1st EURON Summer School on

Perception and Sensor Fusion in Mobile Robotics

1 - 7 September 2005

Università Politecnica delle Marche

Aula 155-D1, Faculty of Engineering

Director

Primo Zingaretti (Italy)
DIIGA, Univ. Politecnica delle Marche

Lecturers

Adam Borkowski (Poland)
IFTR, Polish Academy of Sciences, Warsaw

Wolfram Burgard (Germany)
Dept. Computer Science, Univ. of Freiburg

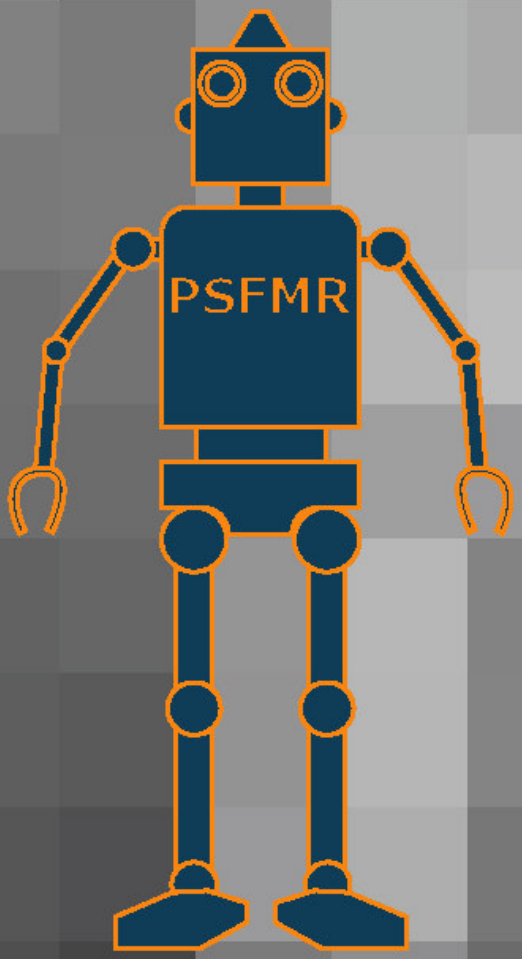
Massimo Callegari (Italy)
Dept. Mechanics, Univ. Politecnica delle Marche

Dieter Fox (USA)
CSE, Univ. of Washington

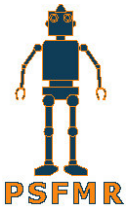
Sauro Longhi (Italy)
DIIGA, Univ. Politecnica delle Marche

Enrico Pagello (Italy)
DEI, Univ. of Padova

Roland Siegwart (Switzerland)
EPFL, Lausanne

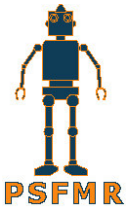


http://psfmr.univpm.it



INDEX

SCHOOL LOCATION 2
MAP OF ANCONA 3
FROM AIRPORT TO ANCONA (there and back) 4
HOW TO REACH THE SCHOOL PLACE 5
SCIENTIFIC PROGRAM 6
Thursday, September 1 6
Friday, September 2 6
Saturday, September 3 7
Sunday, September 4 7
Monday, September 5 7
Tuesday, September 6 8
Wednesday, September 7 8
STUDENT RESTAURANTS 9
SOCIAL EVENT 12



SCHOOL LOCATION

The Summer School will take place at the Faculty of Engineering of the Università Politecnica delle Marche in Ancona, Italy.

In the following pages you will find how to reach Ancona from its Airport and how to reach the Engineering Faculty in Ancona. Signposts indicating how to reach the school activities (schoolroom, poster area, laboratory, internet point and cafeteria) will begin from the main entrance of the Engineering Faculty.

School activities are all located at "quote 155" (155 is the real altitude on sea level, but if you cannot measure it push button "0" on elevators …or ask for the cafeteria!).

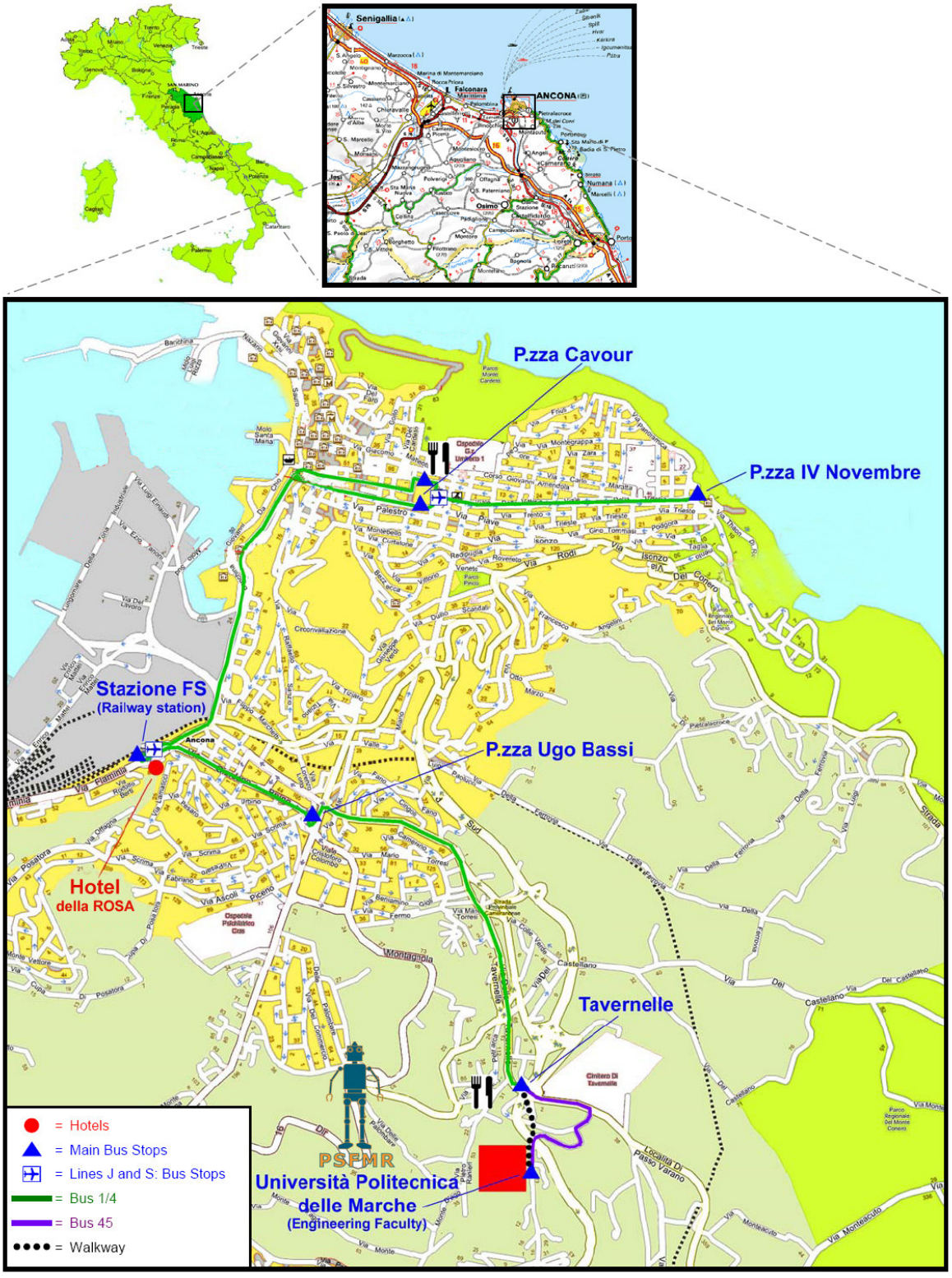
Lecturers' speeches will be held in the **schoolroom** 155-D1.

The **poster area** is located between the schoolroom and the cafeteria.

The computer room for **laboratory** lessons, serving also as **internet point**, is on the right of the corridor leading to the **cafeteria**.

PSFMR

MAP OF ANCONA



FROM AIRPORT TO ANCONA (there and back)

The "Raffaello Sanzio" airport of Ancona is located in a near town, Falconara. You can get there from Ancona railway station by bus, train or taxi in about half an hour (warning: especially by bus the journey can take up to one hour, due to traffic congestion).
Please note that buses and trains have a different timetable on Sunday.

BUS

On weekdays only: LINEA J

Departures from Airport to city centre:

7:45	8:45	9:45	10:45	11:45	12:45*	13:45	14:45*	15: 45*	16:45*	17:45*	18:45*

(*) They stop to *Ancona Railway Station* (do not reach *Piazza Cavour*)

Departures from city centre to Airport:

From *piazza Cavour*		8:45	9:45	10:45	11:45	12:45		14:45					
From *Railway Station*	7:55	8:57	9:48	10:57	11:57	12:57	14:17	14:48	16:17	17:17	18:17	19:17	20:17

On sundays only: LINEA S

From city centre to Airport via Falconara:

Ancona piazza Cavour	6:00	9:00	10:00	13:40	18:00	18:20	19:00
Ancona Railway Station	6:05	9:05	10:05	14:05	18:05	18:25	19:05
Falconara Railway Station	6:15	9:15	10:30	14:20	18:15	18:50	19:30
Airport	6:25	9:25	10:45	14:25	18:25	19:05	19:45

From Airport to city centre:

Airport	10:00	11:10	14:30	18:45	19:25	23:10
Falconara Railway Station	10:10	11:20	14:40	18:55	19:35	23:20
Ancona Railway Station	10:20	11:30	14:50	19:05	19:45	23:30
Ancona piazza Cavour	10:25	11:35	14:55	19:10	20:00	23:35

TAXI

Airport: +39 071 918221
Falconara Railway Station: +39 071 910919
Ancona Railway Station: +39 071 43321

TRAIN

On weekdays:

Airport (Castelferretti Railway Station)	6:58	7:18	8:24	8:40	9:35	14:00	19:12
Ancona Railway Station	7:15	7:35	8:36	8:56	9:52	14:16	19:28

Ancona Railway Station	6:25	8:57	12:27	13:27	14:04	14:32	15:43	16:33	17:27	18:29	19:40
Airport (Castelferretti Railway Station)	6:38	9:12	12:40	13:43	14:19	14:47	15:55	16:47	17:42	18:47	19:53

On sundays:

Airport (Castelferretti Railway Station)	15:54
Ancona Railway Station	16:10

Ancona Railway Station	6:27	8:57	12:27	13:27	14:32	15:43	17:27	18:29
Airport (Castelferretti Railway Station)	6:41	9:12	12:40	13:43	14:47	15:55	17:42	18:47

HOW TO REACH THE SCHOOL PLACE

City buses, identified by numbers, are the most common way of transportation in Ancona. Tickets can be bought at Tobacconists (shops identified by a T on a blue background), authorised newsagents (edicole) and from ticket machines, which can be found at key stops, at 0.90 euro each. A single trip ticket can be purchased from the bus driver but, in this case, it costs 1.40 euro.
Tickets are valid for an hour from validation. The one-way ticket allows you to change buses in the same journey within its one-hour validity. In particular, if you will arrive by bus at the Tavernelle stop, you do not need a new ticket to take the trolleybus 45, which stops at the top of the hill just in front of the main entrance of the Engineering Faculty.

We recommend to take buses 1/4 to reach the school place either coming from the centre of Ancona (in about 35 minutes) or from the Railway Station (Stazione FS, in about 15 minutes). In fact, the terminal of buses 1/4 is Tavernelle, from which the Engineering Faculty can be reached either taking the trolleybus 45 or by walking (warning, it is an upward way and we suggest this mode for the return journey only).

BUS n. 1/4 (City Centre - Railway Station – Tavernelle: there and back)

Main BUS Stops: *P.zza IV Novembre - P.zza Cavour - Stazione FS - P.zza Ugo Bassi – Tavernelle*

Regular service from *P.zza IV Novembre* to *Tavernelle* is from 5:15 to 0:35.
From 7:30 to 20:10 bus 1/4 runs **about every 7-8 minutes**.

Regular service from *Tavernelle* to *P.zza IV Novembre* is from 5:20 to 1:07.
From 7:20 to 19:45 it runs **about every 7-8 minutes**.

TROLLEYBUS n. 45 (Tavernelle – School Site: there and back)

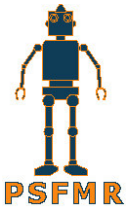
Regular service from *Tavernelle* to the *Engineering Faculty* is from 5:15 to 0:35.
From 7:07 to 10:00, from 10:50 to 13:20, from 14:30 to 16:00 and from 16:50 to 19:00 it runs **about every 25 minutes**.

Regular service from the *Engineering Faculty* to *Tavernelle* is from 5:20 to 1:07.
From 7:18 to 10:19, from 11:01 to 13:39, from 14:21 to 16:19 and from 17:01 to 19:11 it runs **about every 25 minutes**.

BUS n. 46 (City Centre- Tavernelle: there and back)

Regular service from *P.zza Cavour* to *Tavernelle* is from 7:35 to 20:35.
From 7:35 to 13:20 it runs **about every 15 minutes**. From 13:35 to 20:35 it runs **about every 30 minutes**.

Regular service from *Tavernelle* to *P.zza Cavour* is from 7:15 to 20:15.
From 7:15 to 13:30 it runs **about every 15 minutes**. From 13:45 to 20:15 it runs **about every 30 minutes**.



SCIENTIFIC PROGRAM

Thursday, September 1

14h30 – 15h00
Opening

15h00-16h30
Sensors for mobile robotics (Siegwart)

17h00-18h30
Perception and localization (Pagello)

19h30-21h00
Dinner

Friday, September 2

9h-10h30
Sensors for mobile robotics (Siegwart)

11h-12h30
Feature extraction (Siegwart)

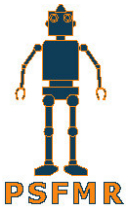
12h30-14h30
Lunch

14h30-16h
Distributed vision systems (Pagello)

16h30-18h
Multi robot coordination (Pagello)

18h15-19h
Poster presentation

19h30-21h00
Dinner



Saturday, September 3

9h-10h30
Sensor fusion techniques for mobile robotics (Longhi)

11h-12h30
Open discussion with all lecturers on perception and sensor fusion

12h30-14h30
Lunch

14h30-18h
Tutorials and exercises in laboratory

Mobile robot kinematics: theory and applications using Matlab (Callegari)

19h30-21h00
Dinner

Sunday, September 4

Social event (see SOCIAL EVENT session)

Monday, September 5

9h-10h30
Kalman filtering in sensor fusion (Longhi)

11h-12h30
Multi robot systems (Borkowski)

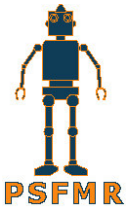
12h30-14h30
Lunch

14h30-16h
Multi robot systems (Borkowski)

16h30-18h
Introduction, Bayesian filtering (Burgard)

18h15-19h
Student Presentations

19h30-21h00
Dinner



Tuesday, September 6

9h-10h30
Robot localization: grid, particle filters, Kalman filters (Burgard)

11h-12h30
SLAM: EKF, graph-SLAM, dynamic environments (Burgard)

12h30-14h30
Lunch

14h30-16h
Open discussion with all lecturers on future trends in robotics

16h15-18h15
Exercises and tutorials in laboratory

18h15-19h
Poster presentation

19h30-21h00
Dinner

Wednesday, September 7

9h-10h30
Rao-Blackwellized particle filters: Fast-SLAM, tracking (Fox)

11h-12h30
Markov networks for mapping (Fox)

12h30-14h30
Lunch

14h30-16h
Evaluation and wrap out

STUDENT RESTAURANTS

Due to summer holidays, we had to arrange a different solution for lunches and dinners during the first days of the school.

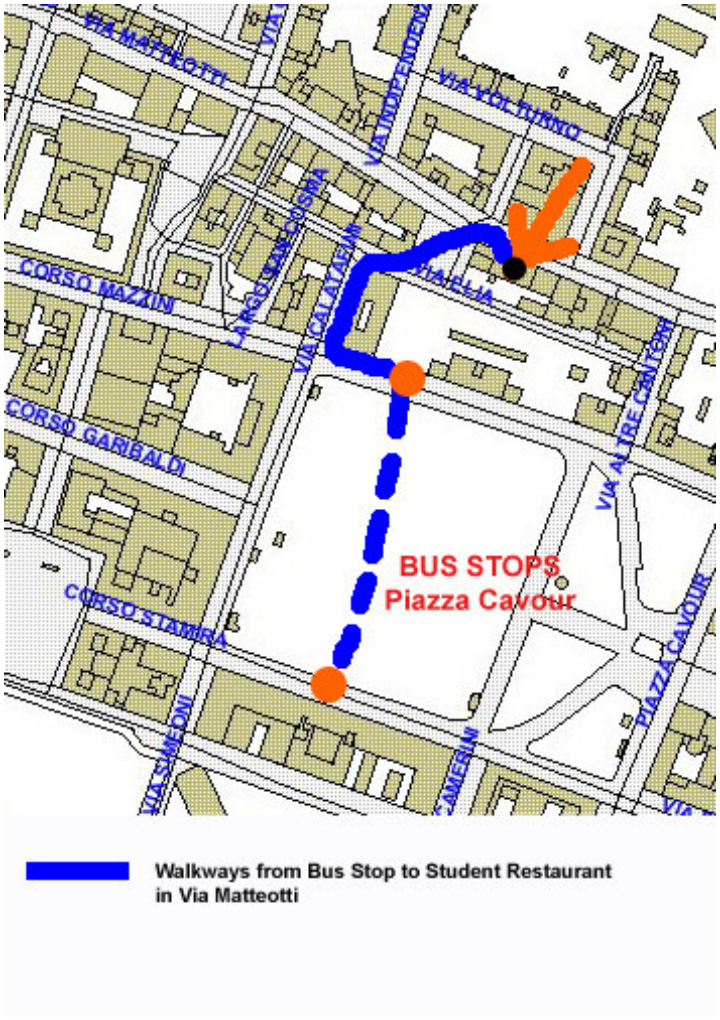
The two lunches of Friday 2 and Saturday 3 September will be served in the cafeteria (just 30 m from the lesson room) of the Faculty of Engineering, while for the social lunch of Sunday 4 see the SOCIAL EVENT section.

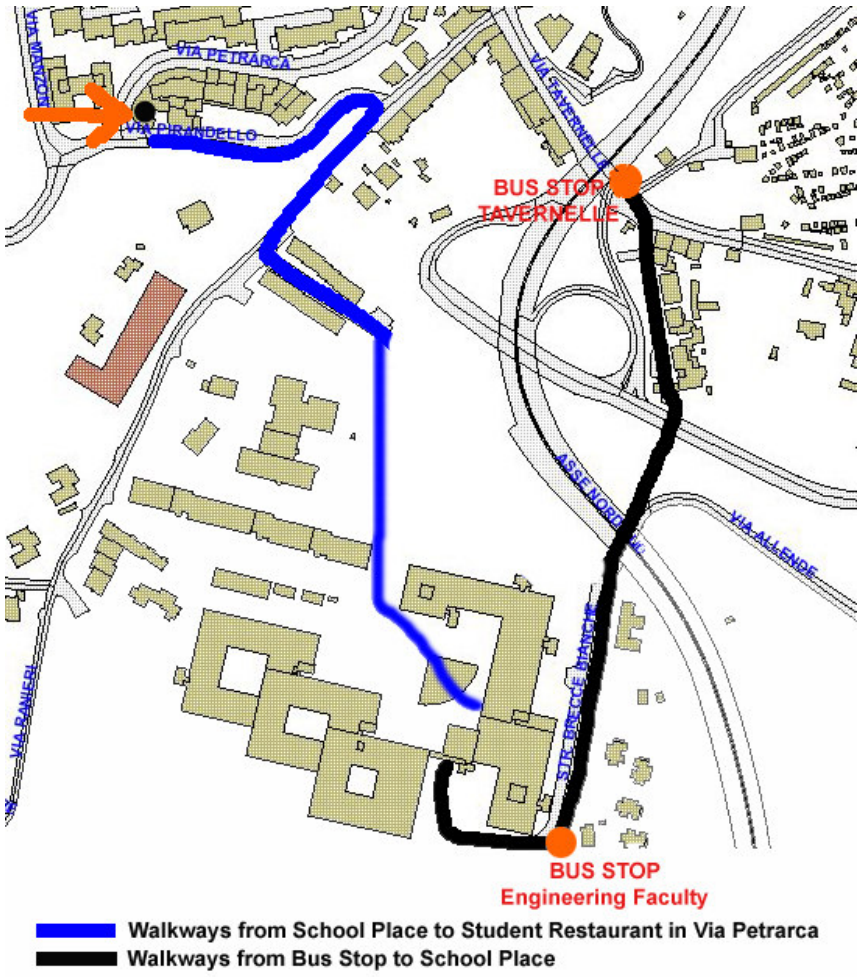
The four dinners from 1 to 4 September will be served in the student restaurant (mensa) located in the city centre, at n° 96 via Matteotti, near the Faculty of Economics of Università Politecnica delle Marche.

Starting from Monday 5 September, both lunches and dinners will be served in the student restaurant (mensa) located in via Petrarca (on the corner of via Pirandello, at 5 min walking from the Faculty of Engineering).

Student restaurants are open for lunch form 12.00 to 14.30 and for dinner from 19.00 to 20.30.

Find the symbol in the map of Ancona (pag. 3) for a global idea of where student restaurants are located, and detailed maps on next pages for suggested walkways from bus stops.


VIA MATTEOTTI
VIA VOL TURINO
CORSO MAZZINI
CORSO GARIBALDI
CORSO STAMIRA
VIA ALTRE CENTORI
PIAZZA CAVOUR
BUS STOPS
Piazza Cavour
Walkways from Bus Stop to Student Restaurant
in Via Matteotti


VIA PETRARCA
VIA PIRANDELLO
VIA TAVERNELLE
BUS STOP
TAVERNELLE
ASSE NORD-SUD
VIA ALLENDE
VIA RANIERI
BUS STOP
Engineering Faculty
Walkways from School Place to Student Restaurant in Via Petrarca
Walkways from Bus Stop to School Place

SOCIAL EVENT

The social event will consist in a trip to Portonovo, one of most beautiful seaside resort in the Marche region, on Sunday 5 September.
Departure will be early in the morning (from 8.00 to 9:30) by bus 94 from railway station (Stazione FS), in front of your hotel, and arrival is scheduled about 45 minutes later.
During the morning you could enjoy this beautiful place on the beach or walking or running around the paths in the bay (and if you are very skill and trained up to the mountain): in any case right sportswear is necessary.
Then, at 13.00 a social lunch is scheduled at Emilia, a good (and romantic) restaurant very close to/on the sea.
In the evening, you are free to chose what you prefer, taking into account that there is a return bus to Ancona every 45 minutes (the last one departs at 18:45 from Portonovo piazzetta).

BUS 94 (Ancona – Portonovo: there and back)

Departures from *Stazione FS* to *Portonovo Piazzetta*	8.00	8:45	9.30	10.45	11.00	12.40	14.00	15.20	17.20	18.00
Departures from *Portonovo Piazzetta* to *Stazione FS*	8.45	10.15	11.45	12.30	13.15	14.40	16.00	17.20	18.00	18.45

Portonovo: the green bay

The ancient fishermen village has turned into a well known seaside resort, where the human hand worked together with the wild nature of the Monte Conero.
Portonovo is a natural bay whose history is connected almost to the same one involving Ancona and Monte Conero. Inhabited from prehistory by different tribes, first of all the Piceni, it was then chosen by the Romans and the Byzantines. From the late Middle Age to the end of the 19th century, it was part of the State of the Church and, before definitely becoming Italian, it also passed under the French government. Along the beach are the beautiful church of S. Maria (11th century), a unique mark of the monastic life; the De Bosis Watch Tower, built in the 18th century to prevent pirates attacks; the Napoleonic fortress, a fort built by the Napoleon's Italian Viceroy in 1808 to fight off English ships. This fort, splitting the beach in two parts, is now a quite singular hotel.
Portonovo lays there where the ever-green oaks smoothing the mountain touch the sea. The lovely bay is a jewel of the Mt. Conero Park (http://www.parcoconero.it/Eindex.html). The Park was especially founded to preserve and safeguard the natural beauties and rarities of this area. Shining from above, the white rocks and pebbles of the beach, originated by a landslide, are an amazing view and a wonderful picture to take. When down on the beach, the clear waters and the astonishing views up on the cliffs of Mount Conero are something to remember and to enjoy in every season. Two small lakes enrich the unique environment of this wonderful turistic resort.

SUPPORTED BY:

Università Politecnica delle Marche
www.univpm.it

European Robotics Research Network
www.euron.org

DIIGA - Dipartimento di Ingegneria Informatica, Gestionale e dell'Automazione - Università Politecnica delle Marche
www.diiga.univpm.it

Comune di Ancona

Assessorato alla Pubblica Istruzione,
relazioni internazionali e cooperazione allo sviluppo

Gruppo Italiano Ricercatori in Pattern Recognition
www.girpr.org