MIDDLE EAST TECHNICAL UNIVERSTIY

DEPARTMENT OF COMPUTER ENGINEERING

Kick-off Document

Group: iTech

Project: Search and Rescue System

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1. Description of Project

The aim of the project is developing a software and hardware solutions for use of Search and Rescue Teams. Main components of the system are as follows;

- Mission Planning and Coordination Center
- Rescue Team Member Mobile Devices (Phone, Tablet)
- Rescue Team Member Wearable Devices (Smart Glasses, Sensors)
- Unmanned Reconnaisance Vehicle(Quadcopter)

Resultant product will be used for planning and executing missions that are aimed to find and rescue people who are lost or injured in the field. System consists of some subsystems which are used in mission planning, tracking and execution of the rescue missions.

2. Work Package Time Distribution

Work Packages and estimated durations for each package estimated as follows. Our distribution based on 36 man-months in total.

WP Id	Term	Work Package Title	Estimated Duration (man-months)
0	491	Pre-Work: Kickoff Preparation and Literature Research	4
1	491	Design & Implementation of Mission Planning and Coordination Center	6
2	491	Geographic Information System Integration	6
3	492	Device Communication Integration	6
4	492	Collaboration between the Rescue Team	4
5	492	Live Video Streaming	4
6	492	Augmented Reality	6
7	492	BONUS: Quadcopter Video Stream	-
8	492	BONUS: Voice Over IP (VoIP)	-

3. Detailed Descriptions of Work Packages

3.0. WP0 - Pre-Work: Kickoff Preparation and Literature Research

Estimated Duration in Man-Months: 4

In this work package, the following functionalities / features / work items will be implemented;

1. Determining boundaries of the project with ASELSAN (Meetings & Presentations)
2. Preparation of Kickoff document
3. Literature Research

3.1. WP1 - Design & Implementation of Mission Planning and Coordination Center

Estimated Duration in Man-Months: 6

In this work package, the following functionalities / features / work items will be implemented;

1. Designing Database to store people, devices, previous missions, paths etc.
2. Web Based User Interface for Mission Planning and Coordination Center
3. Implementation of management of people and device records, matching device - people and rescue mission
4. Web Services (RESTful API) to handle the data coming from devices (excluding video and voice) and to support data to UI.

3.2. WP2 - Geographic Information System Integration

Estimated Duration in Man-Months: 6

In this work package, the following functionalities / features / work items will be implemented;

1. Geographic Information System (GIS) will be integrated to Mission Planning and Coordination Center.
2. Marking the critical geographic points like followings;
    a. last known position of the lost person/people
    b. estimated position of the lost person/people
    c. the points which added/marked by rescue team
    d. key buildings or structures in rescue area
3. Path generation to trace and search for rescue team members

3.3. WP3 - Device Communication Integration

Estimated Duration in Man-Months: 6

In this work package, the following functionalities / features / work items will be implemented;

1. Reading data from sensors (Pulse, action, Laser Range Finder, Accelerometer)
2. Core Application for Mobile Devices in Android Development Environments
3. Each device and sensor will need specific integration and test procedures. In this work package we will implement the communication parts of each component of the project to send data to already developed RESTful Services (mentioned in WP1).

3.4. WP4 - Collaboration between the Rescue Team

Estimated Duration in Man-Months: 4

In this work package, the following functionalities / features / work items will be implemented;

1. Integration of pulse, action and laser range sensors
2. Sharing health and action information with team members and center
3. Sharing location with team members and center

3.5. WP5 - Live Video Streaming

Estimated Duration in Man-Months: 4

In this work package, the following functionalities / features / work items will be implemented;

1. Any team member will be able to share her/his vision with other team members.
2. Mission Center will be able to see the vision of any rescue team member.

3.6. WP6 - Augmented Reality

Estimated Duration in Man-Months: 6

In this work package, the following functionalities / features / work items will be implemented;

1. Team members will be able to see position of each other using mobile devices with the integration of Augmented Reality. In this way, we will provide real-time augmented positioning on screen & camera
2. Augmented Reality layer on screen will also show the estimated distance between other team members.
3. Augmented Reality layer will also include some graphical and statistical information to show health, action and status.

3.7. WP7 - BONUS: Quadcopter Video Stream

In this work package, the following functionalities / features / work items will be implemented;

1. Rescue team may use quadcopters (or any type of multicopters) to provide wider vision and reach unreachable area by foot. System will be able to get video stream from the any type of camera (FLIR or Standard) which is placed on UAV device.
2. Data packets will be transferred mission center and then these packets can be send team members according to needs.

3.8. WP8 - BONUS: Voice Over IP (VoIP)

In this work package, the following functionalities / features / work items will be implemented;

1. Rescue team members will be able to communicate vocally over VoIP technology.
2. Data packets will be transferred and distributed over mission center.

4. Risk Assessment

Risk Id	Description	Possible Solution(s)
1	Late delivery of the equipments (from ASELSAN)	*Solutions are provided below.*
2	Capability of Smart Glass and Mobile Devices	
3	Network/Data Limitations	

4.1. Risk1 - Late delivery of the equipments (from ASELSAN)

All hardware/equipments which will be used in project will be provided by ASELSAN. Since they are still working on the projects which requires similar/same equipment; we may be lack of equipment sometimes. Also delivery time of the equipments not fixed yet, so these unclear factors may pose some risks for us. For mobile devices like phone or tablet we may use our personal devices or emulators but since there is no emulator for other technical devices such as quadcopter and smart glasses we don't have any alternative. To solve these, we will do our best to provide effective communication with our company supervisors.

4.2 Risk2 - Capability of Smart Glass and Mobile Devices

We don't know the model and technical specifications of the smart glass which will be provided by ASELSAN yet. Latest production of ODF Company has Qualcomm® Snapdragon TM 805 2.7GHz quad-core Processor and 3GB Pop LP-DDR3 RAM which will be enough for applications. But lower configurations may generate some risks. Having latest models or lowering the specifications like bit rate of video streaming, graphical abilities may prevent these risks.

4.3 Risk3 - Network/Data Limitations

Uploading speed of main computer may limit our progression. Because we will upload all video/vocal/data streams to this device using 3G (or newer) technology and spread to all devices (instead of P2P). As a solution, we may use external hosting to upload/spread data with higher network capabilities. In this way, "mission computer" will replaced/used as control panel of external server.