FACULTY OF TRANSPORTATION SCIENCES CTU IN PRAGUE

INTRODUCTION OF NEW TEACHING METHODS IN THE COURSE

APPLICATION OF ITS IN URBAN ENGINEERING

JAN 24, 2023, UiS

Iceland Liechtenstein Norway grants

DŮM ZAHRANIČNÍ SPOLUPRÁCE D Z S

INTRODUCTION OF THE PRESENTATION

- Presentation of the course – goal and content
- Structure of the AIUE course (AIMI in CZ)
- Requirements for processing the project of course
- New forms of teaching
  - Flipped Classroom – consultations and exercises
  - Blended learning – teaching also by distance learning
  - CBL = Case Based Learning – case study
  - TBL = Team Based Learning – team teaching
  - PBL = Problem Based Learning – questions
- Examples of outputs
- Positive and negative experiences

GOAL OF COURSE AIUE – APPLICATION OF ITS IN URBAN ENGINEERING

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Goal of course AIUE

- Students will get acquainted with the basic elements of urbanism and urban engineering and ITS and their applications of street networking of municipalities and cities, providing skills and knowledge of urban engineer as a coordinator of technical activities in urban environments with knowledge of new approaches and technologies applicable in public space of cities.

Content of course AIUE

- The course focuses mainly on the issue of the installation of engineering networks in the area, coordination of engineering activities in the area, organization of the public space, concept of public space solution, design of systems for traffic and transport telematics management, coordination of transport models – automobile, pedestrian, PT, cyclists etc. New approaches to the development of Smart and green approaches Promotion into Public.

BASIC FOCUS OF COURSE - AIUE

- Use of SW AIMSUN, VISSIM, ACAD
- Practical orientation for students - field work own proposals
- Current ITS approaches
- Double degree with Sweden
- Erasmus teaching
- Teaching in the ITS and Smart city programs
- Exercises for PhD students
- The possibility of cooperation with UiS
- Link to lifelong education of designers
- Binding of the Czech authorization of designers
- Connection to the Faculty of Civil Engineering
- Teaching of experts in the course

COURSE STRUCTURE

- **Compulsory course, winter semester, 3 + 3 - Z, ZK**
- **Course guarantor - Doc. Tichy, Dr. Filip**
- **Prerequisites and knowledge of the subject**
  - basic knowledge of working with ACAD
  - basic principles of ITS technologies
  - basic orientation in traffic engineering
  - knowledge of the MS Office – *.ppt, *.doc, *.xls

Project-oriented teaching within practices

- Elaboration of the project in the form of a study and urban management
- Preparation for the designer
- Lectures by experts
- Consultation on projects
- The project is solved in groups
- Sustainability and responsibility in designs and solutions
- Fieldwork
- Improvement in mutual communication between students
- Multidisciplinarity

BASIC REQUIREMENTS FOR A STUDENT PROJECT

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General requirements of project:

- Traffic survey - automobile, pedestrian, public transport, bicycle
- Outline of the current state + evaluation of the state, risks, problems
- Capacity evaluation
- Public lighting - calculation
- New state design - outline + description
- Proposal of coordination situation for use in BIM
- materials for design of VISSIM / AIMSUN simulation
- Design of telematics in the given area - outline + description (parking, public transport preferences, sensors, etc.)

Outputs from project

- Situation - ACAD
- Proposals for broader relations and recommendations + urban solution - ACAD
- Coordination situation of networks – ACAD (BIM)
- Telematics suggestions - description + ACAD
- Document - word text + article
- Presentation - ppt - defense of the solution

NEW FORMS DURING THE TEACHING OF THE COURSE

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Flipped Classroom – it is applied in the form of practices at school and at home and through consultations, including discussions within lectures

- Teaching work on a project
- Work on exercises with a PC
- Exercise work in the form of demonstrations
- Exercise work in the form of discussion
- Processed in groups
- Everyone has a partial part of the whole project

10.	24.11.	Use of BIM (Building information modeling) Využití BIM			Ehlich/Tichý
C10	24.11.			Examples of BIM - Coordinating situation	Ehlich/Tichý
11.	1.12.	Trends and technologies in ITS – C-ITS, guidance cameras	I		Brož
C11.	1.12			drawing of ITS and systems, design and interconnection	Brož/Tichý
12.	8.12.	Traffic safety and tunnel systems			Brož/Tichý
C12	8.12.			systems returns, prediction of IoT usage systems	Brož/Tichý
13.	15.12.	SW simulation platforms	Lisa+, AMISUN, VISSIM		Růžička
C13	15.12.			Use of simulatiotion SW resources SW tools P2 and LISA + requirements for the controlled process.	Růžička
14	12.1.	Submission of projects + consultations			Tichý+Filip
C14	12.1			Exam	Tichý+Filip

- Exercises take place on their own PC or the teacher shows the options and the student works at home or at the next exercise
- Exercises take the form of demonstrations and consultations
- everything takes place in designated groups – an effort to find mutual cooperation
- each group must represent its integral part and each student has a defined responsibility for processing

NEW FORMS DURING THE TEACHING OF THE COURSE

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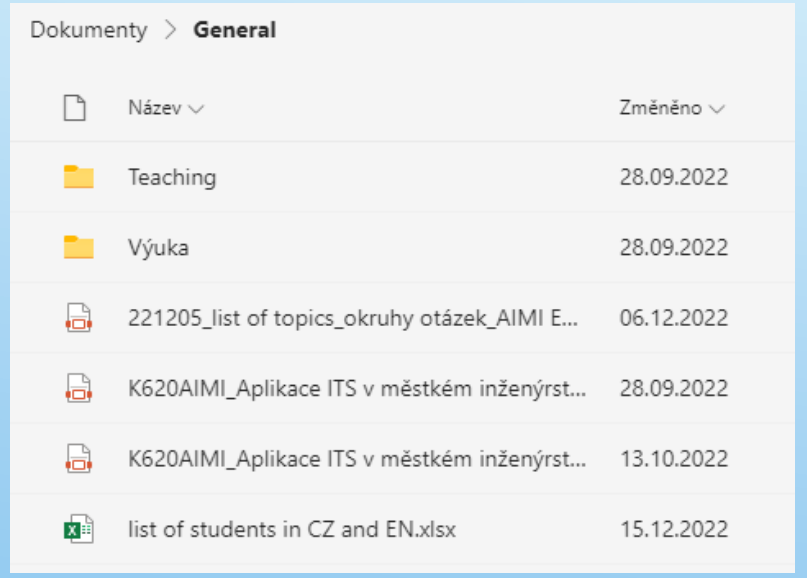
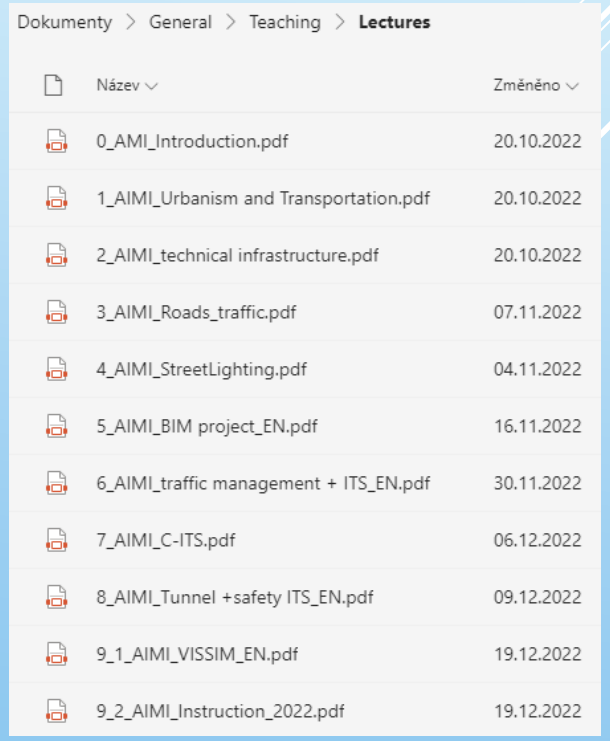
Blended learning – it is applied in the form of prepared Teams with the possibility of remote access during lessons, consultations + unified materials

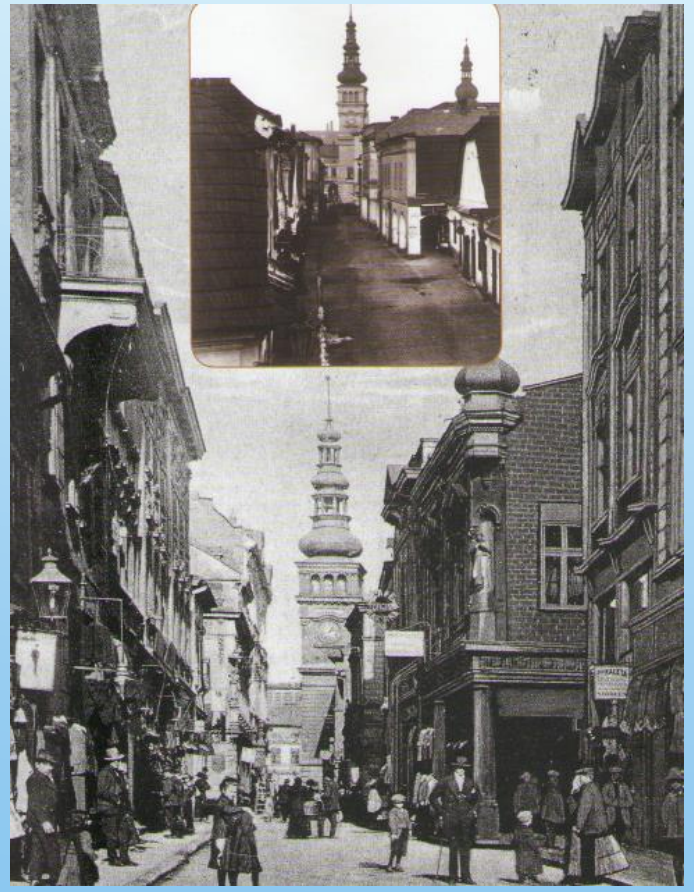
- Work with a combined form on the project
- Common templates in teaching and assignments
- A unified graphic framework
- Use of face-to-face and remote forms
- Creating tests and question ranges
- Video options from Teams
- Practical teaching and discussion
- Consultation via Teams





NEW FORMS DURING THE TEACHING OF THE COURSE

CBL = Case Based Learning – a sample of a potential project and case studies are shown - examples of solutions in the city – urban designs



NEW FORMS DURING THE TEACHING OF THE COURSE

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TBL = Team Based Learning – team learning – defined 4 groups within the teaching

- Discussion of the problem
- Control activities and consultations
- Mutual interaction between groups
- Presentation and evaluation

	name	Urban project	Documents	Engineering networks	Lighting	IoT	ITS	Cameras	C-ITS	activity
1	Vít Baran						x	x		Drawing
2	Jiřina Lucia Varon Izová	x	x		x					Designer
3	Malvína Benešová		x			x				Coordinator
4	David Mička			x		x			x	Engineering
5	Luisa Castrejon	x								Editor
6	Lauren Brown	x	x		x					Engineering
7	Larissa Lara	x						x		Designer
8	Marek Musil	x				x	x		x	Coordinator
9	Jiří Vojtíšek	x		x		x	x		x	Drawing
10	Filip Hrubý					x			x	Engineering
11	Jan Leistner	x					x	x		Designer
12	Martin Zajíček	x								Drawing
13	Oliver Pulda		x	x	x					Coordinator
14	Adam Vilímek		x							Coordinator
15	Vilém Pecen	x							x	Drawing
16	Filip Kotas				x			x		
17	Jan Zarcký			x		x	x			

NEW FORMS DURING THE TEACHING OF THE COURSE

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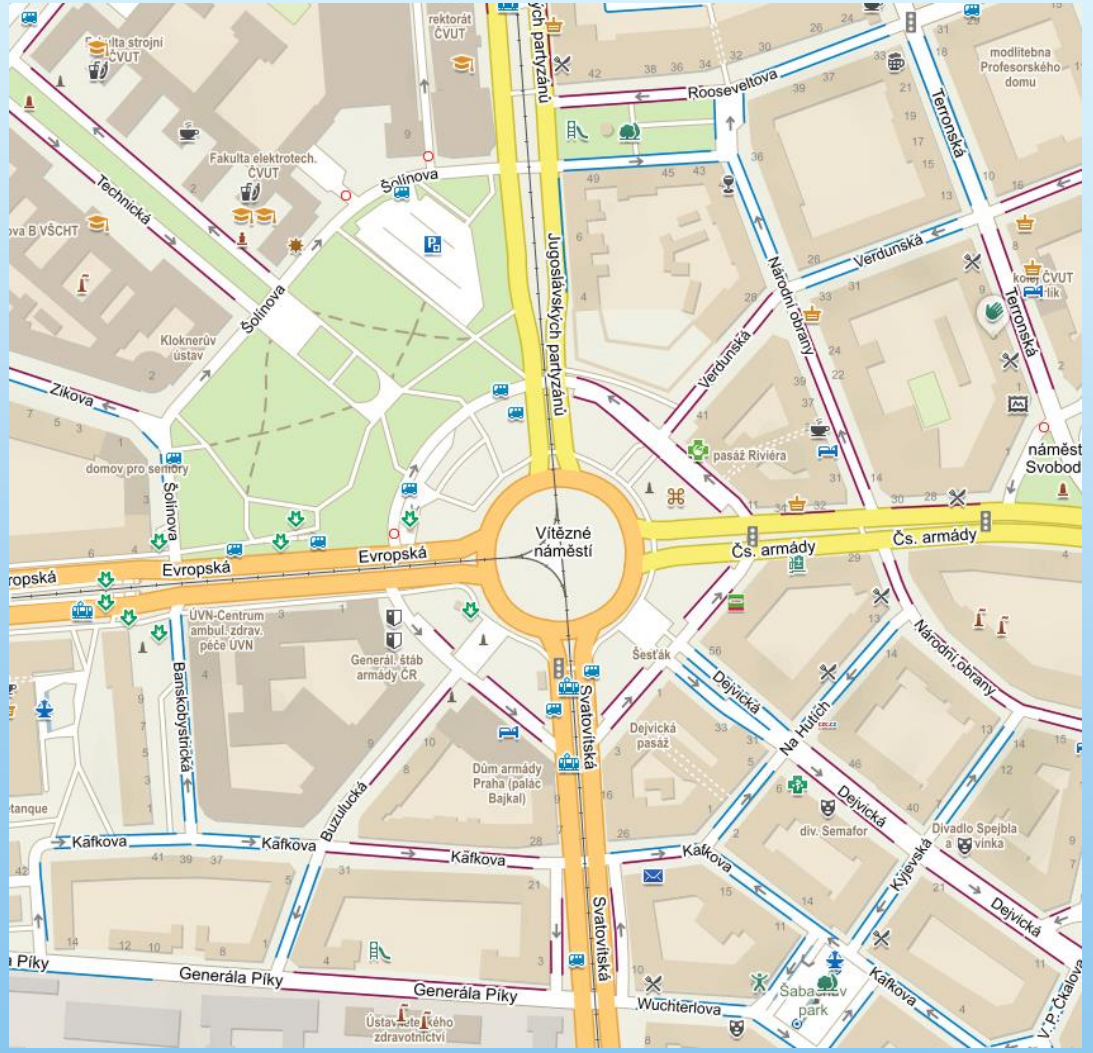
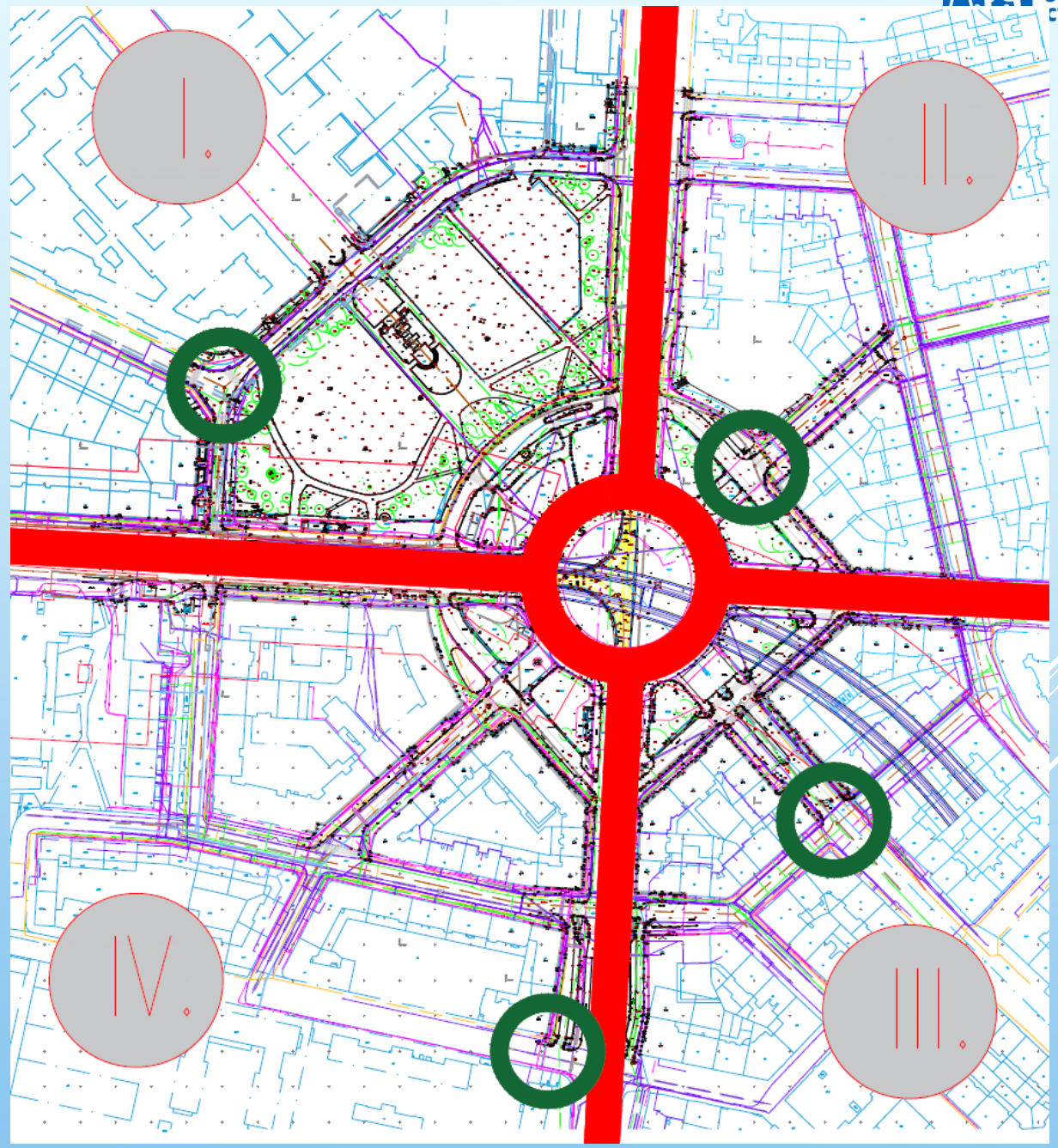
PBL = Problem Based Learning - Questions

- Defining the problem
- Finding information
- Traffic survey
- The local investigation
- Setting questions
- Solving defined tasks in a team

2.	29.9	introductory lecture, basic concepts and terminology Coordination of works, engineering activities, types of documentation Úvodní přednáška, telematika a městské inženýrství Koordinace prací, inženýrská činnost druhy dokumentací	introduction to the content of exercises, organization of the semester and credit requirements - project assignment - brief content of individual partial steps - basic information about the telematics system		Tichý+Filip
C2	29.9			Project assignment for the subject	Tichý+Filip
3.	6.10.	Excursion practical local investigation, traffic survey			Tichý+Filip
C3	6.10.			Excursion practical local investigation, traffic survey	Tichý+Filip
4.	13.10.	Design of urban roads + urbanism Návrh městských komunikací + urbanismus Městský urbanismus a trasování komunikací (zaměřeno na urbanismus, územní plánování, návrhy tras městských komunikací i s přesahem k TP 103 a TP218)	Construction proposals traffic signs Packing curves and pedestrian traffic at intersections Division of marking and its marking Basic use and description in documentation and projects		Teichmann /Endel
C4	13.10.			examples for exercises + samples for designs of the given location	Teichmann /Endel

PROJECT ASSIGNMENT





CONTROL OF THE PROJECT AND TEACHING

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management table

	name	Urban project	Documents	Engineering networks	Lighting	IoT	ITS	Cameras	C-ITS	activity
4	David Mička			x		x			x	Engineering
5	Luisa Castrejon	x								Editor
6	Lauren Brown	x	x		x					Engineering
7	Larissa Lara	x						x		Designer
8	Marek Musil	x				x	x		x	Coordinator
9	Jiří Vojtíšek	x		x		x	x		x	Drawing
10	Filip Hrubý					x			x	Engineering
11	Jan Leistner	x					x	x		Designer
12	Martin Zajíček	x								Drawing
13	Oliver Pulda		x	x	x					Coordinator
14	Adam Vilímek		x							Coordinator
15	Vilém Pecen	x							x	Drawing
16	Filip Kotas				x			x		
17	Jan Zarcký			x		x	x			

Sample structure within Teams application

Dokumenty > General > **Teaching**

Název	
Lectures	
Practice	

Dokumenty > **General**

Název	
Teaching	
Výuka	28.09.2022
221205_list of topics_okruhy otázek_AIMI E...	06.12.2022
K620AIMI_Aplikace ITS v městkém inženýrst...	28.09.2022
K620AIMI_Aplikace ITS v městkém inženýrst...	13.10.2022
list of students in CZ and EN.xlsx	15.12.2022

Dokumenty > General > Teaching > **Practice**

Název	
Group II	
pruzkumy.pdf	
Vitezne_square.mp4	

Dokumenty > General > Teaching > Practice > **Group II**

Název	Změněno
20AIMI-G2_Semester-Project.zip	14.12.2022
II_kvadrant.dwg	28.09.2022
Lighting Classes - Requirements.xlsx	04.11.2022
Lighting Classes - Selection.xlsx	04.11.2022
zadani_celek.pdf	28.09.2022

Dokumenty > General > Teaching > **Lectures**

Název	Změněno
0_AMI_Introduction.pdf	20.10.2022
1_AIMI_Urbanism and Transportation.pdf	20.10.2022
2_AIMI_technical infrastructure.pdf	20.10.2022
3_AIMI_Roads_traffic.pdf	07.11.2022
4_AIMI_StreetLighting.pdf	04.11.2022
5_AIMI_BIM project_EN.pdf	16.11.2022
6_AIMI_traffic management + ITS_EN.pdf	30.11.2022
7_AIMI_C-ITS.pdf	06.12.2022
8_AIMI_Tunnel +safety ITS_EN.pdf	09.12.2022
9_1_AIMI_VISSIM_EN.pdf	19.12.2022
9_2_AIMI_Instruction_2022.pdf	19.12.2022

PRESENTATION OF PART OF THE PROJECTS BY STUDENTS

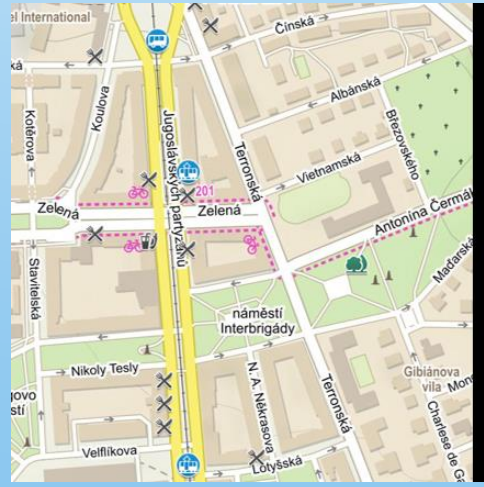
EXAMPLE OF A SOLUTION

IDENTIFIED PROBLEMS

- Insufficient Parking Spaces
- Vanishing Road Markings
- Cycling Path Dead End
- Rundown Rooselvetova Park

INSUFFICIENT PARKING PLACES

VANISHING ROAD MARKINGS



CYCLING PATH DEAD END

EXAMPLE OF A SOLUTION

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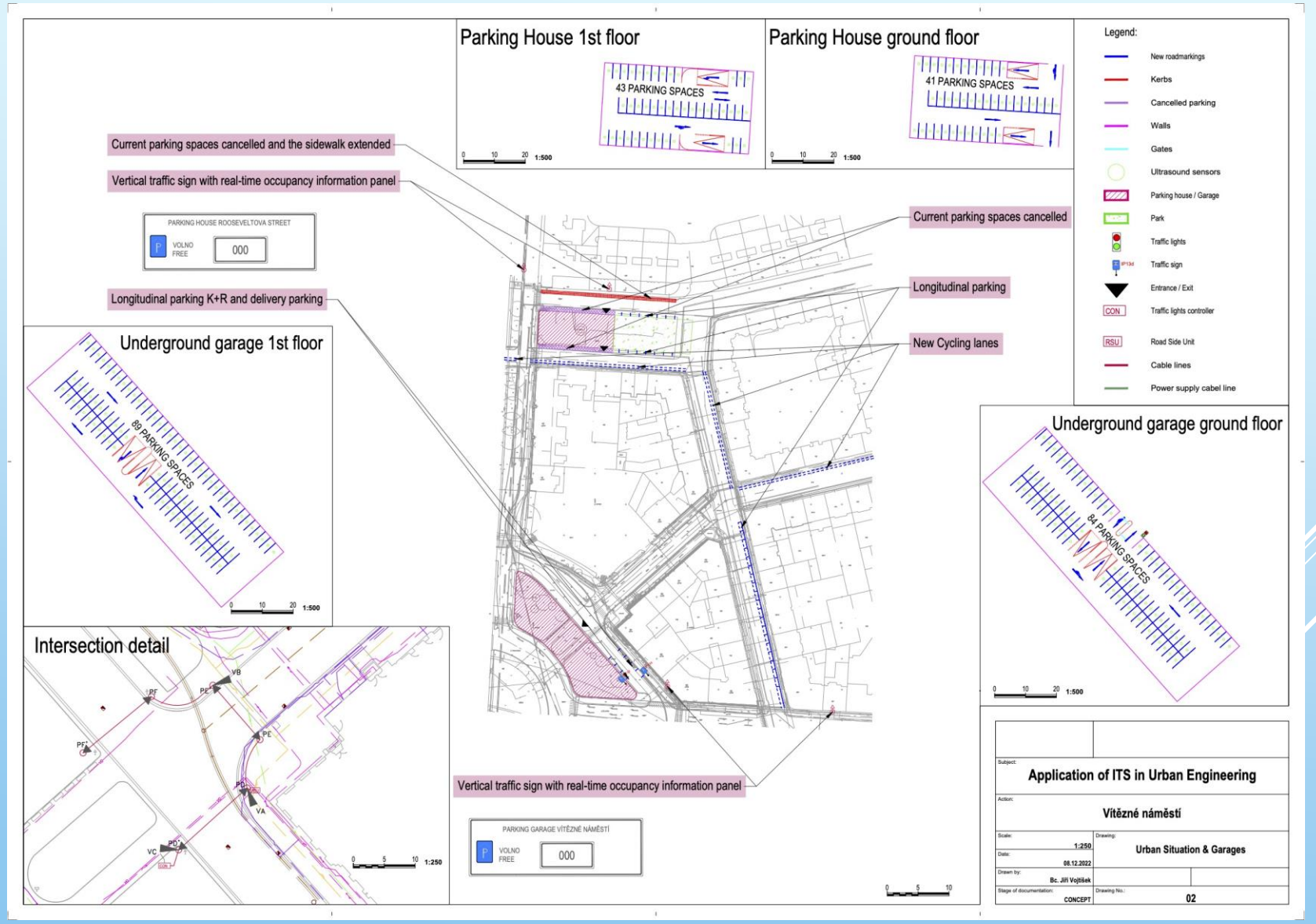
Urbanism Aspect

Technology Aspect



EXAMPLE OF A SOLUTION

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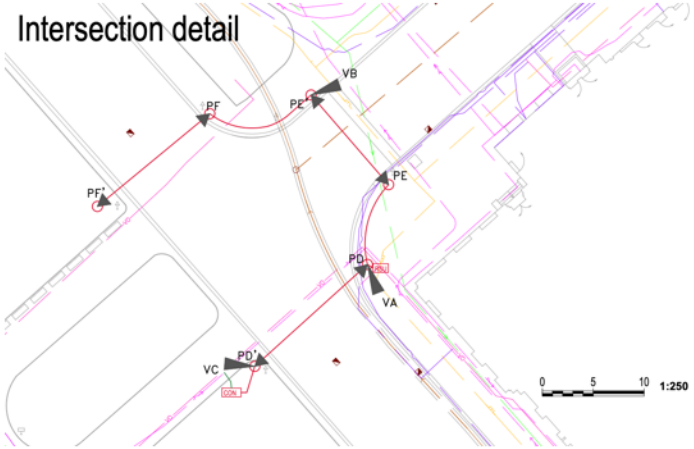
PARKING GARAGES TECHNOLOGY

- 250+ Covered Parking Places
- Ultrasound Detectors
- Barrier with License Plate Recognition Camera
- IoT - Variable Traffic Signs

SIGNALISED INTERSECTION



- Traffic Lights Controller
- 6 Columns
- Cameras Acting as Virtual Loops
- C-ITS RSU
- PoE, Low and High Voltage Cable

POSITIVE VERSUS NEGATIVE ASPECTS

Positive

- Elaboration of the project in the form of a study and urban management - preparation for a designer
- Lectures by experts
- Consultation on projects
- The project is solved in groups
- Sustainability and responsibility in designs and solutions
- Fieldwork
- Improvement in mutual communication between students
- Multidisciplinarity

Negative

- Very long lectures
- A requirement for independence and active participation
- Too deep in some details
- SW knowledge requirements
- Requirements for new approaches in teaching

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CONCLUSION

- Project teaching - student cooperation
- Determination of the problem - subsequent solution
- New forms of teaching - CBL, TBL, PBL
- Focus on practice - min. 5 experts from practice
- Focus on a holistic approach to solutions
- Focus on the application of new technology - ITS in urban engineering
- Approach to respecting the environment and life in the city
- A comprehensive approach within urban engineering
- Application of knowledge of several fields - construction, transport, electrotechnical, information
- A more demanding approach in teaching - student creativity

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Thank you for your attention

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