

# Context-aware life blogging with Context Watcher

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## Context Watcher

Context-aware life blogging is like writing your personal diaries in an automated fashion. It is no bother at all. A mobile application –named the Context Watcher– automatically connects to available sensors, logs the information, detects patterns over time, and generates daily summaries about your location, activities and moods, and environmental conditions.

The Context Watcher is a mobile application developed in the EU project MobiLife, written in Python, and running on Nokia Series 60 mobile phones. The aim of the Context Watcher is to make it easy for end-users to automatically record, store, and use context information. This can be done for personalization purposes, as input parameter for information services, or for sharing information with family, friends, and colleagues, or even just to log them for future use or to provide statistics of the users lives.

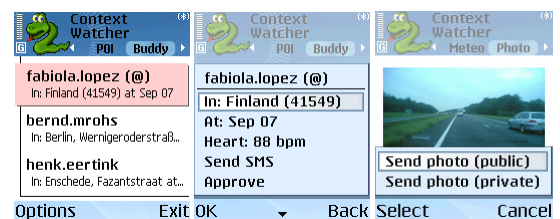
The available information depends on the context providers that are connected to the Context Watcher application, and is not limited to location and reachability information as in [3]. Not all users have exactly the same set of context providers. Some users may not have network access to, or possess certain types of sensors, whereas other users might have multiple sensors for the same type of information. This might result in conflicting information, in which case the information with the highest confidence is used, or these sensors can serve as fallback information sources in case one fails or becomes inaccessible.

The Context Watcher application is able to record information about the user's

- Location (based on GSM cell and optionally on GPS)
- Mood (based on user input)
- Activities and meetings (based on clustering and information fusion)

- Body data (based on heart and foot sensors)
- Weather (based on a location-inferred remote weather CP)
- Visual data (pictures enhanced with contextual data)

When the user starts the Context Watcher it, depending on its configuration, automatically connects to the available sensors and to the remote context providers over GPRS. All connections may also be manually activated by the user. E.g. when the user has a GPS receiver, the Context Watcher application will send the GPS data together with GSM cell information to the remote location provider, which will enrich the data. Enriched information is returned to the user, and they receive an alert when they enter a known cluster (such as their Home, Office, or Hotel) or when they are close to one of the persons in their buddy list.



**Fig. 1.** Contact list with near real-time sharing of contextual data and interaction possibilities, including sharing of context-enriched pictures between buddies or to the general public.

## Context Sharing

Users can invite other users to become their buddies. Initially, new buddies will be shown in their contact list as 'requested' with no extra information. As soon as a buddy approves the request from their contact list, a relation is established and the context information exchange can begin.

Figure 1 shows an example of a contact list with near real-time context information, that is, actual

information when both parties have the Context Watcher application running, or the last known information together with a time stamp when the other party is off-line. The information shown is best-effort. This means that –in the example- Fabiola has no GPS attached or is inside a building, her cell information cannot be resolved, so the best location determination is at country level. The other two contacts have a GPS running or are in a cell of which the location can be resolved from the cell-id database. The location, in terms of latitude-longitude, is resolved into street and city information using the MapPoint web service. This information is shown in the contact list, together with readings from other context providers, including heart rate and walking speed information from the wellness provider, showing a 88 bpm heart rate for Fabiola.

All gathered context information can be used 1) to adapt the behavior of application running on the mobile phone (e.g. prioritizing the favorite applications depending on location cluster), 2) to serve as input for information services (maps, points of interest) or other context providers, and 3) to tag multimedia content recorded with the mobile device.

### Context Blogging

When pictures are submitted to a central image server from the Context Watcher application, a large part of the descriptive text can be generated automatically using present context information. Figures 1 and 2 show how a picture can be submitted, and how this picture is tagged with automatically recorded street and city information, geo position, speed and direction of movement, name of the location cluster (is this a home or an office picture), and people who are nearby.

We have integrated the picture context provider with flickr.com, one of the largest public image servers of this moment, where the context information is submitted as tags, and the descriptive text is automatically generated, e.g. "I was on [business trip] together with [Henk] and [Bernd] in [Oulu] and I made this picture of the [Alexanderkatu] while traveling [with public transport] to the [summer school]", where all the information between brackets is auto-generated. This means that one action on the mobile phone is enough to send a richly described picture to a remote image server, enabling others to easily find pictures of their liking, e.g. by browsing the context

tags to separate the home pictures from the office pictures. Programmatic interaction is also a possibility: because all pictures are geo-tagged, they also show up in experiments where other parties integrate Flickr and Google Earth. One of the next steps is to generate daily reports from the different streams of context information and the pictures taken during the day, and to present them in a format which is enjoyable and informative to the human eye, with cross links between the summaries for easy navigation and categorization. This way it is possible to easily browse your own life, e.g. by finding those other days that you met buddy Marko, and recollecting what you did together.

Date	Owner (rights)	Picture	Data
9/14/05 1:35:45 PM	Johan (private)		cell id: 10571 altitude: 59.4 speed: 115.1 km/h course: 246.6 pos: (52.279,6.503) range: 1 m street: E30 postal code: 7462 city: Rijssen (NL)
12/1/05 6:15:25 PM	Johan (public)		cell id: 17404 pos: (45.189,7.644) range: 1 m street: SP2 postal code: 10072 city: Caselle Torinese (IT) buddy: wagner flickr: <a href="#">link</a>

**Fig. 2.** Sample overview of the submitted pictures, together with relevant context data of that moment. The first example shows GPS based location data, the second one show cell-id based location data together with automatically derived cluster names and nearby buddies.

### Relevant links

- MobilLife: <http://www.ist-mobilife.org>
- Try the Context Watcher yourself: <http://www.lab.telin.nl/~koolwaaij/showcase/crf/cw.html>
- The cell-id database: <http://www.lab.telin.nl/~koolwaaij/showcase/gsmcells>
- Telematica Instituut: <http://www.telin.nl>

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