

MRMap and SARLOC – Mobile ‘phone Geolocation for Search and Rescue

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Summary: MRMap and SARLOC are two tools that have been developed by Mountain Rescue personal to assist Search and Rescue Teams in the UK. MRMap allows real-time tracking of team resources using GPS enabled radios. SARLOC is a system that can be used to locate ‘lost’ people using the geo-location API of the web browser on many ‘smartphones’ without having to install any software

KEYWORDS: SARLOC, MRMap, mountain search and rescue

Abstract:

Dedicated teams of volunteers provide Mountain Rescue in the UK. Although highly trained and competent people, there is an increasing demand to look after their safety whilst operational. Logistically, it is highly desirable to have a current picture of where assets, whether people or vehicles, are. Volunteers are generally part of a Mountain Rescue (MR) Team, thus tracking individual members is normally accepted by the membership and well established. Most MR teams have good radio communication network *in-situ*. MRMap is a system that has been in use for over six years. The handset of a team member’s radio contains a GPS receiver that can be used to transmit the location of the handset to a distant station where it can be displayed on a map.

MR teams deal with many types of incident involving missing persons. Within my team (OVMRO) we receive numerous calls where the caller has a mobile ‘phone but little other equipment to aid their navigation e.g. map and compass or GPS. SARLOC is a system whereby the lost person’s ‘smartphone’ can pass its location to the MR teams. Existing systems are available to track ‘phones but these normally have to be installed on a users ‘phone prior to use. SARLOC utilises functions of the ‘smartphones’ web browser to obtain a location for the handset. SARLOC is currently undergoing testing within the UK and Ireland but has been used successfully on a number of occasions to significantly reduce the ‘search area’ for the teams. In the medical world, the importance of reaching an injured person within the ‘Golden Hour’ is paramount. Reducing the search area can significantly reduce the time required to locate and recover a person.

MRMap

The original work on tracking via GPS enabled radios was carried out by Robert Brookes, himself an MR team member, in 1997 using SRM9000 radios donated by Simoco. The proof of concept confirmed the technique worked but was only suitable for tracking of vehicles due to the size of the radios. Simoco subsequently produced a portable radio containing a GPS in the handset. This enabled tracking of both search dogs and people.

During this development, the software used to display the locations underwent a considerable price increase making it prohibitively expensive for volunteer teams. MR team member, Dave Binks (Duddon and Furness Mountain Rescue Team), developed a bespoke application called MRMap that

could take the location data and display it on Ordnance Survey (OS) maps at various scales in real time.

MRMap is a Windows™ application developed using C++. It receives positional data in latitude/longitude format from a base station radio via a serial port on a PC. This is converted to OSGB36 format for overlay onto digital maps. Each MR Team radio is allocated a unique ID. When MRMap receives a data packet it can retrieve the radio ID, latitude and longitude and plot the ID on a map.

SARLOC

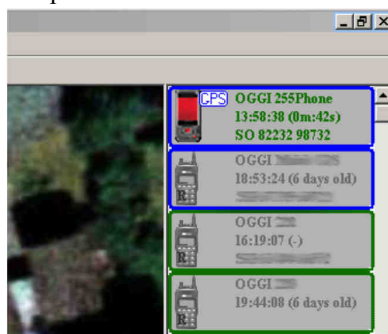
MRMap is used by many MRTs and is ideal for tracking MR personnel through their team radios. MR teams often receive calls for assistance from people on the hills who have mobile ‘phone contact but little if any navigation equipment i.e. map, compass, GPS and/or little knowledge of how to navigate in remote areas. The increased presence of ‘smartphones’ which are location aware led to the development of SARLOC in an attempt to utilise the ‘phones to assist MR Teams in finding the lost people.

Steve Fletcher (Bolton MRT) actively developed an application that can be installed on ‘phones which will interrogate the ‘phone and pass its location to MRT. This works well but relies on the application being installed and configured on the users ‘phone.

SARLOC does not require any applications to be installed on the ‘phone and uses the geo-location API of the ‘phone’s web browser to obtain it’s location. The lost person only needs to browse to the SARLOC web page, the URL of which is sent to the person as an SMS message. SARLOC uses both PHP and JavaScript to request the ‘phones location and to pass it to a web based database which can then be interrogated by the MRT. Most ‘phones have a privacy setting that controls access to the location API. The privacy setting can prevent SARLOC obtaining the location but the user may be prompted to allow the browser access to the information. If the web page obtains the location it uses an Ajax call to update the online database. The users location can then be retrieved from a web page showing the tabular data as below;

OS Ref.	LAT	LON	ACC	ALT	ALT_ACC	HEADING	SPEED	TAG	TIMESTAMP
SN604812	52.41020	-4.05274	24	119	0	0	0	Cas 1	2012-02-09 14:23:40
NY055852	55.15221	-3.48317	48	122	0	0	0	Cas 2	2012-02-06 21:13:27
TQ280046	50.82581	-0.18174	88	11	18	0	0	Cas 3	2012-02-06 20:27:11

The location is also shown in MRMap:



Case Histories

Searching for a lost/missing person is one of the more resource hungry tasks MRT have to conduct. Where the person has little idea of their location a protocol is followed to narrow down the area searched. This is generally based on team member's local knowledge and 'gut feeling'. From this procedure areas of high probability will be identified and resources deployed to search the area. The limited number of resources dictates how many areas can be searched at the same time. The time taken to search these areas will reduce when the distance a searcher can see reduces due to nightfall, weather and the ground conditions they are searching under. A significant amount of work [1][2] has been carried out to try and improve the way searches for missing person(s) are carried out. SARLOC can provide a huge saving in terms of both manpower required and time to recover the lost person by providing an accurate location for them.

One example of this was a search on Yr Wydfa (Snowdon, North Wales) where the party were unsure of their position. Normally a number of search teams would be sent onto the hill to sweep the areas of higher probability. SARLOC was activated and a fix received within a few seconds that allowed the team to deploy just two MR members to walk directly to the lost party.

The urgency to locate a party is increased where a casualty is injured or has a medical problem. If the casualty is unsure of their position, SARLOC can be used to report their location. This allows the MRT to tell the casualty they know where they are and will be with them in a much shorter time than if they had to search for them. This can significantly improve the moral of the casualty.

An example of this is a search on Moel Siabod (North Wales) in November 2011. Two walkers had descended from the summit. They had limited equipment and eventually became totally lost and disorientated in the cloud. They rang for help as the light faded and could only give a vague idea of their location. One of them had a medical condition and was deteriorating so search parties were sent out immediately. SARLOC provided a fix with a reported accuracy of 12m. The location was radioed to the hill parties who were planning to search what would have been the wrong side of the mountain. They entered the location into their GPS and walked straight to the casualty.

Conclusion

In conclusion we can see that MRMap is a well-established system to track team personnel and equipment while operational. SARLOC is a novel new application to rapidly locate lost people by simply using the smartphone they have made the rescue call with. With the continuing expansion of broadband coverage and smartphone ownership SARLOC's importance as a tool to resource strapped MR Teams can only continue to grow. MRMap and SARLOC show how developments in geo-location are helping MR teams to find lost people efficiently, instilling much needed calm and confidence in them, while minimising team resources required and staying safe themselves.

References

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