សាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ

Royal University of Phnom Penh

មហាវិទ្យាល័យវិស្វកម្ម

Faculty of Engineering

ដេប៉ាតឺម៉ង់ វិស្វកម្មទូរគមនាគមន៍ និង អេឡិចត្រូនិច
Telecommunication and Electronic Engineering

Final Project

Autonomous lawnmower relied on GPS

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Introduction

What is Autonomous of Drone

- Developer: ArduPilot Development Team and Community

- Initial release 2009

- Full-featured and reliable autopilot used by industry, research organizations and amateurs.

- Operating system Arduino Atmel based microcontroller architecture

- CPU running the Arduino open-source programming language

Autonomous mower relied on GPS

❑Similar to Autonomous Drone

❑Trop pins in map to make path for vehicle in tower or mission planer

❑use GPS to navigate and telemetry to communicate
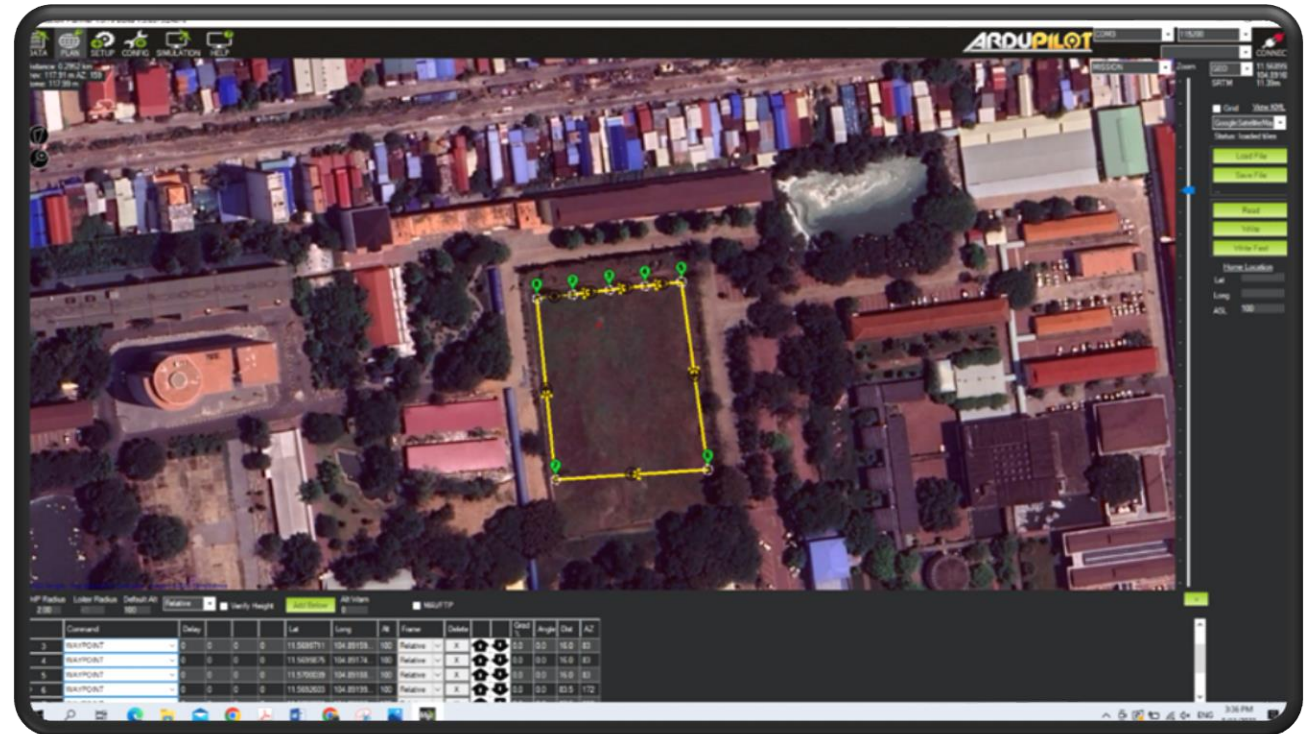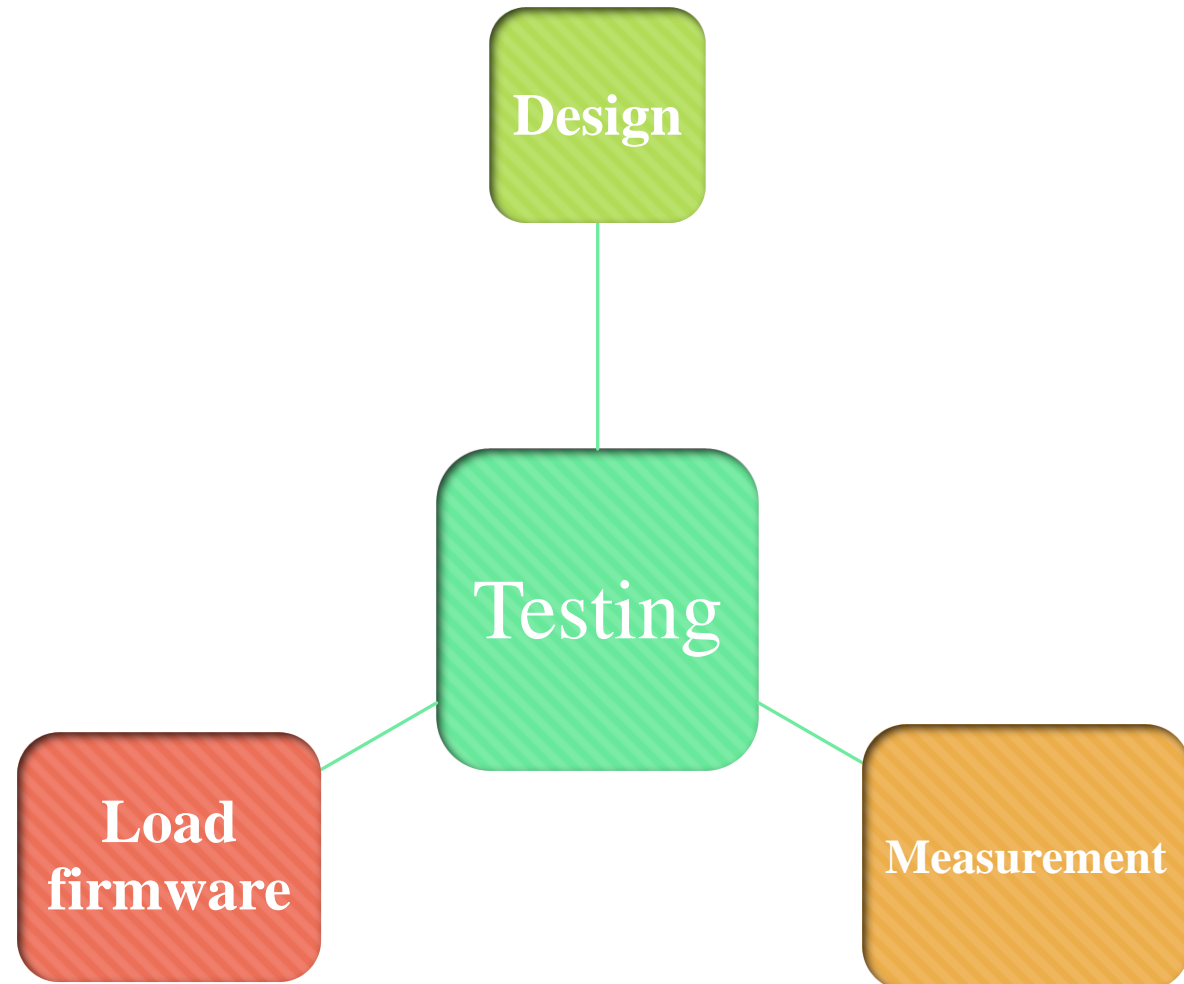
Application

- ❑ Delivery vehicles, shuttles, and robots.
- ❑ trucking, logistics, heavy machinery, and transportation.
- ❑ Drone and boat navigation
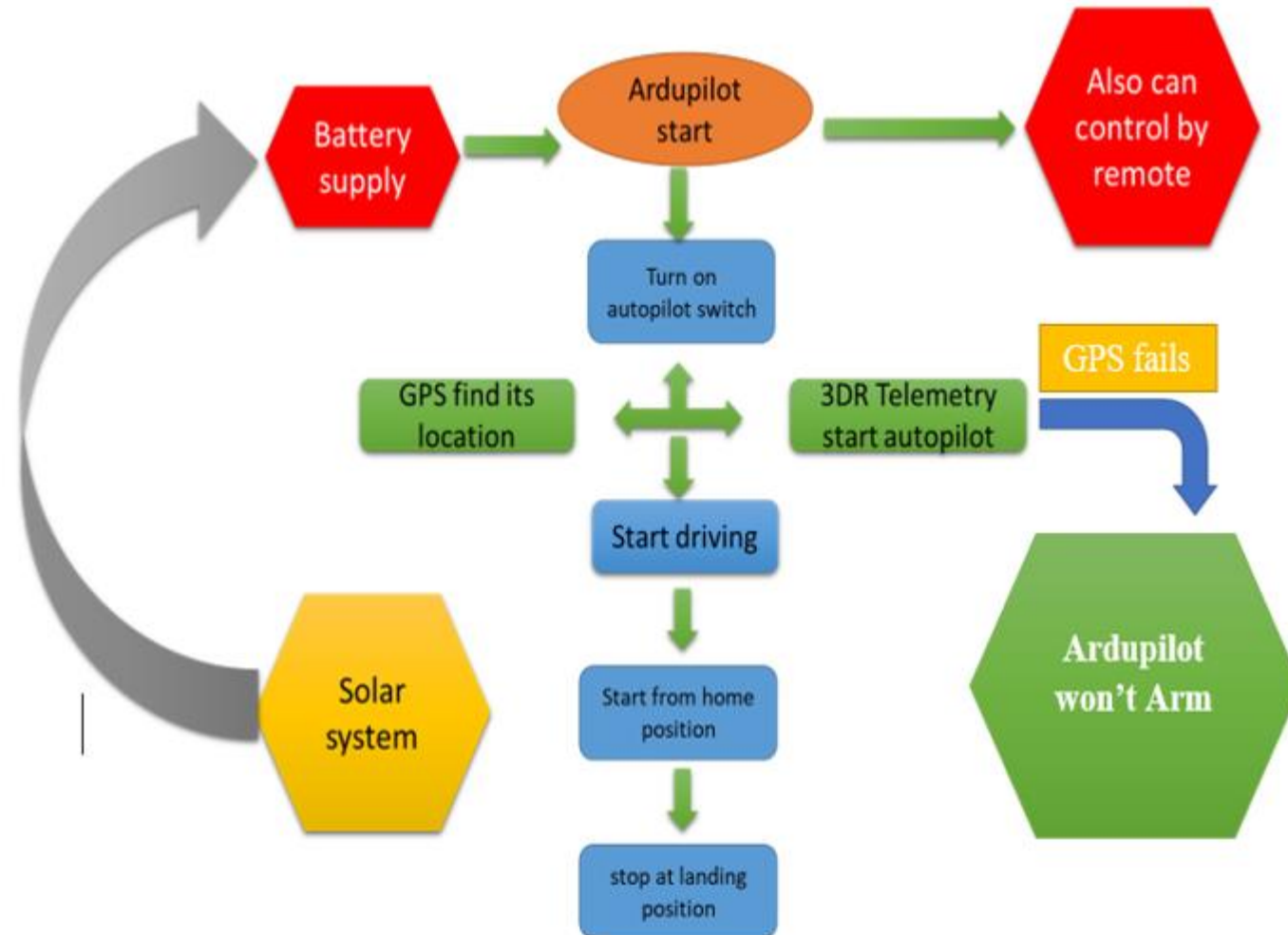- ❑ And use in military

Objectvie

The purpose of this project

Design

Testing

Load firmware

Measurement

METHODOLOGY & FLOW

Algorithms

Basic Concept

- How it works?(Non-Autopilot Mode)

- This mode will be able when there is no GPS signal

  - After we bind transmitter with receiver it can send data through all components by using joystick or any switch on transmitter

  - Then receiver will send data to APM flight controller and all components are going to remote by hand

  - If we want to change back to autopilot, just turn on switch on the transmitter that we have set it

Basic Concept

- How it works?(Autopilot Mode)

- GPS

  - allowing them to know their position relative to a network of orbiting satellites.

  - Connected to the signals of these satellites perform functions autonomous flight

- Telemetry

  - After GPS find location it will lock position and then we can drop pins in map to make path for vehicle in PC or smart phone

  - Next it telemetry will send data from pc or smart phone to flight controller and start to drive on path that we just made
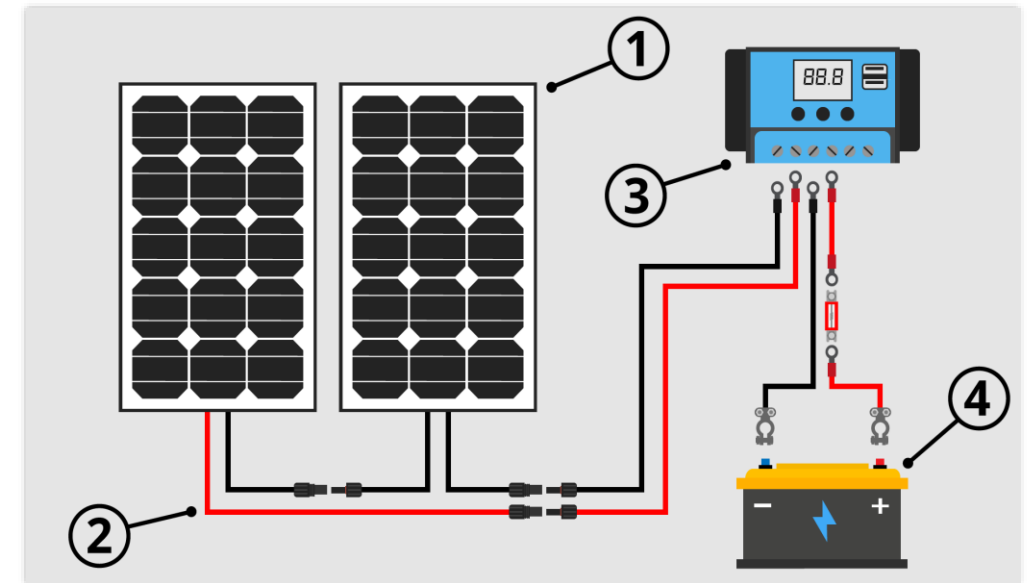
Solar system

❑ To find solar panel we need to know battery size and Average hours of direct sunlight.

❑ If battery is 165.92W and Average hours of direct sunlight are 4hours .

> **=> 165.92w / 4h = 41w**

❑ So solar panel size **41w** is a suitable for our battery .

❑ To find suitable solar controller is :

> ⇨ **Size of solar / 12v or 24v**
>
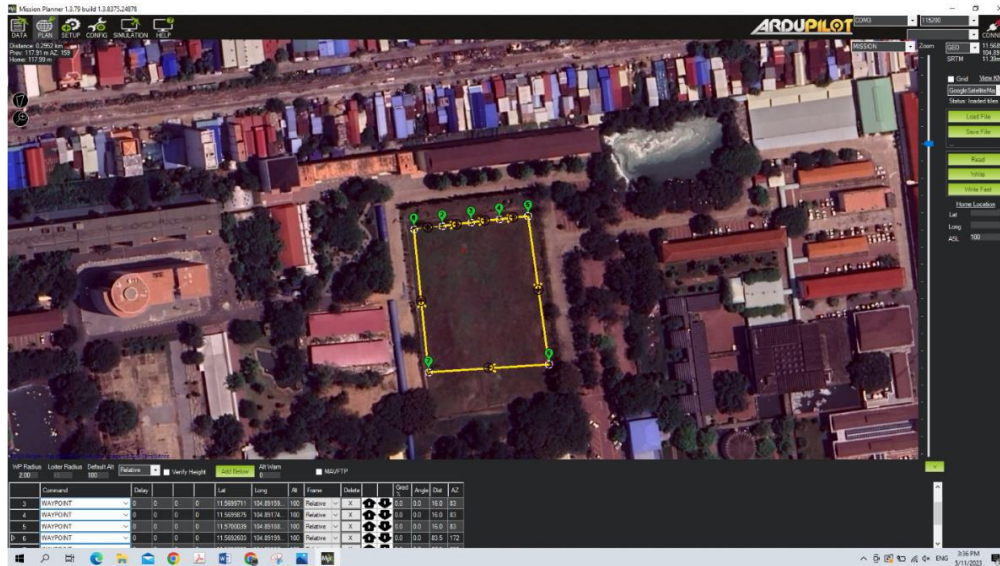> ⇨ **So 41 / 12V = 4A or 10A PWM controller**

CONTROL SOFTWARE

Control Software

❖ for control a drone on our smart phone or tablet
❖ suited to first-time pilots as well as experts Similar to Droid Planner
❖ Tower to quickly build autonomous flights, deform around waypoints with a spline editor

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Control Software

❖ Mission Planner is a ground control station for Plane, Copter and Rover.

❖ can be used as a configuration utility or as a dynamic control supplement for your autonomous vehicle

COMPONENTS AND EQUIPMENTS

Main components

- APM is a professional IMU (**Inertial measurement unit**) autopilot based on the Arduino Mega platform.
- It's use mission planner to monitor , load firmware
- Telemetry data to track key performance on software

- keep track of location, attitude, and altitude using telemetry data
- Band: 433MHz , 100mW
- data collected about an aircraft
- sent back to an operator or ground control station

Main components

|	
	➢ NEO-M8N GPS ➢ With low power consumption and excellent accuracy 0.6 meters or almost 0.9 meter ➢ high sensitivity and has active circuitry for ceramic patch antennas.
	➢ affordable choice for beginners ➢ 6-10 channels ➢ Dual antenna diversity ➢ Communication distant 600m-1000m depend on environment

HARDWARE DESIGN AND TESTING

Hardware Design

The motor and wheels must be large and strong to move mud and grass over the field, according to the field's conditions. The grass-cutting motor will be mounted at the rear of the vehicle, near the ground, allowing for a greater angle of trimming.
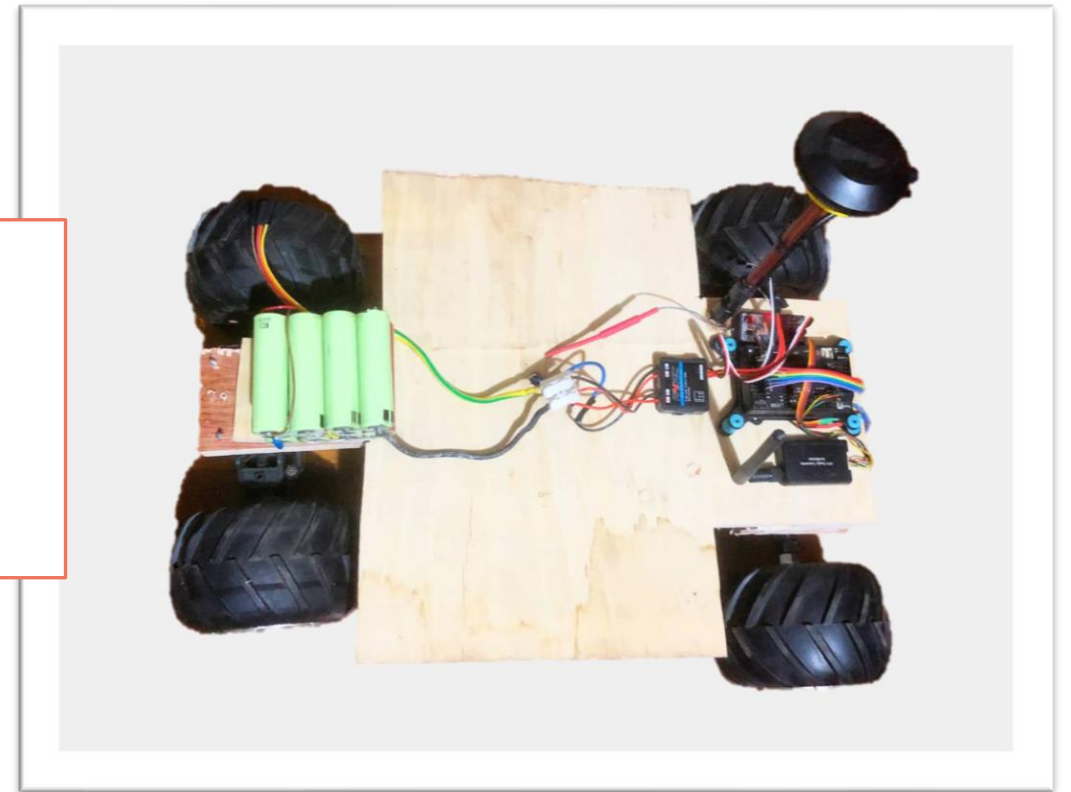
CONCLUSION AND FUTURE WORK

Conclusion

In conclusion, Due to their mechanical design, software, and software implementation, autonomous lawnmowers are dependent on GPS

- ➢ Can easily climb over hills or mud

- ➢ it uses telemetry and GPS to navigate

- ➢ Depending on the amount of sunlight, the solar system also aids in charging and maintaining the battery for a long period

- ➢ convenient features like smartphone app or laptop software to control

Future work

Because the system we created has its limitations even now so future work on this complex will

include the following:

- ❑ Improve GPS quality or find any GPS that are more efficiency
- ❑ Adding smart sensor
- ❑ Long hour drive time
- ❑ New application