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(71) Applicant: **JAIN IRRIGATION SYSTEMS LIMITED** [IN/IN]; Jain Plastic Park, N.H. No. 6 Bambhori, Jalgaon-425001, Maharashtra (IN).

(72) Inventors: **JAIN, Ajit**; Jain Plastic Park, N.H. No. 6 Bambhori, Jalgaon- 425001, Maharashtra (IN). **PATNI, Gaurav**; Jain Plastic Park, N.H. No. 6 Bambhori, Jalgaon- 425001, Maharashtra (IN). **JOSHI, Abhijit**; Jain Plastic Park, N.H. No. 6 Bambhori, Jalgaon- 425001, Maharashtra (IN).

(74) Agent: **CHOWDHURY, Mahua Roy**; 2A/54 Kalpataru Estate, JV Link Road, Andheri East, Mumbai- 400093 (IN).

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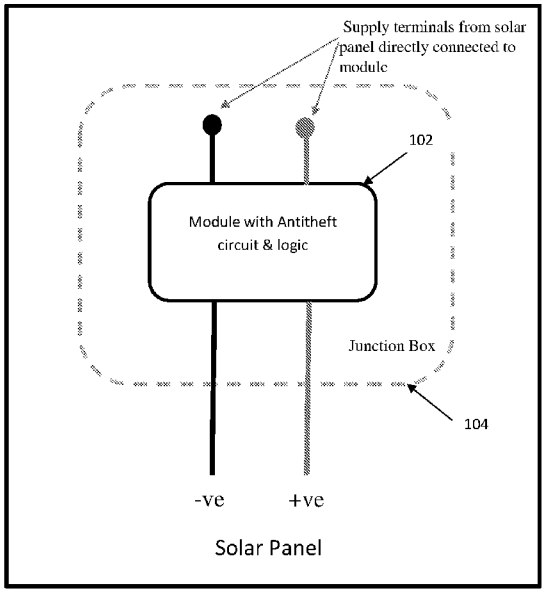

Figure 1

(57) Abstract: In present solar panel theft protection system, a solar panel stops generating power after it is detached from its intended system or if the solar radiation level goes below certain min level. The accordance with the present disclosure solar panel & its connected system identify each other by encrypted codes. The solar panel & its connected system communicate with each other through same power cables which are coming from solar panel (i.e. positive & negative). No extra communication cabling is required.

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ANTI-THEFT PROTECTION SYSTEM FOR SOLAR PANEL

TECHNICAL FIELD

[001] The present disclosure described herein, in general, relates to a protection device more particularly to an anti-theft protection device for the solar panels.

BACKGROUND

[002] Theft of solar panels from un-protected sites is very common. In order to reduce the theft, a host of anti-theft device are available in market. For e.g. antitheft nuts, buzzers, or tracking systems. However, the major drawback of these systems is that are mounted externally on the panels. Further if the panels are stolen there is no way to disable the solar panels.

SUMMARY

[003] This summary is provided to introduce concepts related to an anti-theft device for solar panel and the concepts are further described below in the detailed description. This summary is not intended to identify essential features of the claimed subject matter nor is it intended for use in determining or limiting the scope of the claimed subject matter.

[004] In an implementation of the present disclosure an anti-theft system has been disclosed. The system may comprise a junction box. The junction box may be mounted directly on the solar panel at the terminal junction. The junction box on a first end is communicably connected with 2 very short terminal protruding from a solar panel. Further the junction box has two long terminal protruding from a second end of the junction box. The junction box further comprises a module to encrypt and decrypt signal received to and from the solar panel.

BRIEF DESCRIPTION OF THE DRAWINGS

[005] Figure 1 illustrates an anti-theft system, in accordance with the present disclosure.

[006] Figure 2 illustrates an exemplary embodiment in accordance with the present disclosure.

[007] Figure 3 illustrates a flow chart in accordance with an exemplary embodiment of the present disclosure.

DETAILED DESCRIPTION

[008] The present disclosure discloses an aspect of an anti-theft system for a solar panel. Even though the present system is primarily designed for authenticating solar panel and its subsystem, it can also be used for other applications such as batteries, luminaries etc.

[009] Figure 1 illustrates an anti-theft system, in accordance with the present disclosure. The system as disclosed may comprise a module **102** having anti-theft circuitry and logic integrated within the module. The module **102** may be directly mounted on a solar panel and enclosed in a junction box **104** or any type of housing mechanism. The module **102** may be connected at the location where electric terminals protrude from the solar panel. Further the module **102** may be configured to provide electrical terminals to connect at least one sub-system. In an exemplary embodiment the sub-system are devices or systems that utilize the power generated from the solar panel.

[0010] Further the location and position of the module **102** directly on the terminal exiting from the solar panel is an essential feature. Mounting and sealing of the junction box **104** comprising the module **102** directly over the terminal protruding from solar panel prevents direct access to these terminals hence does not allow tampering, because if someone does try to tamper, the terminal will also get destroyed during tampering, while disabling the solar panel as usable. The electric terminals protruding from the junction box having module with anti-theft circuitry and logic may further be configured to communicate with the subsystem apart from providing a +ve and -ve terminal for the power cable.

[0011] The anti-theft circuitry and logic may be implemented using a processor or a micro controller. The anti-theft circuitry and logic may use a first sensor to detect the power generated by solar panel. Further based on the detection of the power, a code generator, integral to the anti-theft circuitry and logic, may be configured to validate and authenticate connected sub-system and the solar panel before enabling power to the subsystem. The authentication by the code generator may be done using encryption and decryption key or any other authentication logic.

[0012] In another exemplary embodiment, the module may be integrated into the solar panel directly.

[0013] The module may be configured to send or receive and read an encrypted or decrypted signal via the power cable, or a separate cable, or wireless. Only when the signal

matches the module will allow the energy generated by the solar panel to the subsystem. Failure to verify or validate the signal, the module will then disable the solar panel.

[0014] Figure 2 illustrates an exemplary embodiment in accordance with the present disclosure. The solar panel **200**, may comprise a frame **202**. The frame **202** may be peripheral structure with defined geometry. Further the frame **202** may comprise a glass **204** mounted within the frame **202**. The glass **204** may further be mounted on an encapsulant **206**. An array of solar cell **208** may be sandwiched between two encapsulant **206**. Further a back-sheet **210** may seal all the component within the frame **202**. Further a junction box having module with anti-theft circuitry and logic **102**, may be mounted directly on the back-sheet **210**. The module with anti-theft circuitry and logic can be integrated or attached with solar panel with any other assembling or manufactured technique.

[0015] Further if solar panel having module with anti-theft circuitry and logic when not connected to subsystem does not produce any kind of electrical or communication signal. This prevents intruder from decoding or manipulating the anti-theft logic inside the module.

[0016] Figure 3 illustrates a flow chart in accordance with an exemplary embodiment of the present disclosure. According to the present disclosure when the system in switched "ON" i.e. started after getting the radiation, the system checks for the availability of solar power, as illustrated in step 302. Further on detection of availability of solar power via the solar panel in step 304 and 306, an encryption key is randomly generated in step 308. The encryption key can be generated in the solar panel, or in a module integrated into the solar panel, or in an external generator. Further based on location of the generation of the encrypted key, the encrypted key may be then sent for validation in step 310, wherein the encrypted key is decrypted in step 316 by peer system. Once a positive validation is received as in step 318 the supply from the solar panel is initiated in step 324. In another embodiment if the validation fails an iterative attempt at validation is made as per step 320 and 322.

WE CLAIM:

1. An anti-theft system comprising:

a solar panel or battery or luminaries;

a module **102** with anti-theft circuitry and logic is directly mounted on the solar panel, characterised in that the module **102** is connected with the solar panel at location wherein electric terminals protrude from the solar panel, and wherein a junction box **104** having the module **102** is configured to disable the solar panel on detection of tampering to the solar panel; and

at least two terminals protrude from another end of the junction box **102**.

2. The system as claimed in claim 1, wherein the at least two terminals are connected to another sub-system.

3. The system as claimed in claim 1, wherein the module is configured to detect power generated by the solar panel, and further configured to validate the connected sub-system.

4. The system as claimed in claim 1, wherein the module with anti-theft circuitry and logic is integrated into the solar panel directly.

5. The system as claimed in claim 1, wherein the module with anti-theft circuitry and logic is configured to send or receive and read an encrypted or decrypted signal.

6. An anti-theft apparatus comprising: a solar panel **200**, comprising a frame **202**, wherein the frame **202** further comprises a glass **204** mounted within the frame **202**, the glass **204** is mounted on an encapsulant **206**, further an array of solar cell **208** are sandwiched between two encapsulant **206**, further a back-sheet **210** seals all the component within the frame **202**, characterized in that a junction box **102**, is mounted directly on the back-sheet **210**, and configured to verify or validate a predefined signal from the solar panel to determine to allow the solar panel to generate energy or disable the solar panel.

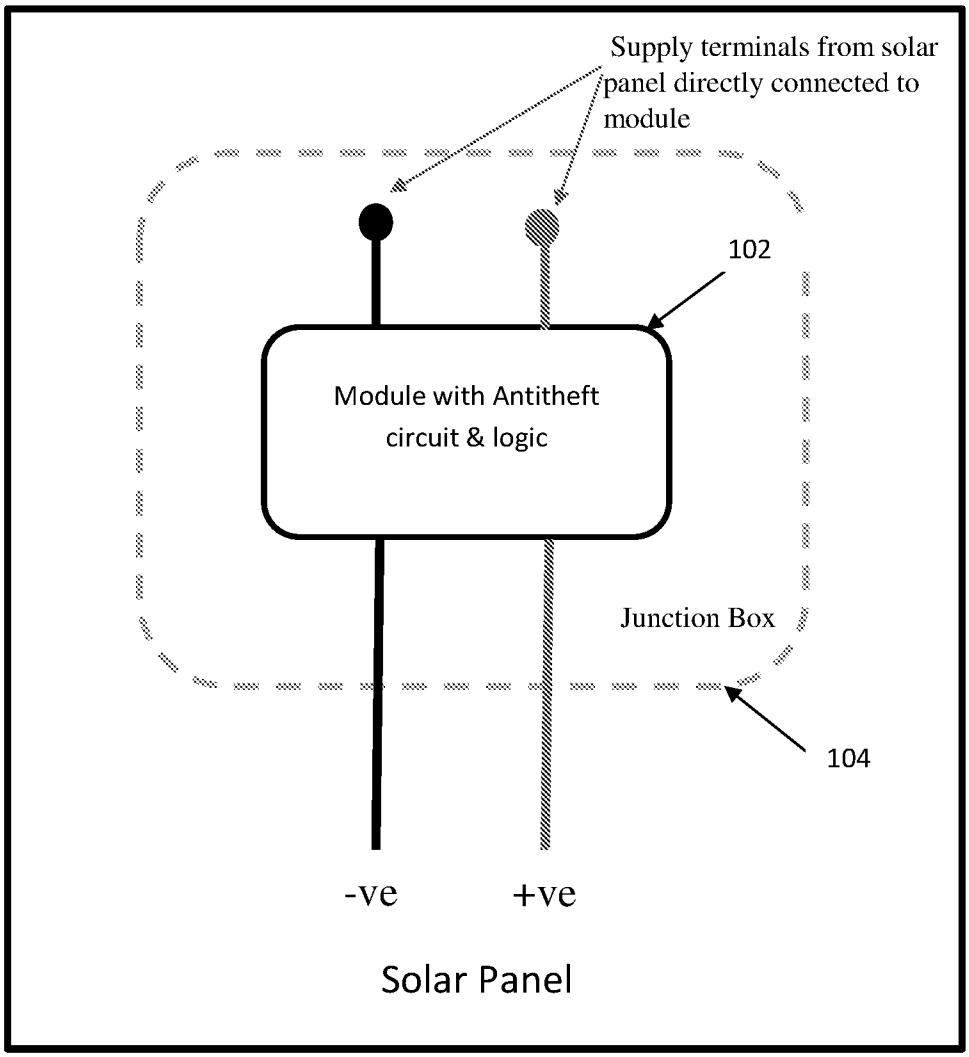
Supply terminals from solar panel directly connected to module
102
Module with Antitheft circuit & logic
Junction Box
104
-ve
+ve
Solar Panel

Figure 1

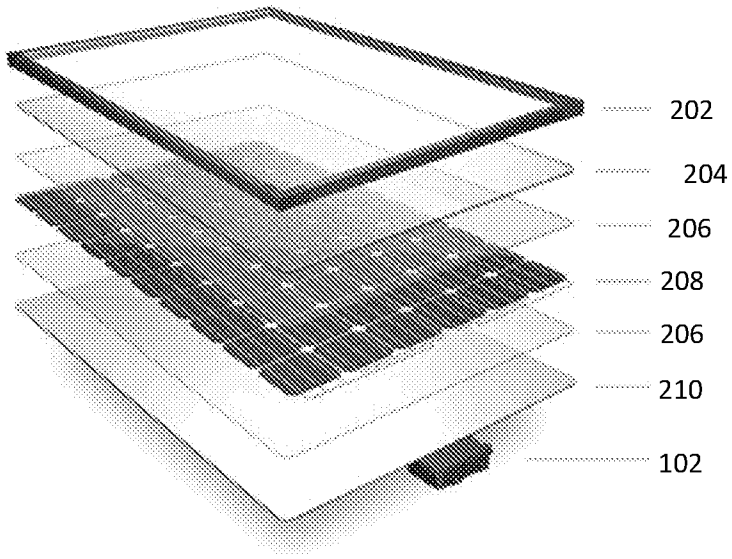

Figure 2

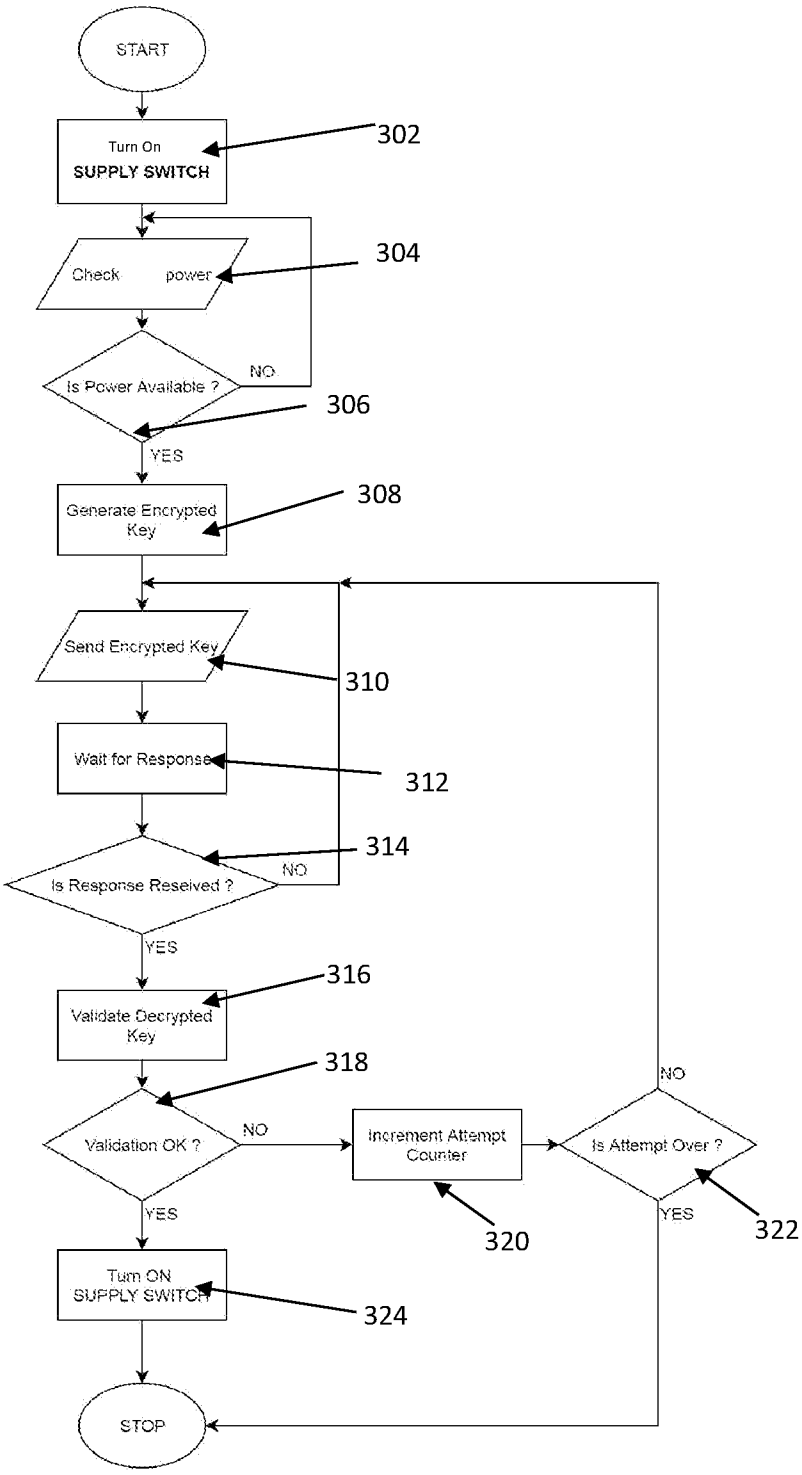
START
Turn On
SUPPLY SWITCH
302
Check power
304
Is Power Available ?
NO
306
YES
Generate Encrypted Key
308
Send Encrypted Key
310
Wait for Response
312
Is Response Reseived ?
NO
314
YES
Validate Decrypted Key
316
Validation OK ?
318
NO
Increment Attempt Counter
320
Is Attempt Over ?
NO
YES
322
YES
Turn ON
SUPPLY SWITCH
324
STOP

Figure 3