

"Multimodal sensing enabled real-time intelligent wireless camera network"

Deliverable	Milestone	Deliverables	Status of deliverables
1 st Deliverable (1 st May 13 – 31 st Jun 13)	Camera, sensors and hardware platform selection	D1: Report on hardware selection with justifications.	Submitted
<p>In this report, the process of finalizing the hardware components and peripherals for the project "Multimodal Sensing Enabled Real-time Intelligent Wireless Camera Networks for Secure Spaces" has been discussed. Different contending vendors with a diverse range of sophisticated equipment and components have been compared and finalized. Based upon diverse requirements with a broad range of available component and peripherals, this report finalizes hardware equipment and peripherals to be employed and used.</p>			
2 nd Deliverable (1 st Jul 13- 31 st Aug 13)	Milestone	Deliverables	Status of deliverables
	Detail node architecture and design	D2: Design document and system architecture.	Submitted
<p>This reports discusses the overall system architecture for achieving the objective of EOI (Event of Interest) localization with the help of acoustic signature, target detection, target tracking, Reporting the event in real-time to local authorities. Design of the sensor node and camera node has been discussed in detail. This report also specifies the respective roles of sensor node and camera node where it discusses that sensor node is used for detecting the acoustic signature and calculating the angle of arrival while on the other hand responsibility of camera node is also discussed where camera node processes the angles for localizing the target. Camera node is also engaged in object detection and tracking in real-time. Similarly, hardware details of the nodes to the level of schematics have been highlighted.</p>			
3 rd Deliverable (1 st Sep 13- 31 st Dec 13)	Milestone	Deliverables	Status of deliverables
	Detailed network architecture and design	D3: Architectural Design Document	Submitted
<p>Objective of this report is to explain in detail the potential network architecture and design for the project". In case of an event of interest (EOI), related information should be communicated to the concerned authorities in real-time. In addition, when an event is being tracked, sensors, both camera node as well as sensor nodes need to collaborate and exchange the decision outputs. Scalable communication network architecture, capable of delivering the required quality of service (QoS) demands, for information transfer from the camera nodes to concerned authorities and data centers as well as for information exchange among different nodes has been discussed. The proposed communication network involves a heterogeneous two tier hierarchical architecture comprising IEEE 802.15.4 (WSNs) and wireless broadband for information transfer.</p>			

4 th Deliverable (1 st Jan 14- 30 th Apr 14)	Milestone	Deliverables	Status of deliverables
	Implementation of Phase-1 and Interim Demonstration	D4: Development of multi-modal node hardware platform. Demonstration	Submitted
<p>In this report, development of multi-modal node hardware platform along with testing and Demonstration scenario for Multi-modal Sensing Enabled Real-time Intelligent Wireless Camera Networks for Secure Spaces" is discussed. Hardware realization of sensor node which is the acoustic processing node and camera node which is the video processing node is based upon the proposed design in \Design Document of System Architecture". Testing has been Partitioned into two phases. Sensor node has been tested and demonstration has been discussed with respect to parameter setting, angle estimation and measurement, packet shaping and transmission, and collision avoidance mechanism while, on the other hand, camera node's testing has been discussed in context of coordinate stitching, object detection, UART communication, camera handover, and video streaming.</p>			
5 th Deliverable (1 st May 14 – 31 st Aug 14)	Milestone	Deliverables	Status of deliverables
	Implementation of Phase-2 and Interim Demonstration	D5: Development of data communication and networking algorithms. Demonstration	Submitted
<p>In this quarter, "Data Communication and Networking Algorithms" are detailed. There are numerous requirements for seamless delivery of data from one operating entity to another within the context of the system. Streaming of live video, captured at intelligent camera node, to the back-end server and to the display panels installed at the mobile vehicles is one of the key requirements. Similarly, Video Management System (VMS) is considered as backbone for wireless camera networks and is addressed in detail. Mobile Live View Application (MLV), which will be installed on the display panels on the mobile vehicles, will also receive the streaming multimedia content (video) from the streaming server for keeping the authorities and personnel abreast of the latest developments on the field. Mobile display panels need to be registered with the network in order to get streaming multimedia content from the server. Similarly, intelligent camera node will be communicating with the streaming server and provide the video content so it has to be registered on the network. Another important consideration is intelligent camera handover, which is also addressed in this quarter.</p>			
6 th Deliverable (1 st Sep 14-31 st Dec 14)	Milestone	Deliverables	Status of deliverables
	Implementation of Phase-3, Interim Demonstration and seminar for potential end users	D6: Development and implementation of sensor collaboration and data fusion algorithms <ul style="list-style-type: none"> • Inter node collaboration • Intra node collaboration Demonstration Publication of results in different	Submitted

		research papers in international conferences and journals	
<p>In the 6th Deliverable, “Data communication and Networking Algorithms” have been submitted. The work has been done for the algorithmic approach to implement streaming mechanism of live video, captured at intelligent camera node, to the back-end server and to the display panels installed at the mobile vehicles. Detailed work has been done for client server model to record and transmit live stream at end point entities.</p>			
7 th Deliverable (1 st January, 2015, 30 th April, 2015)	Milestone	Deliverables	Status of deliverables
	Implementation of Phase-4 and Interim Demonstration	<p>D7: Development and implementation of Consensus development and data fusion algorithms</p> <p>Demonstration</p> <p>Publication of results in different research papers in international conferences and journals</p>	Submitted
<p>In this Deliverable, “Consensus development and data fusion algorithm” have been discussed in detail. The research work was done in perspective of detection and tracking for the event of interest in visual domain. The algorithmic approach has been developed for using filter techniques for detecting and tracking the object via finding the variance and non-variance features of the object of interest. In addition the model also helps the system to track and estimate the updated position of object by calculating the velocity that has appeared in successive video frames. The work done also helps out the occlusion avoidance in parallel to tracking.</p>			
8 th Deliverable (1 st May, 2015, 31 st July, 2015)	Implementation of Phase-5 and Interim Demonstration	D8: Information flow control algorithms	Submitted
<p>In this Deliverable, “Information Flow Control Algorithm” discussion has been made for the data flow and the control algorithm for our proposed hierarchical nodal model. The objective is to define the architectural model for the data centralization and its communication methodology. The need rose to define a control algorithmic model for managing the communication without collision and the data transmission with minimum losses and maximum quality. Real time video streaming and object tracking data flow have also been discussed in this report of development of algorithms.</p>			
9 th Deliverable (1 st August, 2015, 31 st September, 2015)	Final demonstration	<p>D9: A test-bed will be deployed for real life demonstration.</p> <p>Demonstration</p>	Pending
<p>The Project final deliverable has been submitted but a final demonstration of the developed system has to be demonstrated by the Project Team.</p>			

10 th Deliverable (1 st October, 2015, 31 st October, 2015)	Final release, benchmarking and workshop for end users	D10: Final release of the security solution with multimodal camera node and related detailed documents. Also get the feedback from end users	Pending
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