DESIGN AND DEVELOPMENT OF AGENT BASED CONTEXT AWARE SYSTEM IN EMERGENCY SITUATIONS

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Internet of Things, Context Aware Agent, Data Analysis Agent, Emergency Service agent

Introduction:

The Internet of Things (IoT) network has a set of smart physical objects or things. The objects could be sensors, nodes, and other objects that are interconnect. Over the past few years, the IoT network creates a new era of technology to access the services ubiquitously [1]. Also, it has been associated with diverse set of real-time applications to compute and communicate across the IoT networks. It has been impacting on various organizations to send and provide the data during the emergency context to the users. The following are the challenges of IoT security, design based challenges - limited energy, limited memory computation power, etc., scalability, and network connectivity.

Context aware computing is to compute the situations of objects that is understand the situations of the objects from the environment. This type of computing is essentially required during emergency situations for perceiving and transmitting context data over the network. The Context Aware System (CAS) creates the context for emergency users. Therefore, CAS is to afford flexibility of emergency context services to users ubiquitously. It has created a new mode of services and also provides efficient quality of services to emergency users.

The agent is a lightweight process to execute the computational tasks. The agents are running in the background of the system to percept and exhibit the task on behalf of the users. The agents are intelligent and autonomous that are capable to learn and communicating with each other. Some of the agents are to be considered as static and mobile agents in the network environment. The static agents are housed in the environment that learn and communicate with other agents whereas mobile agents moved from one environment to another for performing desired tasks. The agents are used to provide flexible, intelligent, reliable, scalable, and efficient services in various contexts.

Objectives:

The objectives of the proposed work are as follows:

1. To afford efficient services to the users ubiquitously during emergency contexts,
2. To detect and recognize impulsive sounds during emergency situations,
3. To design and develop a centralized system for real-time monitoring of emergency users,
4. To monitor those dead zones of the traditional fixed surveillance system.

Methodology:

The architecture associates various types of agents like the Context Aware Agent (CAA), Data Analysis Agent (DAA), and Emergency Service Agent (ESA). The CAA is to create the emergency contexts by the behavior of emergency users. The CAA is considered as a static agent in the proposed scheme. During emergency contexts, the CAA verifies the emergency context data, if the service is found to be an emergency in the real-world environment. Meanwhile, the CAA communicates with the DAA for the processing of emergency services to the users through ESA. CAA sends the emergency data to DAA in terms of sounds, audio, and video. Also, CAA updates the emergency data into the Emergency Knowledge Base (EKB).

The DAA is a static agent is at centralized service system to analyze the data using the proposed machine learning algorithm for better insights during emergency situations. DAA read and updates emergency data into its Centralized Knowledge Base (CKB) with the timestamp of data. The CKB has the position, type of context, status of service, acknowledgment, etc. ESA is a static agent that situated in emergency service system that provides the services to the users. Once services are over, ESA acknowledges to the DAA.

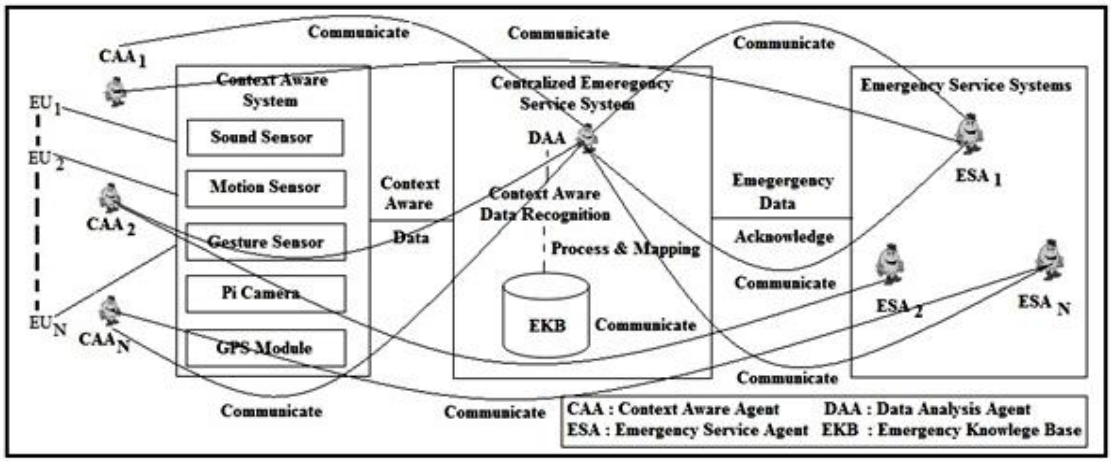

Fig 1: The Proposed System Architecture

The proposed architecture comprises three main modules. Firstly, context aware system module, centralized service system module, and emergency service modules are hospital, police station services, and so on, which are shown in the Fig1. These proposed modules are described follows:

- *Context Aware System*: The proposed context aware system comprises CAA for learning and performing desired tasks in the environment. Also, this system acquaintance with a Pi-camera module, sound sensors, gesture and motion sensors, and GPS module. This module forwards emergency context data to the centralized service system and also records the sounds of emergency users with the help of the CAA. The CAA is triggered automatically and forwarding context data with the context location and timestamp to the concerned service systems whenever an emergency situation has occurred. Often the CAA analyses the emergency context and transmits the same to in close proximity emergency service systems.
- *Centralized Service System:* The DAA agent receives emergency data from CAA during emergency situations. DAA agent is analyzed the emergency data in terms of sound, video, location, and audio of users using the proposed machine learning algorithm. If DAA recognized the data as emergency, immediately pass the data to emergency service systems to save the life of the users during an emergency context.
- *Emergency Service System:* The ESA is to provide the service to users and acknowledge the same to the centralized system.

The agent interaction approach is as depicted in Fig.2. The CAA creates and communicates to the DAA agent during emergency situations based on the behaviour of the user in a real-world environment. Also updates the knowledge base known as EKB which has meta-informations of emergency users. DAA communicates with ESA for providing services, if service as an emergency in the real world environment. ESA acknowledges the same, once service is completed. Also, DAA updates and reads the CKB that has meta-information of emergency services in the networks.

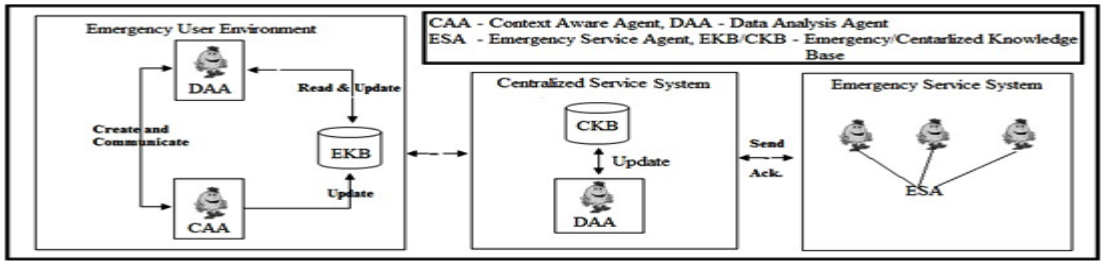

Fig 2: Agent Interaction Approach

Conclusion:

The proposed system is to afford context aware services to various types of users during emergency contexts. Also, it saves the life of emergency users in a real-world environment. It has been presented the detailed survey towards the proposed work in terms of approaches and limitations. It has been planning to an implement machine learning approach to emergency context aware service system in future work. Therefore, the proposed scheme comprises possible outputs like efficient analysis of emergency data, efficient monitoring of emergency users ubiquitously, highly secure and easy to use, flexible and scalable, and high level of emergency user satisfaction and low-cost implementation.

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