens with a certain focal length. Compared to photodiodes based on visible light communication, OCCs have a more unidirectional LOS. The camera can focus on a ROI with low interference. Additionally, by using a lens, the camera can easily zoom in on the ROI at different distances. Most cameras have a zoom function to change the focus and zoom distance. The communication distance therefore depends on the camera lens. The performance of the OCC system based on rolling shutter and global shutter is evaluated with the implemented scenario. The receivers are rolling video request webcam and NI smart camera for video request global shutter. The 15W LED emitter is controlled by an Arduino board and a power controller driver. The modulation scheme is implemented based on OOK, OOK and OOK frequency offsets with the Manchester code. OOK and OOK frequency conversion with Manchester code is used for the non-flip version of VLC. For OCC ID service, the transmitter, LED, transmits the 8-bit identification string over the optical channel of visible light on a. server image link. The receiver and camera find the ID and send a connection request from the server via WiFi connection. The relevant default ID information will be displayed on the receiving device. An illustration of the implementation of the OCC-ID service. On the smartphone screen, the upper area is an image of the received signal. The bottom part contains the data related to the broadcast ID.

We also evaluate the performance of the OCC system based on OOK modulation and OOK frequency shift keying. With the OOK frequency conversion for some positions and the performance of the rolling shutter camera, two bits are embedded in an image. The number of integrated bits can be increased with higher symbol rates. However, to be compatible with precision shutter cameras, the frequency separation must satisfy the high flutter period during the second sampling. With a global shutter image chip, the data rate matches the frame rate of the camera because it takes two frames to decode a communications bit,. This method also requires two frames to synchronize that applies to all shutters10 kHz The same principle , OOK , as the performance of the shutter image chip can obtain one bit for a sample image. Data rates can reach 28 bits per second with a frame rate of 30. Unlike the global shutter and OOK rate shift modes, the global shutter sync cycle and OCC-based OOK modes maintain the synchronization and description of data. Compare the two bits of the Manchester code "0". Based on the phase reference of the sync bit, the receiver can determine the phase of the sample bit. Rolling shutter cameras have data rate performance advantages over round shutter cameras in terms of OOK modulation and OOK frequency shift. With roller shutter and OOK module system, OCC systems can achieve more than other commercial communication systems, data rate is one of the most respectable limitations of OCC technology. In RF communications, MIMO is a promising solution for data rates. However, with OCC, MIMO depends on the architecture of the imaging chip. For a global shutter image chip, MIMO can be used using parallel data in the LED array. At the receiver, LED sources are separated and decoded independently by image processing algorithms

Conclusion:

With rolling shutter image sensors, the MIMO technique is difficult due to the pixel construction process. There is a limited distance between the light source and the image sensor to create pixel roll. The light source must cover all vertical pixels in the image. Optical camera communication has great potential in future wireless communications due to the advantages of VLC and commercial development. Currently under review by the IEEE 802.17.5 revision. However, OCC issues related to timing, data rate and interference have not been resolved. Timing is an important issue because the signal received by the camera is a discrete transmitter image without feedback, and the camera communication program is based on the transmission topology. The roller shutter has more advantages over the overall shutter in terms of timing. In this study, we present and evaluate the performance of two image chip techniques, namely rolling shutter and global shutter. Student performance and thinking will play an important role in contributing to the standards. Finally, we propose a new service application for OCC based on cloud architecture, called OCC-ID. It can be considered as an invisible ID that uses visible light communication, camera communication and cloud computing technology. The identifier is integrated into the optical channel using OOK modulation or OOK frequency shift. The receiver uses the camera to decode the embedded information from the LED and is then directed to the broadcast link of the cloud server based on the detected ID. The OCC ID system demonstrates the advantages of dynamic content management over traditional ID systems.

References

[1] A. Ashok, M. Gruteser, N. Mandayam, and K. Dana, "Char- acterizing multiplexing and diversity in visual MIMO," in Proceedings of the 45th Annual Conference on Information Sciences and Systems (CISS '11), pp. 1–6, Baltimore, Md, USA, March 2011.

[2] N. Saha, M. S. Ifthekhar, N. T. Le, and Y. M. Jang, "Survey on optical camera communications: challenges and opportunities," IET Optoelectronics, vol. 9, no. 5, pp. 172–183, 2015.

[3] Visible Light Communications Consortium (VLCC), http:// www.vlcc.net/.

[4] Infrared Data Association (IrDA), http://www.irda.org.

[5] Home Gigabit Access (OMEGA) Project, http://www.ict- omega.eu/.

[6] Visible Light Communications Association (VLCA), http:// vlca.net/.

[7] IEEE Standards Association, IEEE 802.15.7 Standard for Local and Metropolitan area Networks. Part 15.7: Short-Range Wireless Optical Communication Using Visible Light, 2011.

[8] Technical Considerations Document, IEEE.15.7r1, 2015, https://mentor.ieee.org/802.15/documents?is done=DCN%2C %20Title%2C%20Author%20or%20Affiliation&is group=007a.

[9] T. Nguyen, N. T. Le, and Y. M. Jang, "Asynchronous scheme for optical camera communication-based infrastructure-to-vehicle communication," International Journal of Distributed Sensor Networks, vol. 2015, Article ID 908139, 11 pages, 2015.

[10] S. Arai, S. Mase, T. Yamizato et al., "Feasible study of road-to- vehicle communication system using led array and high-speed camera," in Proceeding of 15th World Congress on Intelligent Transport Systems and ITS America's 2008 Annual Meeting, pp. 1–12, November 2008.

[11] R. D. Roberts, "Space-time forward error correction for dimmable under sampled frequency shift ON-OFF keying camera communications (CamCom)," in Proceedings of the 5th International Conference on Ubiquitous and Future Networks (ICUFN '13), pp. 459–464, July 2013.

[12] P. Luo, Z. Ghassemlooy, H. Le Minh, X. Tang, and H.-M. Tsai, "Under sampled phase shift ON-OFF keying for camera com- munication," in Proceedings of the 6th International Conference on Wireless Communications and Signal Processing (WCSP '14), pp. 1–6, IEEE, Hefei, China, October 2014.

[13] C. Danakis, M. Afgani, G. Povey, I. Underwood, and H. Haas, "Using a CMOS camera sensor for visible light communication," in Proceedings of the IEEE Globecom Workshops, pp. 1244–1248, Anaheim, Calif, USA, December 2012.

[14] S. Rajagopal, R. D. Roberts, and S.-K. Lim, "IEEE 802.15.7 visible light communication: modulation schemes and dimming sup- port," IEEE Communications Magazine, vol. 50, no. 3, pp. 72–82, 2012.

[15] T. Nguyen, N. T. Le, and Y. M. Jang, "Asynchronous scheme for unidirectional optical camera communications (OCC)," in Proceedings of the 6th International Conference on Ubiquitous and Future Networks (ICUFN '14), pp. 48 –51, Shanghai, China, July 2014.

[16] P. Luo, Z. Ghassemlooy, H. Le Minh, X. Tang, and H.-M. Tsai, "Under sampled phase shift ON-OFF keying for camera com- munication," in Proceedings of the 6th International Conference on Wireless Communications and Signal Processing (WCSP '14), pp. 1–6, Hefei, China, October 2014.

[17] Rolling Shutter vs. Global Shutter, Technical Note, 2014, http://www.qimaging.com/. [18] http://abertoatedemadrugada.com/2011/09/o-que-e-o-rolling- shutter.html.

[18] digital government. Social Science Computer Review, 40(2), 494–511. https://doi.org/10.1177/0894439320980122

[19] 4.Ku, C. H., & Leroy, G. (2014). A decision support system: Automated crime report analysis and classification for e-government. Government Information Quarterly, 31(4), 534–544. https://doi.org/10.1016/j.giq.2014.08.003

[20] 5.Matheus, R., Janssen, M., & Maheshwari, D. (2020). Data science empowering the public: Data-driven

dashboards for transparent and accountable decision-making in smart cities. Government Information Quarterly, 37(3), 101284. https://doi.org/10.1016/j.giq.2018.01.006

[21] 6.Min, K. E., Liu, P. J., & Kim, S. (2017). Sharing extraordinary experiences fosters feelings of closeness. Personality and Social Psychology Bulletin, 44(1), 107–121. https://doi.org/10.1177/0146167217733077

[22] 7.Sharma, G. D., Yadav, A., & Chopra, R. (2020). Artificial intelligence and effective governance: A review, critique and research agenda. Sustainable Futures, p. 2, 100004. https://doi.org/10.1016/j.sftr.2019.100004

[23] 8.Sun, T. Q., & Medaglia, R. (2019). Mapping the challenges of Artificial Intelligence in the public sector: Evidence from public healthcare. Government Information Quarterly, 36(2), 368–383. https://doi.org/10.1016/j.giq.2018.09.008