STUDENT DIPLOMA PROJECTS
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No. Crt	Topic Titlte	Topic Description	Competence Area
1	Smart Intersection Manager	Real-time intersection manager according to current traffic. Vehicles will transmit their planned route to the central intersection manager, outside IOT sensors will sense other traffic participants which do not have V2X communication. According to this data the system will optimize the traffic through the intersection, setting the traffic lights, sending speed and direction recomandations for the vehicles. All the communication and preception can be simulated, no need to involve perception AI and IOT sensors. Proof of concept algorithm needed for the existing patented idea. Details via mail.	computer science, artificial intelligence
2	Smart City Traffic Manager	Having a set of intersection and an intersection manager for each of them, route the complete city traffic in an efficient way. Re-route traffic in case of accidents, block streets in case of events. Create an optimal route for emergency vehicles to reach accidents. Proof of concept algorithm needed for the existing patented idea. Details via mail.	computer science, artificial intelligence
3	Anomaly detection in movies, radar flow, image flow, camera	Detect whether the sensor is blocked, is partially blocked, is getting blocked using artificial intelligence, deep learning. To do this, we will try to detect whether there are impossible changes in a movie from one frame to another, or from one sequence to another - like a new cut, sudden black screen, and so forth. Deep	artificial intelligence, deep learning

4	System to evaluate if an autonomous driving function might cause secondary accidents	In general autonomous driving functions choose on main target vehicle and act accordingly - collision avoidance according to one main target. In case of city traffic there are a lot of interactions between traffic participants, so a wrong activation of one autonomous driving function might cause secondary collision or blocking an intersection and so forth. The idea is to create a system which evaluates and calculates the best time to apply one autonomous driving function, like emergency braking, collision avoidance, turn assist, or choosing between those depending on primary and secondary collisions. Proof of concept needed for the patented idea, details of algorithm can be asked via mail.	computer science, artificial intelligence
5	Collision Avoindance in intersection using blocked grid, fluid dynamics	In case of intersection it is really hard to assess whether there will be a collision or not, because there are a lot of traffic participants and the movement of one influences the others a lot. We will try to map the kinematics and future possibilities of every traffic participants into a grid and treat the whole scenario with fluid dynamics theory or other similar methods. The main idea is to treat the traffic scenario as a whole, not as individual interactions between different traffic participants. Treating individually is impossible, because of the number of interactions and possibilities. Proof of concept needed for the patented idea, details can be asked via mail.	computer science, artificial intelligence
6	Game theory and autonomous driving	Make atuonomous driving like a game where you are a winner if you reach the destination safe and in a quick, natural way. Using a combination of game theory algorithms and deep learning methods create a general autonomous driving function. Proof of concept needed for the patented idea and the algorithm, details can be asked via mail.	artificial intelligence, deep learning

7	Traffic participant intention monitoring	Create a system which evaluates and creates a set of probable future trajectories and intentions for each traffic participants using the measured data. Predictions can be made using a sequence of measured data, the traffic scenario, the current environment. Possibilities has to be evaluated, probabilities added according to measurement from the next cycles. Proof of concept needed for the patented idea and the algorithm, details can be asked via mail.	artificial intelligence, deep learning
8	Deep learning method to optimize hyper-parameters for one driving function (there are more than 10 driving functions, each one can be a separate diploma project)	Using the set of created attributes for each traffic participants and for the eqo vehicle, we can create a neural network to create better links between those attributes and activation of a driving functions. The neural network can create new, better indirect connections between several attributes and the driving functions. The neural network can be further developed to create a state machine with defined transitions according to the attributes of the traffic participants. Proof of concept needed for the patented idea and the detailed algorithm, details can be asked via mail.	artificial intelligence, deep learning
9	LabView driver for 2.8' TFT display with touch screen	create a FPGA library for MI0283QT-9A color display with ILI9341 display controller	LabView and FPGA programming
10	LabView driver for 7' TFT display with touch screen	create a FPGA library for HT050AWV40T color display with SSD1963 grafic controller and STMPE811 touchpanel controller	LabView and FPGA programming
11	Communication protocol converter - hw development	design and build a PCB which is able to transmit/receive data over various the serial protocols, design hardware interfaces for these serial buses (CAN, LIN, RS232, I2C)	schematic and PCB development
12	Communication protocol converter - fw development	create the firmware for one board which is able to transmit/receive data over various the serial protocols (CAN, LIN, RS232, I2C)	embedded C development
13	CNC machine control software and GUI	LabView real-time and FPGA design - read G-code files, axis control, GUI development	LabView and FPGA programming
14	Advanced technique for BLDC/PMSM sensorless motor control (1)	An microcontroller or an DSP should be used for implementation. BEMF trapezoidal control with and without phase advance. PID RPM compensation is required.	Embedded C development and motor control

15	Advanced technique for BLDC/PMSM sensored motor control (1)	An microcontroller or an DSP should be used for implementation. HALL/Sensored trapezoidal control with and without phase advance. PID RPM compensation is required.	Embedded C development and motor control
16	Advanced technique for BLDC/PMSM sensorless motor control (2)	An microcontroller or an DSP should be used for implementation. BEMF sinus comutation control with and without phase advance. PID RPM compensation is required.	Embedded C development and motor control
17	Advanced technique for BLDC/PMSM sensored motor control (2)	An microcontroller or an DSP should be used for implementation. HALL/Sensored sinus comutation control with and without phase advance. PID RPM compensation is required.	Embedded C development and motor control
18	Advanced technique for BLDC/PMSM sensorless motor control (3)	An microcontroller or an DSP should be used for implementation. Sensorless FOC control with and without phase advance.	Embedded C development and motor control
19	Advanced technique for BLDC/PMSM sensored motor control (3)	An microcontroller or an DSP should be used for implementation. Sensored FOC control with and without phase advance.	Embedded C development and motor control
20	Some possibilities to generate ISO Pulses using Bidirectional Switch with SiCMOS transistors	Positive and negative pulses generated using two bidirectional switches, controlled with Microchip dsC.	Power Electronics and Embedded C
21	Digital control of an DC-DC Buck convertor with PID regulator (1)	An microcontroller or an DSP should be used for implementation of digital control. Output electrical power should be at least 50W. A voltage control will be used.	Embedded C development and Power Electronics
22	Digital control of an DC-DC Boost convertor with PID regulator (1)	An microcontroller or an DSP should be used for implementation of digital control. Output electrical power should be at least 50W. A voltage control will be used.	Embedded C development and Power Electronics
23	Digital control of an DC-DC Buck-Boost convertor with PID regulator (1)	An microcontroller or an DSP should be used for implementation of digital control. Output electrical power should be at least 50W. A voltage control will be used.	Embedded C development and Power Electronics
24	Digital control of an DC-DC Buck convertor with PID regulator (2)	An microcontroller or an DSP should be used for implementation of digital control. Output electrical power should be at least 50W. A peak current control will be used.	Embedded C development and Power Electronics
25	Digital control of an DC-DC Boost convertor with PID regulator (2)	An microcontroller or an DSP should be used for implementation of digital control. Output electrical power should be at least 50W. A peak current control will be used.	Embedded C development and Power Electronics

26	Digital control of an DC-DC Buck-Boost convertor with PID regulator (2)	An microcontroller or an DSP should be used for implementation of digital control. Output electrical power should be at least 50W. A peak current control will be used.	Embedded C development and Power Electronics
27	Driving strategy autocalibration based on AI for a robot car.	*NOTE: for Norbert Veresz, Intern TR BSW, DB team. Not confirmed yet. (to be confirmed if feasibile until end of CW 43)	Embedded C, C#
28	Emulated Resistance for DC Power Supply Load Diagram determination.	The equivalent DC resistance of a transistor running in linear region is controlled by an uC.	Electronic Devices and Circuits, Power Electronics, Embedded C
29	Bipolar Linear DC Power Supply	Two ways to realise (voltage / current source) must be compared in Pspice simulation: a current source and voltage source in series and two feedback circuits.	Electronic Devices and Circuits, Power Electronics, Embedded C
30	Bipolar Swithced Mode DC Power Supply	Bidirectional switches and two feedback circuits is used for voltage / current source realisation.	Electronic Devices and Circuits, Power Electronics, Embedded C
31	Thermal Micro-Chamber for Electronic Devices Testing	Microchip dsC and Peltier elements is used for controle the temperature inside the box where is introduced an electronic devices.	Electronic Devices and Circuits, Embedded C