

Solar inspection: from thermal image to work order

For solar operations and maintenance: locate findings by module, review them and deliver image-backed work orders. A Germany pilot proposal, not yet an available product offer.

Decision and German reference

Fraunhofer ISE lists thermography, electroluminescence and field measurements for PV quality assurance. This establishes neither a partnership nor evidence of our system performance. Our engineering hypothesis is that a bottleneck can occur between a suspicious image, the correct module ID and a reviewable maintenance order. The operator must validate it.

Pilot workflow and deliverables

1. Collect the plant layout, module IDs and existing inspection reports. 2. The operator defines access and suitable capture conditions. 3. Capture RGB, radiometric thermal imagery and GNSS/timing logs. 4. Associate findings with the plant layout. 5. A specialist reviews findings and apparently normal comparison areas. 6. Deliver findings, original images, uncertainties and work orders. A hot image region alone does not prove an electrical defect.

What RTK can and cannot do

RTK supports georeferencing; it does not replace radiometric calibration or association with actual module geometry. Exposure events, camera pose, lever arm and reference system must agree. Record irradiance, wind, reflections, shading and operating load; agree thresholds with the reviewing specialist. Choose network RTK, a local base or PPK based on connectivity, raw observations and required turnaround.

A / B and ownership

A: invite CiRC to propose a fully documented aircraft configuration. B: integrate a sensor, positioning, communications and processing package into an existing platform after interface review. LOCOSYS, HiDES and AVerMedia/AAEON are candidates, not a confirmed BOM. The asset owner defines acceptance; the integrator owns agreed interfaces; the flight operator owns operations; an electrical specialist assesses findings. Confirm procurement and budget approval roles.

RFQ: inputs that enable review

Federal state, site area and module count, rooftop/ground-mounted site, layout and ID scheme, existing aircraft/firmware, thermal camera and raw format, coverage, desired report and current labour. Do not put credentials or sensitive plant layouts in public links. An approved PDF summary is sufficient for the first request.

Sources: S14, S16, S18, S19, S20, S21

Disaster assessment: a reviewable operational map

For incident coordination and geospatial teams: deliver current observations, gaps and uncertainty together. Start with a planned exercise, not an untested system in an emergency.

Historical evidence and present question

DLR reports that its 29 October 2022 Ahrtal exercise processed drone data on site and integrated it into operational maps, while investigating communications alternatives to cellular service. This is historical research evidence, not a current performance promise for our platform. Our proposed pilot measures time to the first reviewed map of a bounded road or infrastructure area.

From tasking to a usable map

1. Incident command prioritises the area and information need. 2. The operator coordinates airspace, access and capture. 3. Save imagery and raw observations locally. 4. Produce a preliminary overview with capture times and gaps. 5. The geospatial team checks reference systems and independent checkpoints. 6. Hand observations, uncertainty and unresolved checks to incident command. Imagery alone cannot certify bridge load capacity or safe access.

Offline first; separate correction and control links

Cellular service, NTRIP and image transfer can fail independently. Loss of corrections is not automatically loss of command and control. Log state and data age after correction loss; continue or abort only under the approved operating plan. PPK requires suitable rover/reference observations and does not provide immediate corrections to flight control. Do not promise fixed GNSS accuracy in obstructed areas.

A / B and delivery responsibility

A: approach GEOSAT for surveying/data products and assess CiRC as an aircraft/mission-system candidate. B: define a bounded positioning, imaging, local storage and data-handoff package. Select radio and edge computing only after power, mass and interface review. Operational clearance remains with the responsible operator; an integrator does not replace incident command. German buyer and procurement roles remain market hypotheses to validate.

For a concrete request

Provide exercise area and federal state, priority decisions, map formats, target CRS/height system, reference data, connectivity, existing aircraft/sensors, authorised recipients and current time to a reviewed map. Put sensitive exact locations only in approved private documentation.

Sources: S15, S16, S17, S2, S3

Two procurement paths: complete system or critical kit

Taiwanese suppliers as discussion candidates; origin and suitability are assessed for the specific configuration.

A: complete configuration

An agreed exclusion of Chinese supply-chain participation covers explicitly defined tiers: aircraft, propulsion, battery/BMS, flight control, navigation, radio, payload, ground station, firmware and external services. Manufacturing location, ownership and sub-suppliers are separate questions. Require part numbers, revisions, origin evidence, software inventory and change approval. A country label or general manufacturer statement does not replace review.

B: critical functional kit

The contract names reviewed modules and explicitly excluded parts of the existing aircraft. A kit can include positioning, data radio, sensing, edge processing and mission software. A qualified kit does not automatically qualify the whole aircraft for procurement. Review flight control, payload and companion computing for power, mass, timebase, data protocol and failure behaviour.

Suppliers and evidenced roles

CiRC publishes inspection, mapping and disaster applications. GEOSAT has documented UAV/geospatial services. LOCOSYS offers GNSS/RTK and attitude products. HiDES offers data links with its own Taiwanese supply-chain declaration. AVerMedia D137SM is a drone carrier board. AAEON supplies embedded computing for UAV applications. These are selection candidates; no combined solution, partnership or completed whole-system review is established. Thermal sensing, propulsion and battery pack remain specific sourcing gaps.

Germany and responsibility matrix

Non-Chinese origin does not replace operating approval, radio requirements or tender-specific conditions. Do not describe US terms such as NDAA or Blue UAS as blanket German approval. Before quotation, name contracting entity, integrator, flight operator, data controller, maintenance and warranty owner. This platform currently captures requirements; it does not confirm supplier delivery commitments.

Sources: S16, S17, S18, S19, S20, S21, S11

Pilot brief: data flow, acceptance and labour

A shared review basis for solar inspection and disaster assessment. Agree every threshold before the trial.

Local processing and external services

Onboard: record sensors, receiver/flight state and timing events. Ground computer: check integrity, produce a preliminary map or findings list and retain a local copy. External: SAPOS supplies corrections under its service agreement; optional cloud storage receives only approved data. Flight control must not depend on our inquiry backend. Agree ownership, hosting region, access, deletion and update responsibility before transfer. This is a proposed architecture, not an operational flight system.

German reference and service selection

Record federal state, actual SAPOS access, mountpoint, RTCM messages, GGA, receiver firmware and coverage. As checked on 30 September 2026, ZSS lists HEPS at EUR 10 per account/month and EUR 100 one-time registration administration; state offers can differ. One account is not intended for concurrent device use. Name target CRS, realisation/epoch and height reference; ellipsoidal height is not automatically DHHN2016 height. Recheck state conditions before ordering.

Measurable criteria, no preset targets

Solar: correct module assignment, confirmed findings and false alarms; assess misses only against an independently reviewed sample. Disaster: agreed coverage, independent checkpoint error and time to a reviewed map. Both: record Fixed/Float and missing epochs, re-fix time, data loss, reflights, manual review and failures. Report median, 95th percentile and sample size; missing results are not zero error.

Compare labour transparently

Compare equal area, deliverables and review standards. Person-hours equal the sum of all staff time for preparation, travel, capture, processing, review and rework. Difference equals baseline person-hours minus pilot person-hours. Percentage saved equals difference divided by baseline person-hours times 100, only with a positive baseline. Measure elapsed time separately; parallel work is not duplicated time savings. No improvement is claimed before measurement.

Handoff and decision

Deliver configuration, responsibility matrix, originals, processing revision, test table, failures and deviations together. Assess technical fit and data quality first; then quote engineering, equipment, setup, training and support separately. The buyer decides whether to proceed using documented results. Prices, dates and acceptance thresholds remain open.

Sources: S2, S3, S14, S15

Sources and boundaries

Editorial synthesis and engineering proposals. No verified delivery capability, partnership or product measurements.

S2 / ZSS · Gebühren & Anmeldung

<https://zentrale-stelle-sapos.de/gebuehren-anmeldung/>

S3 / LDBV Bayern · SAPOS FAQ

https://www.ldbv.bayern.de/produkte/dienste/sapos_faq.html

S11 / EASA · Operating a drone

<https://www.easa.europa.eu/en/domains/drones-air-mobility/operating-drone>

S14 / Fraunhofer ISE · Digitale Qualitätssicherung von PV-Kraftwerken

<https://www.ise.fraunhofer.de/de/geschaeftsfelder/solkraftwerke-und-integrierte-photovoltaik/photovoltaische-kraftwerke/digitale-qualitaetssicherung-von-pv-kraftwerken.html>

S15 / DLR · Drohnen sammeln Daten für schnelle Katastrophenhilfe, 2022

<https://www.dlr.de/de/aktuelles/nachrichten/2022/04/drohnen-sammeln-daten-fuer-schnelle-katastrophenhilfe/>

S16 / CiRC · Applications

<https://www.coretronic-robotics.com/application>

S17 / GEOSAT · Taiwan Excellence profile

<https://ap1.taiwanexcellence.org/en/award/product/109250>

S18 / LOCOSYS · GNSS and RTK

<https://www.locosystech.com/>

S19 / HiDES · Communication systems

<https://hides.com.tw/>

S20 / AVerMedia · D137SM

<https://professional.avermedia.com/br/product-detail/D137SM>

S21 / AAEON · Digital Drone Launch Guide

<https://solutions.aaeon.com/aaeons-digital-drone-launch-guide/>