

RESULT NO. 7

Synchronized local WP with overall project:

This document represents synchronization of local WP with overall project of each partner. Each partner will make electric car on his own way with use of different equipment. In accordance with this synchronization of WP or plan of work all the activities will be carried out.

Synchronization of local WP with overall project covers:

- Description of activities which will be carried out to develop electric car,
- Description of different materials, equipment, its specifications and different methods used at making of electric car and
- Naming of social and other supporting organisations (if any).

TSC NG:

In accordance to get to know students with electric cars we have been searching for different options of existing vehicles with inside burning which would enable the easiest installation of electromotor and all entitled equipment. Emphasis was on weight of the vehicle and this is why we have decided for vehicle called buggy. There is enough space for installation of driving unit. At first the vehicle has been driven by stiff rear axle. Vehicle will be mainly used in courtyards and therefore existing drive axle would cause too much of friction and loss of energy. For this reason we will install differential on rear axle which will be connected to electric and petrol engine by clutch.

When vehicle is driven by petrol engine electric motor serves as a generator and is recharging the batteries. When vehicle is driven by electromotor electric clutch uncouples shaft in the way that petrol engine rests.

We have chosen electromotor on behalf of vehicle weight and demanded strain. After all calculations we have chosen three-phase engine of 5 kilowatts of power and 48 volts of voltage which is made by world known manufacturer Iskra Avtoelektirka d.d. Distinctly characteristics of electric engine are in specification. Electric motor is driven through controller which provides transfer of energy from batteries and which is recharging batteries in the phase of braking. Besides of this controller we can also find in the electrical power system display of several parameters. User can check condition of battery, energy consumption etc. at any time. On the accelerator pedal besides steel wire rope which is regulating gasoline conduit into petrol engine there is also potentiometer. In combination with controller potentiometer provides speed or power to electric motor.

We will mount silicon photocells on the roof of the vehicle which will recharge batteries through charging regulator. Charging regulator provides regulation of current and voltage for batteries. When batteries are recharged it disconnects recharging. On the display of regulator we can track current of recharging, capacity of batteries, voltage of batteries etc.

Batteries will be mounted in the luggage compartment. Because of optimization of the process we have decided to use four lead units of 12 volt of voltage which in series circuit provides 48 volts of voltage.

ITI Cardano

In order to make our electric car we planned this working experience:

We started from a combustion engine mini-car which, after having removed the engine, we intend to transform into an electric vehicle. We kept the braking system, the lighting system and the differential gear. We think to realize the transmission from the engine to the differential gear through a system of automatic centrifugal clutches in order to limit the motion transmission difficulties, particularly during the acceleration phase. This arrangement should also limit the initial starting torque required to start the vehicle.

We also decided not to install a solar panel on the roof of the car for two reasons:

1. The solar panel supplies a 38 Volt tension which is too low for our engine.
2. We prefer to optimize the number of our solar panels in order to maximize the charge capacity in the shortest time.

We tested the vehicle mass and calculated all the forces in play for the part of kinematics. The realization of all mechanical and electrical works of transformation will be performed in our laboratories with the exception of some specialized work. The activities will involve teachers and students.

Besides the realization of our electric car, we have developed a project for the optimum utilization of solar panels that will be used to recharge the vehicle batteries. The project involves the design, construction and installation on the roof of our school of system for the automatic orientation of the solar panels toward the perpendicular to the sun at different times of the day.

Also for this phase, the activities will involve teachers and students. For the materials that we use in the project, we make use of the technical advice and supplies of some local companies:

1. Autogianini Pavia for the car
2. BiEsse Fossano for the solar panels

They already appear as partners in the project.

For the purchases of metal frames we rely on local suppliers, while the centrifugal clutch transmission system will be purchased on national websites of mechanical components.

TS Pula

Different actions will be taken:

- studying the literature about electric vehicles
- studying the literature about motors for electric vehicles
- studying the literature about photovoltaic panels
- start of designing electric vehicle
- establishment of a group of students who will closely participate in the project
- presentation of inventor prof. dr. Branimir Ružojčić about motors with permanent magnets
- collect offers for the purchase of electric motor
- consideration of the characteristics and prices of motors
- collect offers for the purchase of PV panels
- consideration of the characteristics and prices of PV panels
- creating a questionnaires for students and teachers involved in the MESA project
- 16.04. virtual meeting with partners of the MESA project
- visiting go-kart club
- visiting the innovator of electric car Nenad Devetak
- visiting Solaris PV panel factory in Novigrad
- visiting Brainspot store that sells electric bikes (e – bikes)
- designing column with PV panels as power station for electric vehicle
- 03.05. virtual meeting with partners
- designing electrical vehicle
- the decision about type of the vehicle, engine, batteries and PV panels
- order – purchase electric motor
- order – purchase PV panel
- testing of electrical motor
- testing of PV panels
- working on the project with students
- searching for the best offer for car type cross – kart
- studying the curriculum that we have in school and separation issues associated with MESA project
- designing an electric vehicle
- designing column with PV panel
- testing of electric motor
- testing of PV panels
- preparing for a meeting of members MESA project in Pula
- designing an electric vehicle



- designing column with PV panel
- organization meeting of members MESA project
- designing an electric vehicle
- designing column with PV panel
- tender for the purchase of cross – kart
- buying cross – kart
- purchasing PV panels and adjustment for the installation on the vehicle
- preparing for a meeting of members MESA project in Pula
- organization meeting of members MESA project
- designing an electric vehicle
- designing column with PV panels
- completion of the car
- development of the column with PV panels
- the establishment of associations for the promotion of renewable energy sources and energy saving
- finishing work on the car
- testing of vehicle
- finishing work on the column with PV panels
- testing column with PV panels
- testing of vehicle
- development of laboratory exercises in electronics
- development of laboratory exercises in mechatronics
- testing of vehicle and panels

Le Vele

Le Vele analysed the elements needed for adaptation of the curriculum for:

- Photovoltaic panels installer and
- Expert in energy saving (energy manager).

In relation with synchronization with the needs of the realization of electric car and the optimum utilization of solar panels that will be used to recharge the vehicle batteries.

The specific elements related to the design, construction, installation and maintenance of solar panels with automatic orientation of the solar panels toward the perpendicular to the sun at different times of the day, are included in the adapted curriculum as a specific module of the course. In addition the curriculum provide a service in the automotive technical training to improve skills and theoretical and practical knowledge on issues related to electric powered cars. In particular to drive the endothermic step of the car to the electric car through the practical retrofit of a car by means of a kit electrical conversion.

The following subjects are considered:

- Basic principles on issues relating to electric cars,
- Electrical parameters and electrical measurements-Instrumentation required,
- Functions and limitations of the main components used in the car,
- Battery life and methodologies related to the charge-checking battery state of health,
- Converter AC/DC system and auxiliary services,
- Testing and electromagnetic testing,
- Procedures for monitoring and verifying the status of the vehicle,
- Dismantling of mechanical units of the internal combustion engine.

The new curricula will be presented and discussed with Regione Lombardia in view of the future standardization of specific courses for electric motion specialist.