Camera Application

Mobile Project TTOW0630

Marek Korenciak

2016/2017 JAMK University of Applied Sciences

Content

Introduction

SolarGis is Slovak company providing long time solar forecast for almost whole of the world. They have lot of clients, who need the special information about solar irradiation on their concrete place. The company uses meteo satellites to gather basic data. They can make the map of the solar irradiation this way with at most 7% tolerance. But this data can be used mainly for the bigger areas. For example, we want to find place for build new solar power plant. We can choose, via the maps, some bigger area for this special purpose. However, how to find the best place in this bigger area?? We have to make the terrain research in this area. Problem is, that the solar irradiation of the chosen area can be influenced by the local terrain (forests, hills, buildings,...).

Planned application called Horizon Camera will be an unofficial Android application used for the special purposes of SolarGis. This application can make the terrain work easier in this company. Point is to take the pictures/video of the horizon. This pictures (frames of videos too) will have additional information- GPS position, orientation and angle from the gyroscope. All this data will be send to server side, where it will be processed and used for more exact expected solar irradiation for the place. Data can be stored temporarily in the mobile phone, until some internet connection appears.

Processing and calculating of the gathered data on the server side are not part of this project.

Objectives

- Main objective is to create application, which can make easier specialised terrain work in the company SolarGis
- Application can be used for usual camera situations too (usual photos)
- Application has developed all components- camera services, GPS and orientation services
- User friendly application
- Application, which can be easily expandable with new features
- Use features of Android- Material Design, fragments, notifications

Use Cases

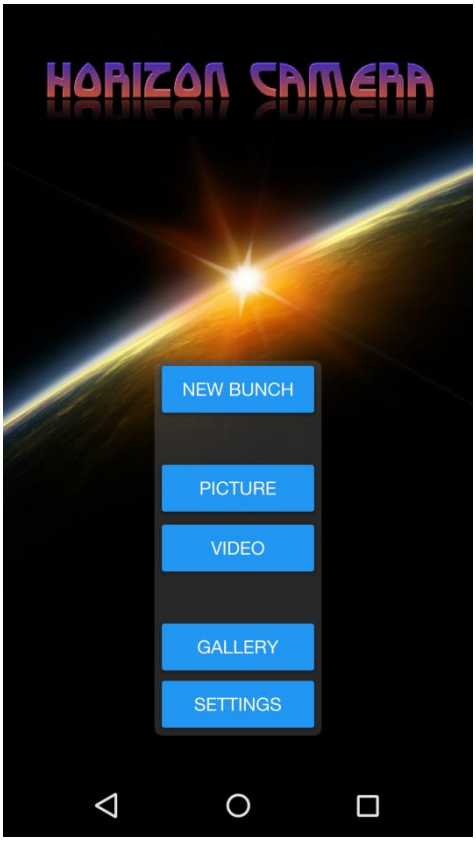
Functionalities of application:

- ability to take photos with the additional information (GPS position, orientation, angle)
- ability to record video with the additional information per frame (GPS position, orientation, angle)
- transform data to appropriate format
- send transformed data to server
- store data in the mobile
- change settings of application- storage location, choose included additional information, connection settings, quality of records
- use mode for create pictures of horizon
- create bunches of pictures (packs of pictures and videos from the same GPS position)
- open pictures with details in the gallery
- deleting data from storage
- manual sending data to server

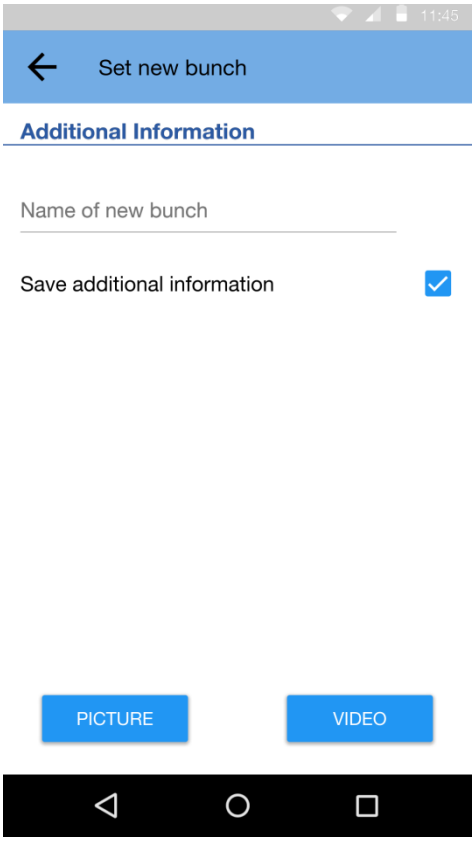
Usage workflow and Mockup

There is attached video of mocked application in the same subfolder with this document. In the video is shown usage workflow of application as well. Video file name: “mobileProject_mockUpVideo.webm”

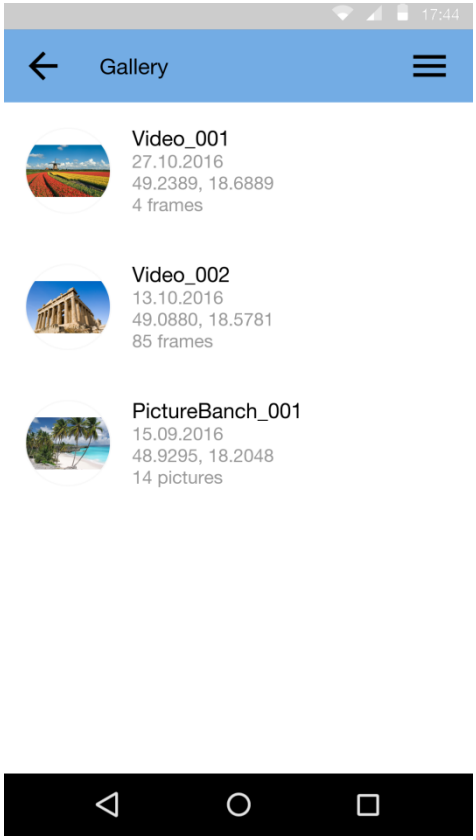
Images of mockup application:



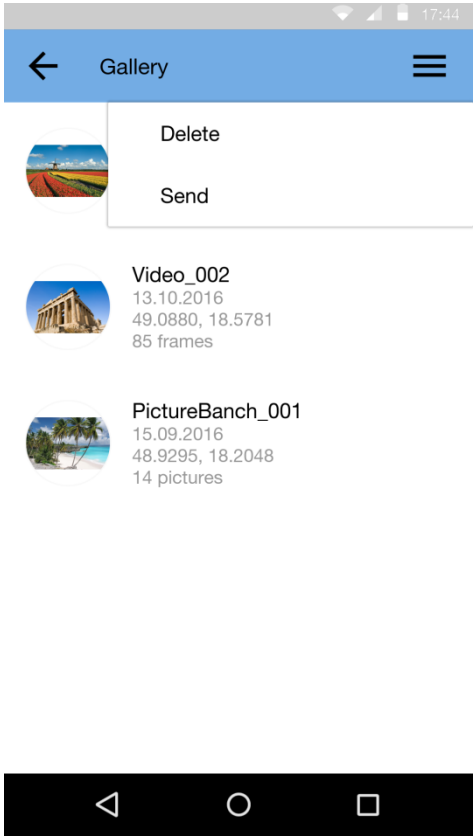
Main page



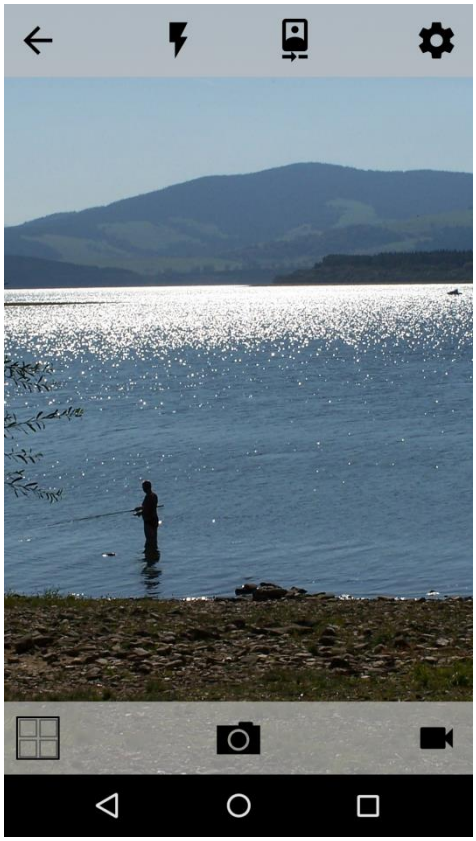
New bunch activity



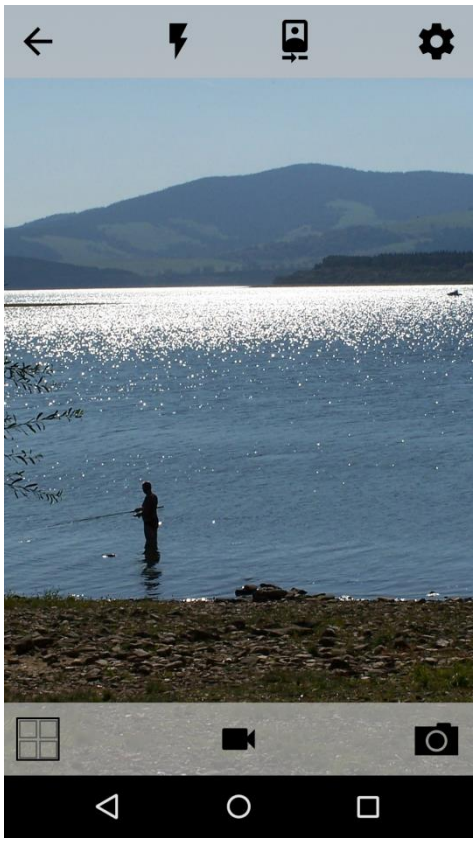
Gallery activity



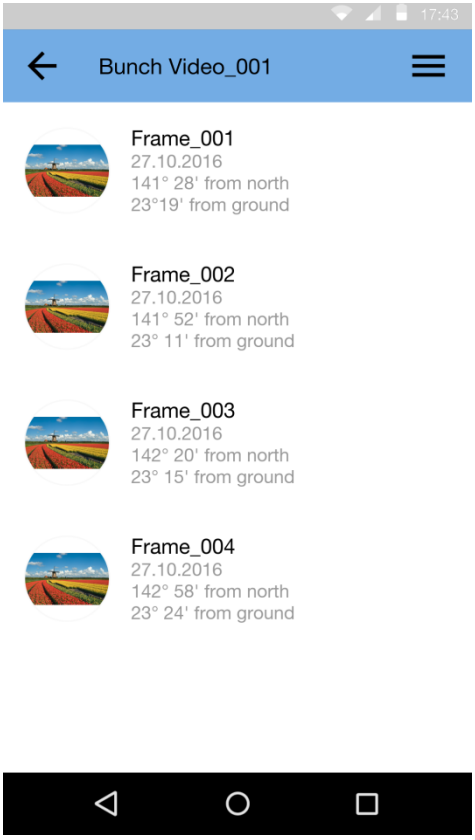
Gallery activity options



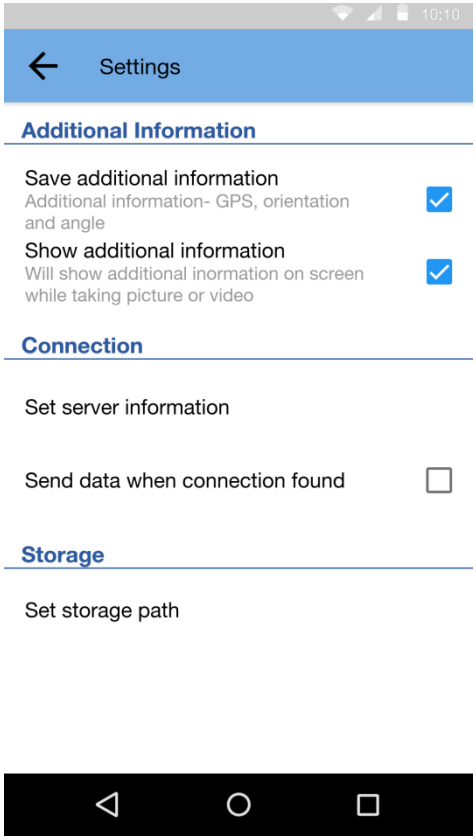
Picture activity



Video activity



Bunch details activity



Settings activity

OOP

Main activity: Main activity contains background picture with name of the application and five simple buttons in the middle of the screen. This buttons can navigate to next activities.

Picture and Video screen activities: These activities hold FrameLayout. It is used to create real time camera screen in the application. These activities have also more buttons- take picture/record video, go to Gallery activity, go to Settings activity, go back to Main activity, turn on front/back camera, turn on flash, turn on picture/video mode. These settings are placed on the toolbars on the top and down of the screen.

New bunch activity: Activity has form with basic properties of bunch to choose- name, save the additional information, media format (picture or video).

Gallery activity: Gallery activity consists of ListView with complex records. Records have information about created bunches- datum, GPS, number of frames. It is able to open this bunches and show the frames inside. Activity has menu on the top of the screen. It is able to choose actions delete or send. Then you can choose bunches and click on the button on the screen (delete or send) to execute the action.

Bunch details activity: An Activity Bunch detail consists of ListView with complex records. This activity will be shown after the click to some bunch in the Gallery activity. All frames/pictures will be open and it is able to delete or send some of them. Frame/picture will be open in phone gallery after the click. In the landscape will be shown fragment, which show the preview of selected frame/picture in the application.

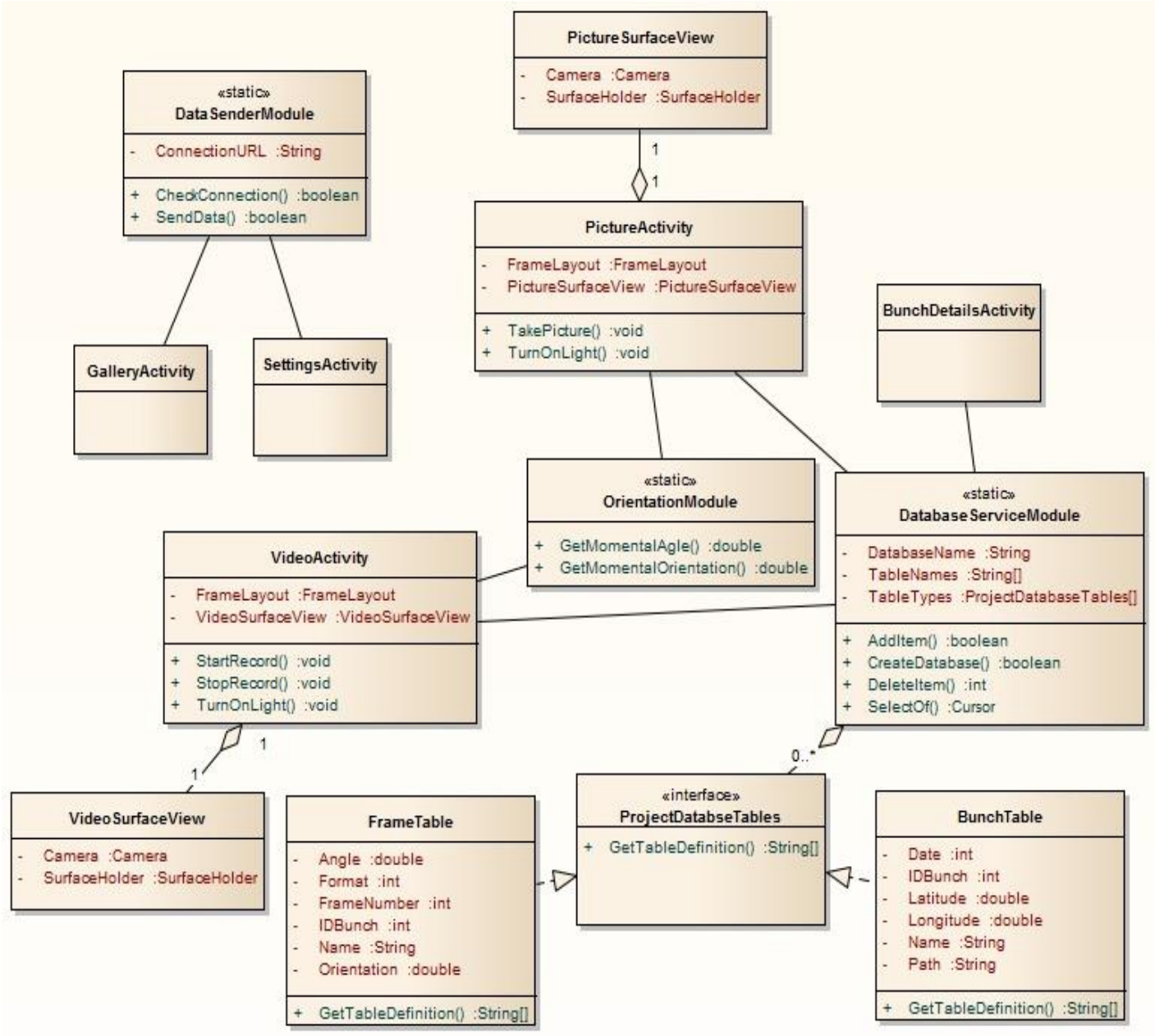
Settings activity: Activity consists of more lists with complex records. These lists are in the several settings groups. Settings groups have the main title and declarative subtitles. It is able to tick checkboxes or type text in some settings. Back button on the top of the screen will return to previous activity.

Class UML diagram

Complete class diagram is attached in the subfolder with this document. It is called Complete_MobileProject_ClassDiagram.jpg. Dependency lines represent flow of activities.

Picture lower is simplified class diagram. There are not all activities and activity flow. This diagram represents just necessary additional backend classes.

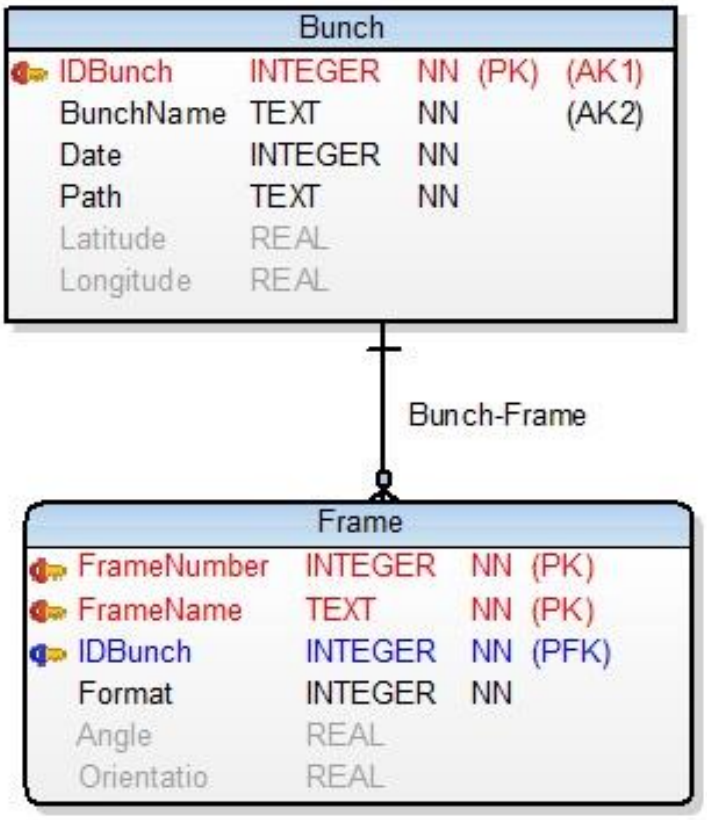
In the project are some static modules, which provide basic service features - DatabaseServiceModule, DataSenderModule and OrientationModule. All activities can use these services. It is possible to extend project easier this way.



Database planning

Bunch table: Whole bunch of photos has the same date, GPS position, storage path and unique name.

Frame table: In the bunch can be more frames (pictures and video frames). FrameName in the Frame table is name of the subfolder- name of video, or global picture name. Frame number is identification of frame in this subfolder. There can be just one frame with certain number in subfolder (primary key). Every frame has orientation and angle in the 3D area and format- picture or video. Additional information- GPS position, orientation and angle are not mandatory.



Database model

Backend

Data are composed of pictures/frames and additional information. Pictures are stored in the mobile storage, so it is able to open them in the mobile gallery application. Additional data are stored in SQLite application database. In the database are stored just paths to pictures in the mobile memory. The pictures are transformed to string format while sending and added with all additional information into JSON file. This file is compressed and sends via internet connection to server side, where it will be decompressed and processed.

It will be used android Camera library for camera services.

Workload and time planning in weeks

Week 44: Create planning documentation and continue with camera services research.

Week 45: Finish the camera services research. Implement activities with camera services. Implement database and local storage of pictures/frames. Start research of GPS and orientation tools.

Week 46: Implement GPS and orientation tools. Implement all necessary activities. Start research of connection and data transfer tools.

Week 47: Implement data transfer module. Implement design of the application.

Week 48: Testing, debugging, clean code. Finish some late work. Create documentation.

Week 49: Finish documentation. Create presentation.